SELF-EFFICACY AND FEARS OF PAIN AND INJURY IN GYMNASTICS AND TUMBLING: DOES A PREVIOUS INJURY MATTER?

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The purpose of this study was to explore whether a previous gymnastic or tumbling injury influences gymnasts' and tumblers' self-efficacy, motivation, competition anxiety, and fears of pain and injury. Participants \( N = 105 \) completed survey packets during practice which contained demographic questions and questionnaires that measure self-efficacy for physical abilities and exercise, self-motivation, risk of injury, pain catastrophizing, and sport anxiety. Results of a one-way ANOVA indicated that gymnasts and tumblers who experienced a previous injury were significantly different than those who had not experienced an injury on their self-efficacy for physical abilities \( (p = .007) \), self-motivation \( (p = .007) \), and perceived risk of reinjury \( (p = .018) \). Specifically, these findings indicate that gymnasts and tumblers with previous injuries experience higher levels of self-efficacy for physical abilities, self-motivation, and perceived risk of reinjury. Implications for coaches, gymnasts, and tumblers include: creating an open and comfortable environment to discuss pain and injury, developing strategies to break the negative cycle of fear of injury, and fostering a positive rehabilitation process. In the future, researchers should examine the influence that gender and type of competition has on self-efficacy, self-motivation, perceived risk of reinjury, pain perceptions, and competition anxiety of those who have experienced sport-related injuries, as compared to those who have not experienced these types of injuries. Researchers should also examine how the type of injury, whether it is a first time injury versus a reinjury, influences perceptions of pain and fears directly following the injury.
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SELF-EFFICACY AND FEAR OF PAIN AND INJURY IN GYMNASTICS AND TUMBLING: DOES A PREVIOUS INJURY MATTER?

Introduction

Competitive gymnastics and power tumbling can be very physically and mentally demanding, especially at the elite level where the most difficult skills are performed. Many gymnasts and power tumblers experience a certain level of anxiety and fear when attempting new and complicated skills (e.g., Chase, Magyar, & Drake, 2005). The skills and routines continue to get more difficult as gymnasts and power tumblers advance through the various competition levels. Research indicates that the factor most consistently distinguishing highly successful athletes from less successful athletes is the belief that they can successfully perform the skill or activity (Jones & Hardy, 1990; Vealey, 2005).

Self-efficacy is the belief a person can successfully perform a certain skill (Bandura, 1977, 1997) and is the most influential factor determining whether a person will attempt or avoid a difficult task (Chase et al., 2005). Being scared of a real or potential threat can reduce athletes’ motivation to try and learn new skills, reduce motivation to train, provoke fear of physical injury, and eventually lead to an early withdrawal from sport (Cartoni, Minganti, & Zelli, 2005). When athletes are worried or apprehensive about performing, their self-efficacy decreases and they may become mentally and physically anxious which can cause detriments in their performance and increase their risk of injury (Chase et al., 2005). Unfortunately few studies exist that examine gymnasts’ and power tumblers’ self-efficacy and fear of performing gymnastic and tumbling skills. Even fewer address how they experience pain and injuries and how previous pain and injury experiences influence future training and competition performances.
More than 600,000 children participate in school or club level gymnastics programs and competitions each year (Singh, Smith, Fields, & McKenzie, 2008). According to the National Electronic Injury Surveillance System of the United States Consumer Product Safety Commission, the sport of gymnastics has one of the highest injury rates, with the average number of injuries totaling over 26,000 per year (Singh et al., 2008). Another 425,900 children ranging from 4 to 17 years of age are treated for gymnastics-related injuries in hospital emergency departments (Singh et al., 2008). There are numerous causes of gymnastics injuries which result from: (a) lack of warm-up and recovery; (b) inappropriate training environments, equipment, and clothing; (c) inadequate fitness, skill, and technique; (d) physical weakness or limitations; (e) lack of protective safety equipment; (f) biomechanical imbalances and anatomical factors; (g) inappropriate focus; and (h) prior injury (Bird, Black, Newton, & Campling, 1997). Sports injuries, in general, are classified into two types depending on how they occur: traumatic and gradual overuse (Bird et al., 1997). Traumatic injuries occur suddenly; for example, a gymnast lands a dismount incorrectly and tears the anterior cruciate ligament (ACL). Gradual use injuries occur slowly over a short or long period of time. One example is a gymnast feeling tenderness in her wrist after a competition, but ignoring it after the pain lessens overnight. The tenderness returns and is worse after each practice or competition. With this cycle repeating itself, the pain becomes constant and eventually impairs the gymnast’s ability to perform correctly (Bird et al., 1997). In the long run, it benefits athletes to recognize and pay attention to their pain.

Pain serves as a warning sign to an approaching or an actual injury and may also be a signal to athletes that they have reached or gone beyond their optimal workload capacity (Caine & Lindner, 1990). Pain is a common experience in gymnastics and power tumbling (Ellison &
Mackenzie, 1993; Nemeth, von Baeyer, & Rocha, 2005). Learning to detect and understand this warning signal is important in order to make the best decision on how to manage the pain (Nemeth et al., 2005). Athletes are led to believe that experiencing pain in sports is a normal process (American Institutes for Research, 1988; Curry & Strauss, 1994; Snyder, 1990) and they often are encouraged to practice and compete while in pain (Young, McTeer, & White, 1994).

Athletes experience pressure from coaches, parents, and teammates to continue in pain for the sake of individual or team success. Some athletes are socialized into sport believing that injury is part of the sporting experience and they should physically “play” through it (Young et al., 1994). In sports, such as women’s Olympic gymnastics, where only the top few are guaranteed a spot on the team, it is common for those vying for a position to try to conceal their pain or injuries, by ignoring them and continuing to practice without acknowledging them, in order to make it seem as though they are healthy enough to compete at their best.

As athletes advance and become more serious about their sport, the number of hours they spend training usually increases (e.g., Chase et al., 2005; Martin, Polster, Jackson, Greenleaf, & Jones, 2008). In gymnastics, athletes can progress through 10 levels, with 10 being the highest. Levels 1 through 3 are used to develop basic skills without competition. In Levels 4 through 6, all the gymnasts perform the same routine in competition. Individually choreographed routines begin in Level 7 and the gymnasts in Level 10 are considered elite, with the highest skill level (Chase et al., 2005). Female gymnasts compete on the vault, uneven bars, balance beam, and floor exercise, whereas male gymnasts compete on the parallel bars, floor exercise, pommel horse, still rings, vault, and high bar (Sands, 2000).

Similarly, the power tumblers’ levels are labeled from sub-beginner to elite. However, in power tumbling, the athletes can compete at any level and they progress towards the elite level as
their skill acquisition increases (http://www.usta1.org/abcusta/abcusta.html). Power tumblers, both males and females, only compete in three events: rod floor, trampoline (singles or synchronized), and double-mini.

In general, as the athletes improve and advance in level, they must attempt new and more difficult skills and routines, which increase the risk of pain and involve a greater risk of injury (Chase et al., 2005; Meeusen & Borms, 1992). As the scoring system continues to be revised, gymnasts and power tumblers must continue to raise their game in order to keep up with their current competition, which results in executing higher difficulty skills and routines than ever before. Advanced gymnasts and power tumblers regularly test their bodies by pushing their limits in order to pursue a regional, national, and international acclaim (Stokstad, 2004).

While research on the physical risk involved in most sports has been extensive, there are few studies on how athletes, especially gymnasts and power tumblers, experience pain and injury and what factors contribute to their anxieties and fears, perceptions of pain, confidence, and motivation. Research indicated that gymnasts and tumblers can develop high levels of worry and anxiety (Chase et al., 2005; Martin et al., 2008). For example, when gymnasts and tumblers have already experienced injuries, they may lose their confidence to perform successfully, especially under high pressure situations. In these circumstances, they are expected to be tough-minded, but may experience negative thoughts and emotions about being reinjured, which may result in physical bodily tension, increased heart rate, and disrupted concentration (Chase et al., 2005; Martin et al., 2008). These responses may cause athletes to lose confidence causing them to not be able to perform the physical skills properly which results in what they worried about in the first place, an injury (Chase et al., 2005; Martin et al., 2005).
Due to lack of current research on how previous injuries influence gymnasts’ and power tumblers’ fear of pain and reinjury, the purpose of this study was to examine self-motivation, self-efficacy, and anxiety and fears of reinjury associated with pain and injury during gymnastics and tumbling training. Based on the previous literature (see review of literature presented in Appendix A), elite gymnasts and power tumblers who have experienced a previous injury were anticipated to have decreased self-efficacy for exercise and physical abilities than those who have not had previous experiences with pain and injury because after an injury, confidence level has most likely decreased. Those gymnasts and power tumblers that have had a previous injury were expected to have a higher level of self-motivation because they experience a strong desire to return to the level of performance attained before the injury.

Methodology

Participants

The participants in this study were 65 gymnasts and 40 power tumblers ranging from 10 to 18 years of age. Their levels in gymnastics or power tumbling varied from Level 2 through Level 10 and from Beginner to Elite, respectively. The participants were from gymnastic facilities in the states of Illinois and Texas. The gymnasts and tumblers received information at their gyms through the gym owners (see Appendix B). Once the gym owners approved the study, athletes were asked to participate in the study (see Appendix C). The majority of the volunteer participants were females (82.86%) and they primarily classified themselves as Caucasian (67.62%), with a small percentage indicating that they were African American (13.33%), Asian American (4.76%), Hispanic (3.81%), or other (10.48%). The sample included participants who were in good health, as they were healthy enough to compete in gymnastics or power tumbling based on their doctors, coaches, and/or parents’ opinions.
Survey Instrument

The survey packets include assent forms for the participants to sign, informed consent forms for parents to sign (if applicable), and the survey instrument. In addition to the initial signature forms, a short demographic questionnaire including questions about the athlete’s physical stature, background, and experiences in gymnastics and tumbling is incorporated. The survey packet also included several questionnaires assessing the athlete’s thoughts about competition, self-efficacy, self-motivation, pain, and injury.

Self-Efficacy for Physical Abilities

The Self-Efficacy for Physical Abilities (SEPA; Bortoli & Robazza, 1996, as cited in Cartoni, Minganti, & Zelli, 2005) measures an individual’s perception of his or her own physical abilities. Participants read 10 statements about physical abilities and circle the response that best describes them on a range of 1 (not at all) to 5 (quite a lot). The reliability of the systematic individual differences in physical self-efficacy was reported as high with a Cronbach’s alpha of 0.79. The validity was not reported. After reversing three items and summing the scores across all items, higher scores represent a high level of self-efficacy for physical abilities (as cited in Cartoni et al., 2005).

Self-Efficacy for Exercise

The Self-Efficacy for Exercise Scale (SEES; Resnick, Palmer, Jenkins, & Spellbring, 2000) focuses on an individual’s self-efficacy to continue exercise in the face of barriers. The participants rate on a Likert-type scale ranging from 1 (not very confident) to 10 (very confident) how confident they are right then that they could exercise three times per week for 20 minutes in eight different situations (i.e., I felt pain when exercising). The internal consistency of the measure was an alpha coefficient of 0.92. Convergent validity was found based on a significant
correlation between self-efficacy expectations related to exercise and exercise behaviors ($r = 0.56$). Higher scores predict that the individual is more likely to exercise in the face of barriers (Resnick et al., 2000).

**Self-Motivation Inventory**

The Self-Motivation Inventory (SMI; Motl, Dishman, Felton, & Pate, 2003) is a scale that measures a person’s likeliness to continue in a strenuous physical activity regardless of extrinsic motivation. Participants rate eight statements related to self-motivation on a scale ranging from 1 (*very unlike me*) to 5 (*very like me*). An alpha reliability coefficient of 0.91 was reported with a validity correlation of 0.63 with the participant’s scores and their responses on the Thomas-Zander Ego-Strength Scale (Thomas & Zander, 1973). A higher mean total score indicates that the individual is more likely to be motivated (Motl et al., 2003).

**Pain Catastrophizing Scale**

The Pain Catastrophizing Scale (PCS; Sullivan, Bishop, & Pivik, 1995, as cited in Sullivan, Tripp, & Santor, 2000) measures the strength of a participant’s thoughts and feelings when they have experienced pain. Participants rate 13 statements of different thoughts and feelings associated with pain on a scale ranging from 1 (*not at all*) to 5 (*quite a lot*). With three subscales assessing rumination, magnification, and helplessness, the scale has a high internal consistency (coefficient alphas: total PCS = 0.87, rumination = 0.87, magnification = 0.66, helplessness = 0.78). Validity was not reported. With the total score and three subscales that assess rumination, magnification, and helplessness, higher scores indicate that the individual is more likely to engage in catastrophizing thinking when in pain or during an injury (Sullivan et al., 2000).
**Risk of Injury in Sport Scale**

The Risk of Injury in Sport Scale (RISSc; Kontos, 2004) measures athletes’ perceived risk of injury in different sports. Using a Likert-type scale ranging from 1 (*very unlikely*) to 6 (*very likely*) athletes rate how likely they think it is to have 18 certain events related to injury happen to them while playing their sport. Using Cronbach’s alpha, the internal consistency of the subscales range from 0.64 to 0.82. Validity was not reported. The scale is broken into six subscales: (a) uncontrollable; (b) controllable; (c) overuse; (d) upper-body; (e) surface-related; and (f) reinjury. Subscales with higher scores indicate the individual believes they are more likely to be injured in that particular way, whether it is because of equipment or overuse, etc. (Kontos, 2004). Because gymnasts do not come into physical contact with opponents during competition, the uncontrollable subscale was not used.

**Sport Competition Anxiety Test**

The Sport Competition Anxiety Test Children’s version (SCAT; Martens, Vealey, & Burton, 1990) assesses individual differences in competitive trait anxiety or an athlete’s inclination to identify competitive situations as threatening. Participants are given a list of 15 statements about how a person feels when they compete in sports and games and are asked to rate if they hardly ever (A), sometimes (B), or often (C) feel this way when they compete in sports and games. The scale has a reliability coefficient of $r = 0.85$. Content validity was found in the selection phase. Convergent validity was also supported with the responses to the SCAT being positively correlated to measures of sport-specific dispositions of fear of failure, unsuccessful attentional focus, and anxiety. On the contrary, divergent validity was shown by SCAT scores being inversely related to sport-specific characteristics of want for power and self-confidence. Convergent validity was supported by the significant positive correlation coefficients
with the general trait anxiety measures and assessments of external locus of control, and negative
correlation coefficient of internal locus of control and self-esteem assessments. Total scores
range from 10 (low competitive trait anxiety) to 30 (high competitive trait anxiety; Martens et
al., 1990).

Procedures

After obtaining Institutional Research Board (IRB) approval, owners of the gymnastics
and tumbling gyms were contacted by telephone or via email to gain written permission for
access to their athletes. Once permission was granted, arrangements were made to advertise the
study and recruit athletes to volunteer to participate. The consent forms were signed at the
beginning of a practice. For the participants under the age of 18, consent from their parents in
addition to their assent was obtained. After the consent forms had been signed and collected, the
survey packets were distributed to the participants at the beginning of a practice. It took
approximately 15 to 20 minutes for the athletes to complete the survey. Once the surveys were
completed, the data was entered and analyzed with the results being available to the participants
and gym owners.

Data Analysis

Descriptive statistics related to age, gender, racial/ethnic group, hours and days of
practice per week, years of experience, competition level, previous gymnastic or tumbling injury,
and mean responses associated with, self-efficacy for physical abilities, self-efficacy for exercise,
self-motivation, pain catastrophizing, risk of reinjury, and sport competition anxiety were
determined. The descriptive statistics include frequencies, means, and standard deviations. Chi-
square analyses were conducted to determine whether previous injury was associated with the
type of competition and level of competition. A one-way analysis of variance (ANOVA) was
conducted to determine whether previous injury was associated with the demographic variables of participants’ age and years of gymnastics/tumbling experience. Likewise, a one-way ANOVA was conducted to determine whether the mean responses to self-efficacy for physical abilities, self-efficacy for exercise, self-motivation, pain catastrophizing, risk of reinjury (i.e., subscale of the RISSc), and competition anxiety (SCAT) were influenced by a previous injury in gymnastics or power tumbling. Because the sample size was small and certain multivariate analyses could not be conducted, correlations were also examined to determine the relationships of the previously mentioned dependent variables separately for males and females and for gymnasts and tumblers.

Results

Demographic Information

Demographic information was analyzed using SPSS Predictive Analytics SoftWare (PASW 17.0, 2010). Forty-three participants competed in tumbling and 62 in gymnastics. Of the 105 total participants, there were 87 females and 18 males. Forty-four participants attended gyms in Illinois and 61 attended gyms in Texas. The age range of the participants varied from 10 to 18 ($M = 14.40$, $SD = 2.51$) years old and the majority of participants were White/Caucasian (67%). Participants’ self-reported heights ranged from 42-74 inches ($M = 60.33$, $SD = 5.29$), self-reported weights from 40-160 pounds ($M = 100.01$, $SD = 25.30$), and BMI, calculated based upon self-reported height and weight, from 13.67 to 25.00 ($M = 19.52$, $SD = 2.10$). Participant’s self-reported total years of experience in gymnastics or tumbling ranged from 2 to 16 years ($M = 8.22$, $SD = 3.28$). Number of hours spent practicing per week ranged from 1 to 36 hours ($M = 15.63$, $SD = 9.63$) and number of days spent practicing per week ranged from 1 to 6 days ($M = 3.91$, $SD = 1.75$). Sixty-four participants competed at the high level, which includes Levels 8, 9,
and 10 in gymnastics and Advanced and Elite Levels in tumbling. The low level of competition includes Levels 1 through 7 in gymnastics and Sub Beginner, Beginner, Sub Novice, Novice, Intermediate, and Sub Advanced in tumbling \((n = 44)\). Sixty-five participants reported experiencing an injury related to gymnastics or tumbling. When asked to report how many injuries they had experienced related to gymnastics or tumbling, the number ranged from 1 to 15 \((M = 2.77, SD = 2.34)\). When asked to report how long the injuries kept them away from practice or competition, 44 reported more than 3 weeks, 14 between 7-21 days, 4 less than 7 days, and 3 reported none, or no effect on training or competition.

*Previous Injury*

Chi-square analyses revealed that a greater number of high level participants reported experiencing injuries related to gymnastics or tumbling than low level participants \((p = .0001)\) and more gymnasts reported experiencing injuries than did power tumblers \((p = .018; \text{see Table 1})\). High level participants had a significantly higher odds of injury \(\text{OR} = 4.85, .95\text{CI} = 2.08 – 11.51\). Gymnasts also had significantly elevated odds of injury \(\text{OR} = 2.56, .95\text{CI} = 1.14 – 5.76\). Forty-seven of the 61 high level participants reported experiencing an injury while only 18 of the 44 low level participants reported experiencing an injury. Of the 62 gymnasts, 44 (or 71%) indicated they had experienced an injury whereas only 21 (or 48%) of the 43 tumblers had experienced an injury.

A one-way ANOVA was conducted to determine whether differences existed between the two groups, participants who had previously experienced an injury related to gymnastics or tumbling and those that have not, for age, years of gymnastics/tumbling experience, type of competition, and level of performance competition. Results indicated a significant difference between the two groups, for age \((p = .002)\) and length of participation \((p = .0001)\). Table 2
includes the means and standard deviations for each group along with the \( p \) values and effect sizes for each dependent variable. Athletes who had a previous injury are older and had more years of experience than those who had not experienced an injury.

A one-way ANOVA was also conducted to examine mean responses to the self-efficacy for physical abilities, self-efficacy for exercise, self-motivation, pain catastrophizing, perceived risk of reinjury, and sport competition anxiety scales. Results of the ANOVA revealed significant differences between the groups for the dependent variables of self-efficacy for physical abilities (\( p = .007, ES = .60 \)), self-motivation (\( p = .007, ES = .55 \)), and perceived risk of reinjury (\( p = .018, ES = .47 \); see Table 2). The effect sizes were moderate. The results did not support the hypothesis for decreased self-efficacy for physical abilities, but did support the hypothesis for an increased level of self-motivation. No significant differences were found in the previous injury group on self-efficacy for exercise (\( p = .108, ES = .33 \)), pain catastrophizing (\( p = .231, ES = .25 \)), and sport competition anxiety (\( p = .678, ES = .09 \)).

**Correlations among the Scales Based on Type of Competition and Gender**

To further explore the meaningfulness of the aforementioned findings, correlations were examined to determine whether relations existed between the dependent variables of self-efficacy for physical abilities, self-efficacy for exercise, self-motivation, pain catastrophizing, perceived risk of reinjury, and sport competition anxiety separated for type of competition and gender (see Tables 3 & 4, respectively). For both gymnasts and tumblers (see Table 3) a significant positive correlation was found between self-motivation and self-efficacy for physical abilities (\( r = .463, p = .001; r = .629, p = .000 \)) and between pain catastrophizing and sport competition anxiety (\( r = .353, p = .008; r = .524, p = .000 \)). For tumblers, a significant positive correlation was found between self-efficacy for exercise and self-motivation (\( r = .463, p = .002 \)).
and self-efficacy for exercise and self-efficacy for physical abilities ($r = .489, p = .003$). In addition, there was a significant positive association between perceived risk of reinjury and self-efficacy for exercise ($r = .425, p = .004$). For gymnasts, a significant positive correlation was shown between risk of reinjury and self-efficacy for physical abilities ($r = .443, p = .001$) and a significant negative correlation existed between sport competition anxiety and self-efficacy for physical abilities ($r = -.378, p = .011$). Based on the correlations, there exists some relation between the gymnasts and tumblers mean responses to the variables.

For boys, a significant negative correlation was found between sport competition anxiety and self-efficacy for physical abilities ($r = -.724, p = .002$). For girls, a significant positive correlation was shown between self-motivation and self-efficacy for physical abilities ($r = .582, p = .031$) and between self-efficacy for exercise and self-efficacy for physical abilities ($r = .386, p = .002$). Risk of reinjury was found to have a significant positive correlation with self-efficacy for physical abilities ($r = .497, p = .000$) and self-efficacy for exercise ($r = .405, p = .000$) in girls. Sport competition anxiety had a significant negative correlation with self-efficacy for exercise ($r = -.295, p = .009$) and a significant positive correlation with pain catastrophizing ($r = .427, p = .000$). As with the type of competition, there exists some relation between male and female mean responses to the variables.

Discussion

There are many factors that influence how gymnasts and tumblers view or experience pain and injury related to their sport. These factors may include self-efficacy, motivation, perceived risk, internal and external pressure, and previous pain and injury (see Chase, Magyar, & Drake, 2005; Nemeth, von Baeyer, & Rocha, 2005). It is important to examine these factors so that coaches and sport psychology consultants can help reduce the anxiety and fears that may
hinder gymnasts and tumblers from advancing to a higher competitive level. Gymnasts and tumblers need to recognize what contributes to their anxiety and fears associated with performance, and use that knowledge in a positive manner to maximize performance success.

The overall purpose of this study was to explore if a previous injury manipulates levels of self-efficacy, motivation, competition anxiety, and perceived risk of pain and injury among male and female gymnasts and tumblers of different competitive levels.

Age, length of participation, a high level of competition, and a previous injury were found to be directly related. As gymnasts and tumblers advance in age and mature athletically, there tends to be a progression in skill difficulty and advancement in competition level which often results in anxiety and possibly fear during future performances (Cartoni et al., 2005; Martin et al., 2008). Thus, as is with most sports, as participation continues, the chances of experiencing pain or an injury related to the sport is amplified.

Results of the current study did not support the hypothesis, but indicated a significant difference between the previous injury and no injury groups for self-efficacy regarding their physical abilities in gymnastics and tumbling. One possible explanation for gymnasts or tumblers with a previous injury experiencing a higher level of self-efficacy for their physical abilities is the belief that they have a secure position on their team or feel secure about making the team. Those with a previous injury are confident they will be able to keep or earn their spot and are not as concerned with their injuries because they know they have the talent, skill, and ability to rebound quickly from it and jump right back into training when the injury is healed (Gayman & Crossman, 2003). Gymnasts and tumblers that have experienced a previous injury are likely relying on their past performance accomplishments, vicarious experiences, verbal persuasions, positive feedback, and physiological arousals and emotions to maintain or increase their self-
efficacy while they are injured (Bandura, 1977; Chase et al., 2005). Also, after an injury, there is a certain amount of inherited fear towards performing a difficult skill again. Previous research shows that self-efficacy is considered the most important factor in overcoming the fear of performing a task (Bandura, 1986; Feltz, 1982) and gymnasts and tumblers that have had a previous injury clearly must overcome that fear.

The current study supported the hypothesis that gymnasts and tumblers who had experienced a previous injury related to gymnastics or tumbling reported a significantly higher level of self-motivation. This finding corresponds with previous research indicating that those with high self-efficacy put more effort into achieving a task (Bandura, 1997; Brown, Malouff, & Schutte, 2005). Because the gymnasts and tumblers with previous injuries also have a higher level of self-efficacy, it makes sense that the level of self-motivation is increased. This could be due to their knowledge of how hard they must work to regain their skills they had acquired before the injury (Chase et al., 2005). Depending on the timing of the experienced injury, it may motivate their recovery in order to participate in the current or upcoming season (Gayman & Crossman, 2003). They also might experience an increased level of motivation so as to not lose their position on a competition team, such as the Olympic team. However, since the survey was not taken during an injury experience and it was not known if any were in recovery from an injury, their motivation may have been low at the time, but has now returned to a higher level.

Those gymnasts and tumblers who had experienced a previous injury reported a higher perceived risk of reinjury than the gymnasts and tumbler who had not experienced a previous injury related to the sport. One reason for this could be the fact that those who have already experienced an injury know how easily it can occur, and have possibly acquired a new fear of reinjury (Chase et al., 2005). Previous research has shown they might also experience flashbacks
of their previous injury before trying new skills which can have negative mental and physical effects and increase the risk of reinjury (Bandura, 1977; Chase et al., 2005; Lethem, Slade, Troup, & Bentley, 1983; Nolen-Hoeskma, 1998).

No significant difference was found for self-efficacy for exercise between the previous injury and no injury group. Both groups responded similarly to questions about their confidence in working out or practicing in the face of several barriers. The survey instrument may not have been suitable for assessing gymnast and tumbler responses to exercise barriers because they often face more extreme barriers such as serious injuries.

There were also no significant differences found between the injury and no injury groups for pain catastrophizing. Because athletes are regularly pressured by various sources to normalize pain and injury, it is possible that the gymnasts and tumblers in this study consider their pain and injury to be a natural and normal part of the sport. This finding is consistent with other research with other athletes (American Institutes for Research, 1988; Curry & Strauss, 1994; Snyder, 1990; Young, McTeer, & White, 1994). Athletes may regard their pain and injuries as routine and uneventful and believe that if they acknowledge or complain about them, their coaches, peers, or competitors will view them as not tough and unable to participate (Curry & Jiobu, 1984; Curry & Strauss, 1994). Because pain is so commonly present in gymnastics and tumbling, athletes who compete in these sports may try to minimize or ignore the sensation. These athletes are frequently praised for doing so (Nixon, 1993).

Lastly, there was no significant difference shown for sport competition anxiety based on a previous injury. Possible reasons for the previous injury group not showing a high level of competitive anxiety is that they may not have experienced their injuries during competition or have developed coping strategies to deal with it effectively. Previous research has shown that
competitive anxiety tends to be altered more during significant non-sport-related personal events rather than in sporting competitions (Nesti & Sewell, 1999).

The responses from tumblers indicated significant positive associations between self-motivation and self-efficacy for physical abilities, self-motivation and self-efficacy for exercise, self-efficacy for physical abilities and self-efficacy for exercise, perceived risk of reinjury and self-efficacy for exercise, and sport competition anxiety and pain catastrophizing. On the other hand, gymnasts’ responses revealed significant positive associations between self-motivation and self-efficacy for physical abilities, perceived risk of reinjury and self-efficacy for physical abilities, and sport competition anxiety and pain catastrophizing. This suggests that as one variable increases, the other also increases. For example, as sport competition anxiety increases, pain catastrophizing increases. The sport competition anxiety and self-efficacy for physical abilities responses made by gymnasts were also significantly negatively related. This suggests that as a gymnast’s competition anxiety increases, the belief in his or her own physical abilities decreases.

In boys, a negative association was found between the sport competition anxiety and self-efficacy for physical abilities scales. This suggests that as competition anxiety increases, self-efficacy for physical abilities decreases. These results are consistent with previous research that shows when anxiety increases bodily tension and heart rate, a drop in self-efficacy can occur. The body will physically resist the execution of a skill out of fear (Chase et al., 2005). If anxiety during competition could be recognized and dealt with, confidence in physical abilities would not falter and the boys would have greater performance success. For girls, significant positive associations were found between self-motivation and self-efficacy for physical abilities, self-efficacy for exercise and self-efficacy for physical abilities, perceived risk of reinjury and self-
efficacy for physical abilities, perceived risk of reinjury and self-efficacy for exercise, and sport competition anxiety and pain catastrophizing. Again, this suggests that as one variable increases, the other also increases. For example, as self-motivation increases, there is also an increase in self-efficacy for physical abilities. A significant negative relationship was found for girls between sport competition anxiety and self-efficacy for exercise. This suggests that as the level of competition anxiety increases, their self-efficacy for exercise and practicing in the face of barriers decreases.

**Coaching Implications**

As a coach, it is beneficial to know how each athlete understands, experiences, and interprets their pain and injuries. Coaches should not normalize or downplay athletes’ pain and injuries. Gymnasts and tumblers need to feel comfortable being open and honest about their pain and injuries. Additionally, it is crucial that the rehabilitation process be positive, making the return to participation seem like a challenge rather than an obstacle to be feared (Brewer, 2001; Chase et al., 2005; Rotella & Heyman, 2005; Taylor & Taylor, 1997). Coaches should also understand that many factors, such as self-efficacy or previous pain and injury, contribute to or affect athletes’ fear of injury and risk of pain and injury. They should empower gymnasts and tumblers to overcome this fear of pain, injury, and reinjury by developing strategies to break the performance barrier (Chase et al., 2005).

**Gymnast and Tumbler Implications**

It is hopeful that gymnasts and tumblers, regardless of history of injuries, view these results to better recognize what contributes to their fear of pain and injury. They can then begin to break the negative cycle that leads to these fears, maximize successful performances, and possibly advance to elite levels with less pain and fewer injuries. Once they understand and
recognize what contributes to their fear, they can develop strategies to overcome or manage it and possibly regain their confidence to perform. These strategies should include visualizing past successful performances, watching a similar peer successfully perform, receiving verbal persuasion and positive feedback from coaches and others, and feeling strong and confident physically and mentally (Bandura, 1977; Chase et al., 2005).

Limitations

There were several limitations in the current study. First, the sample size was limited to 105 participants from three different gyms and included only 18 boys. While over 20 gym owners or managers were contacted, it is possible that after their coaches viewed the survey in more depth they did not want their gymnasts or tumblers to participate due to the questions about current and desired weight, considering the underlying idea of being thin but powerful is so prevalent in the sport (Martin et al., 2008). Because the current study relied solely on self-reported data, the participants who chose to respond may not have answered honestly even after being informed the surveys were anonymous. That is, they may have instead altered their answers to fit what is considered socially desirable.

The sample was also not very diverse in terms of gender and race or ethnicity with the majority of participants being female and Caucasian. Although, in the United States, the majority of those involved in gymnastics and tumbling are Caucasian females. Due to the fact that participants were only gymnasts and tumblers, the results may not generalize to athletes participating in other sports and while gymnastics and tumbling are mainly individual sports, the results may not generalize to athletes in team sports.

The current study did not explore in length the type and severity of injury the gymnast or tumbler received. Some researchers suggest this is important to consider when examining the
psychology of injuries (Chase et al., 2005; Udry & Andersen, 2002). While the current study did ask for number of injuries, most severe injury, and length of time away from practice or competition, the significance of these factors was not examined due to the limited number of participants. Also, if participants had experienced an injury, the study did not take into account when the injury occurred during the course of the season or if it was a first time occurrence or a reinjury.

Future Research Directions

The results of this study provide a foundation and direction for future research. Sample size should be increased and taken from several regions of the United States in order to obtain more generalizable results. With the participants all competing in the sports of gymnastics and tumbling, it is important to examine whether athletes in other sports have the same perception of pain and injury.

Due to the current study’s focus of injury versus no injury, future research should look at the differences in motivation, self-efficacy, and fears between groups of participants with a first time injury and participants with a reinjury. Future research could also examine the relationship between the length of time between the occurrence of an injury and when the survey was taken and how it affects current fears of pain and reinjury. It would also be of benefit to explore the differences in fears of pain and injury between groups of athletes that regularly use mental skills and sport psychology, such as visualization or self-talk, and those that do not. Finally, because the questions about pain and fears were not collected at the time of injury, the participants may not rate their true perceptions due to the length of time since the injury occurred. Thus, it would be important to explore ratings and perceptions of pain and fears directly after the injury occurred. In addition, using a multivariate analyses approach would be useful when examining
the influence of gender, previous injury, type of sport, and level of competition on variables such as self-efficacy for physical abilities and exercise, self-motivation, pain catastrophizing, risk of reinjury, and sport competition anxiety.

Because the current study was retrospective, it would be beneficial to perform a prospective study. The study should track a large cohort of children that are about to begin their gymnastics or tumbling career and have not experienced an injury related to the sport. Baseline data regarding self-efficacy, self-motivation, perceptions of pain, and anxiety and fears should be taken before participants start their gymnastics or tumbling career. Throughout their careers, surveys could be given when an injury occurs. This would allow researchers to obtain perceptions and fears directly following an injury and then be able to compare them to the baseline data. It would also allow researchers to attain information about the gymnasts’ and tumblers’ training experiences, including any psychological issues that may arise. The results would be of benefit to the USA Gymnastics and United States Tumbling and Trampoline Association (USTA). Information from these findings may help develop training procedures and programs that reduce the number of injuries that gymnasts and tumblers experience and help athletes manage or overcome their pain and fears.
Table 1

Type and Level of Competition by Previous Injury

<table>
<thead>
<tr>
<th>Variable</th>
<th>Experienced an injury related to gymnastics or tumbling?</th>
<th>Chi-square</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
<td>Total</td>
</tr>
<tr>
<td>Type of Competition</td>
<td>44 (70.97%)</td>
<td>18 (29.03%)</td>
<td>62</td>
</tr>
<tr>
<td>Gymnastics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tumbling</td>
<td>21 (48.84%)</td>
<td>22 (51.16%)</td>
<td>43</td>
</tr>
<tr>
<td>Total</td>
<td>65</td>
<td>40</td>
<td>105</td>
</tr>
<tr>
<td>Level of Competition</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>47 (77.05%)</td>
<td>14 (22.95%)</td>
<td>61</td>
</tr>
<tr>
<td>Low</td>
<td>18 (40.91%)</td>
<td>26 (59.09%)</td>
<td>44</td>
</tr>
<tr>
<td>Total</td>
<td>65</td>
<td>40</td>
<td>105</td>
</tr>
</tbody>
</table>
Table 2

Descriptive Statistics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Previous Injury $N = 65$</th>
<th>No Previous Injury $N = 40$</th>
<th>$p$ value</th>
<th>Effect Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Women (%)</td>
<td>86.15%</td>
<td>77.50%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age (yrs)</td>
<td>14.40±2.51</td>
<td>12.73±2.75</td>
<td>.002</td>
<td>.61</td>
</tr>
<tr>
<td>Length of participation (yrs)</td>
<td>9.52±2.81</td>
<td>6.15±2.91</td>
<td>.000</td>
<td>1.00</td>
</tr>
<tr>
<td>Self-Efficacy for Physical Abilities</td>
<td>4.34±.44</td>
<td>4.08±.36</td>
<td>.007</td>
<td>.60</td>
</tr>
<tr>
<td>Self-Efficacy for Exercise</td>
<td>6.67±2.09</td>
<td>5.93±2.37</td>
<td>.108</td>
<td>.33</td>
</tr>
<tr>
<td>Self-Motivation</td>
<td>4.38±.47</td>
<td>4.11±.50</td>
<td>.007</td>
<td>.55</td>
</tr>
<tr>
<td>Pain Catastrophizing</td>
<td>2.43±.77</td>
<td>2.24±.71</td>
<td>.231</td>
<td>.25</td>
</tr>
<tr>
<td>Risk of Reinjury</td>
<td>3.95±1.34</td>
<td>3.27±1.53</td>
<td>.018</td>
<td>.47</td>
</tr>
<tr>
<td>Sport Competition Anxiety</td>
<td>18.57±5.10</td>
<td>18.16±4.37</td>
<td>.678</td>
<td>.09</td>
</tr>
</tbody>
</table>

*Note.* Mean ± SD or median (25th, 75th percentile) unless indicated.
Table 3

Type of Competition Correlations

<table>
<thead>
<tr>
<th></th>
<th>Tumbling (n = 43)</th>
<th>Gymnastics (n = 62)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Self-Efficacy for Physical Abilities</td>
<td>Self-Efficacy for Exercise</td>
</tr>
<tr>
<td>Self-Efficacy for Physical Abilities</td>
<td>----</td>
<td>.489 **</td>
</tr>
<tr>
<td>Self-Efficacy for Exercise</td>
<td>.335 *</td>
<td>----</td>
</tr>
<tr>
<td>Self-Motivation</td>
<td>.629 **</td>
<td>.463 **</td>
</tr>
<tr>
<td>Pain Catastrophizing</td>
<td>-.301 *</td>
<td>-.006</td>
</tr>
<tr>
<td>Risk of Reinjury</td>
<td>.443 **</td>
<td>.286 *</td>
</tr>
<tr>
<td>Sport Competition Anxiety</td>
<td>-.378 **</td>
<td>-.345 *</td>
</tr>
</tbody>
</table>

Note. ** Correlation is significant at the 0.01 level (2-tailed). * Correlation is significant at the 0.05 level (2-tailed).
Table 4

*Gender Correlations*

<table>
<thead>
<tr>
<th></th>
<th>Boys (n = 18)</th>
<th>Girls (n = 87)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Self-Efficacy for Physical Abilities</strong></td>
<td>----</td>
<td>.386**</td>
</tr>
<tr>
<td><strong>Self-Efficacy for Exercise</strong></td>
<td>.437</td>
<td>----</td>
</tr>
<tr>
<td><strong>Self-Motivation</strong></td>
<td>.582**</td>
<td>.239 *</td>
</tr>
<tr>
<td><strong>Pain Catastrophizing</strong></td>
<td>.338</td>
<td>-.191</td>
</tr>
<tr>
<td><strong>Risk of Reinjury</strong></td>
<td>-.081</td>
<td>.009</td>
</tr>
<tr>
<td><strong>Sport Competition Anxiety</strong></td>
<td>-.724**</td>
<td>-.454</td>
</tr>
</tbody>
</table>

| **Self-Efficacy for Physical Abilities** | ---- | .259 |
| **Self-Efficacy for Exercise** | .386** | ---- |
| **Self-Motivation** | .523 * | ---- |
| **Pain Catastrophizing** | -.251 * | -.109 |
| **Risk of Reinjury** | -.231 * | -.579 * |
| **Sport Competition Anxiety** | -.508 * | -.498 * |

| **Self-Efficacy for Physical Abilities** | ---- | .497** |
| **Self-Efficacy for Exercise** | .405** | ---- |
| **Self-Motivation** | .217 * | ---- |
| **Pain Catastrophizing** | .200 | ---- |
| **Risk of Reinjury** | ---- | ---- |
| **Sport Competition Anxiety** | ---- | ---- |

*Note.* **Correlation is significant at the 0.01 level (2-tailed). * Correlation is significant at the 0.05 level (2-tailed).
Figure 1. Main effect: Self-efficacy for physical abilities.

<table>
<thead>
<tr>
<th></th>
<th>Injury</th>
<th>No Injury</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-Efficacy for Physical Abilities</td>
<td>4.3</td>
<td>4.1</td>
</tr>
</tbody>
</table>

$p = .007$
$ES = .60$

Figure 2. Main effect: Self-motivation.

<table>
<thead>
<tr>
<th></th>
<th>Injury</th>
<th>No Injury</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-Motivation</td>
<td>4.4</td>
<td>4.1</td>
</tr>
</tbody>
</table>

$p = .007$
$ES = .55$
Figure 3. Main effect: Risk of reinjury.
APPENDIX A

REVIEW OF LITERATURE
Competitive gymnasts and power tumblers experience a plethora of positive and negative emotions that contribute to their motivation to participate. Negative emotions can cause mental (anxiety, fear, etc.) and physical (coordination and movement problems, injury, etc.) difficulties in practice or competition (Scanlan, Babkes, & Scanlan, in press) and can affect one’s self-efficacy beliefs. When gymnasts and power tumblers doubt their ability to perform a skill or routine, the possibility of pain and an injury increases (Chase, Magyar, & Drake, 2005).

Different athletes may experience pain and injury and interpret the internal and external pressures to fight through it differently. The pressure to continue performing while injured or in pain may come from many different sources. Athletes may feel obligated to perform for their parents, siblings, friends, teammates, coaches, and fans. If they do not perform they may feel guilty (Young, McTeer, & White, 1994). These groups may influence athletes’ motivation to compete through the pain and injury, which can affect and alter their self-efficacy beliefs (Young et al., 1994).

**Self-Efficacy**

Albert Bandura developed the self-efficacy theory and defines self-efficacy as the belief that people have in their ability to successfully complete skills or tasks (Bandura, 1977, 1997). Self-efficacy beliefs determine how people feel, think, motivate themselves and behave. Such beliefs are influenced by cognitive, motivational, affective, and selection processes. An important notion of the theory is that self-efficacy beliefs help a person overcome adversity, such as the fear of injury when attempting a difficult skill and is viewed as the most important determinant of overcoming a fearful task (Bandura, 1986; Feltz, 1982). Self-efficacy is influenced by four main sources of information: (a) performance accomplishments, (b) vicarious experiences, (c) verbal persuasion, and (d) physiological arousal and emotion. Gymnasts and
tumblers gain confidence by experiencing positive past performances of a feared skill, watching other gymnasts or tumblers perform the feared skill, receiving feedback from coaches and teammates about their ability to perform the feared skill, and recognizing their physiological and emotional responses during the skill (Bandura, 1977; Chase, Magyar, & Drake, 2005).

Individuals with high self-efficacy, as compared to those with low self-efficacy, tend to put more effort into successfully performing a task and are more likely to experience positive emotions relating to the task (Bandura, 1997; Brown, Malouff, & Schutte, 2005).

Self-efficacy sources come from five general areas. The most important self-efficacy source is previous history of mastery experiences of a skill, which results in increased confidence to successfully perform the skill or routine in future attempts. Athletes are more confident if they have performed the skill successfully and consistently in practice (Chase et al., 2005; Feltz & Lirgg, 2001; Vealey, Walter, Garner-Holman, & Giacobbi, 1998). While gymnasts and tumblers most likely experience this, more research is needed to clarify. Previous successful experiences usually help athletes overcome their concerns and fears about future performances.

Communication is the second significant source of self-efficacy. Positive feedback, including verbal and emotional support from coaches, parents, and teammates fosters a sense of confidence in performing a feared skill (Bandura, 1977; Vealey et al., 1998). Increased self-awareness is a third common self-efficacy source. The more mentally and physically aware the athlete feels, (i.e., feeling strong, positive, and fit) the higher their confidence is performing the feared skill (Chase et al., 2005). Physical and mental preparation (e.g., positive imagery) also may increase confidence in performing a certain skill (Vealey et al., 1998). The final source known to increase self-efficacy is modeling and comparison with others. Athletes, such as gymnasts and tumblers,
compare and evaluate their skills against others (Bandura, 1977) and use the normal standards to assess their own ability and to overcome fear (Chase et al., 2005).

Research on the influence of gender on self-efficacy has been inconsistent. Several studies have found that females have lower self-efficacy than males (Jenkins & Gortner, 1998; Prohaska & Glasser, 1994). However, other studies have found no significant relationship between gender and self-efficacy (Clark, 1999; Grembrowski, et al., 1993; 1998b; Resnick, 1998a; Resnick & Spellbring, 2000).

Injuries in Gymnastics

With such a high number of injuries reported in the sport of gymnastics per year, it is understandable that gymnasts may express an increased level of fear of experiencing an injury during practice or competition (Duda, 1995; Kerr & Minden, 1988). Elite gymnasts and tumblers rarely pass through childhood and adolescence without experiencing an injury. The risk of injury increases as weekly practice time increases and the difficulty of the routine increases (Tofler, Stryer, & Micheli, & Herman, 1996; Kirialanis, Malliou, Beneka, Gourgoulis, Giofstidou, & Godolias, 2002). Two age groups (6-11 and 12-17 years old) have similar percentages of total number of injuries, both approximately 43%. Lack of sleep can also contribute to physiological and mental issues, such as reduced motivation, physical weakness, and blurry vision that can increase the risk of injury. This can lead to technical mistakes and a lack of stamina, which greatly increases the risk for injury (Chase et al., 2005). While many factors contribute to the occurrence of injuries in gymnastics and tumbling, pain, decreased self-efficacy, and social pressures seem to be the most prevalent and unacknowledged.

There are several sources of pressure that exist for high-level gymnasts and tumblers to normalize their pain and injuries such as: media, coaches, parents, teammates, etc. (American
Institutes for Research, 1988; Curry & Strauss, 1994; Snyder, 1990; Young, McTeer, & White, 1994). When a serious injury is normalized, it is thought of as routine and uneventful (Curry & Jiobu, 1984; Curry & Strauss, 1994). The media paints a picture of athletes being glorified for competing through their pain and taking risks with their health. Respected commentators and retired athletes often praise current athletes that sacrifice themselves for the team, tolerate a high pain threshold, and forego the personal consequences. However, athletes who choose to talk about their pain and injuries are often stigmatized, especially when the sources of their pain and injuries are unseen (Nixon, 1993). Athletes who show the least amount of reaction to their pain or injury are celebrated, praised, and promoted as good examples (Ewald & Jiobu, 1985; Hughes & Coakley, 1991; Nixon, 1991).

Coaches use the existence of pain and injury to give their athletes an opportunity to prove their worth or to display their character (Nixon, 1993). However, coaches may not have to try very hard to convince their athletes to play through pain and injuries because the injured athletes may have previously been encouraged, socialized, pressured, or influenced to perceive pain and injury as part of the sport (Nixon, 1993). Risk of injury is framed as a way to impress coaches (Faulkner, 1973) or as a way to establish identity among peer groups (Colburn, 1985; Smith, 1975; Young et al., 1994).

Previous research has shown that athletes, compared to non-athletes, possess a greater pain tolerance (Bourgeois, Meyers, & LeUnes, 2009; Jarmeko, Silbert, A Mann, 1981; Pen & Fisher, 1994; Scott & Gijsbers, 1981) and report a lower pain intensity (Ahern & Johr, 1997; Hamilton, Hamilton, Meltzer, Marshall, & Molnar, 1989; Paparizos, Tripp, Sullivan, & Rubenstein, 2005; Sullivan, Tripp, Rodgers, & Stanish, 2000). To tolerate the pain, gymnasts and tumblers use several different coping styles including rumination and avoidance. Two main
categories are approach and avoidance with two subcategories in each: problem-focused and emotion-focused. Approach coping style consists of actions of engagement, sensitization, and attention, whereas avoidance style includes actions of rejection and disengagement (Anshel, Porter, & Quek, 1998). Approaching the pain suggests that athletes believe their condition is temporary and they are more willing to confront it so they may return to sport as soon as possible (Lethem, Slade, Troup, & Bentley, 1983; Tripp, Stanish, Ebel-Lam, Brewer, & Birchard, 2007). Rumination corresponds to the struggle and frustration that is connected to the complexities of fear of injury (Chase et al., 2005). Gymnasts and tumblers who catastrophize tend to dwell, or ruminate, on the negative aspects of their pain and situations (Spanos, Radtke-Bodorik, Ferguson, & Jones, 1979) and their failure to cope with the pain successfully, which intensifies the feelings of distress and helplessness they experience (Rosenstiel & Keefe, 1983; Tripp et al., 1983). Orlick (1990) suggests that avoidance coping might be used more productively in sports such as gymnastics and tumbling because they involve continuous tasks.

Once a gymnast or tumbler experiences an injury, it becomes difficult to overcome the fear of reinjury in attempting the same or a new skill. Gymnasts or tumblers may ruminate about becoming reinjured (Chase et al., 2005). Athletes may passively dwell on their injury and what contributed to the injury such as: loss of conditioning, separation from teammates and workouts, and pain. Negative and fearful thoughts can prevent athletes from overcoming the fears associated with reinjury and exacerbate their fear of returning to full participation (Bandura, 1977; Chase et al., 2005; Nolen-Hoeskma, 1998). Lethem et al. (1983) proposed that athletes develop irrational beliefs about their ability to function which restrain behaviors they view as unnecessary, in order to avoid anticipated pain and further damage to the injury.
Gymnasts or tumblers may also adopt an avoidance behavior. This coping style can include negative self-talk, holding back effort, guarding, and withdrawing from performing (Bandura, 1997; Chase et al., 2005; Heil, 2000; Nolen-Hoeskma, 1998). Feltz (1982) found that each mastery experience caused a gain in confidence about performing the fearful task. Consequently, if gymnasts or tumblers avoid tasks on the first attempt, they are more likely to avoid them on later attempts. This is called a performance barrier that weakens the influence of self-efficacy. Regularly avoiding certain tasks, skills, routines, or activities results in not only fewer practice attempts, but can lead to mental blocks. These mental blocks or performance barriers will not likely disappear without some form of intervention (Chase et al., 2005).

Pain Experiences in Sport

Experiencing pain (e.g., muscle and joint) is normal for gymnastics and power tumbling (Sullivan et al., 2000; Paparizos et al., 2005). Athletes typically recognize pain as a warning signal that represents the possibility of an impending injury or soreness from extreme exertion (Caine & Lindner, 1990; Nemeth, von Baeyer, & Rocha, 2005). There are many anecdotal stories of gymnasts and tumblers using painkillers to prolong their ability to compete, even when they are trying to recover from broken bones and severe injuries. These examples lead to the common myth that elite gymnasts and tumblers are insensitive to pain and should continue to compete even through their injuries (Nemeth et al., 2005), whereas other research by Thornton (1990) has shown that even the most elite gymnasts and tumblers are very sensitive to pain as warning signals. However, many times these warning signals are ignored.

Like other athletes, gymnasts and tumblers are taught that pain is a part of their sport and the sacrifices they make are great. For elite athletes, rational decisions and considerations of physical costs are often forgotten (Kotarba, 1983; Nixon, 1993). When their sport participation
causes or is accompanied by chronic pain, it must be minimized or ignored (Kotarba, 1983; Nixon, 1993). For example, one gymnast’s response to pain may be to tough it out. That is, she believes that she would not be viewed as tough-minded if she were to cry and question whether she should be in the gym if she is not tough (Nemeth et al., 2005). She has been conditioned to believe that crying makes a person look weak.

Because tolerance of pain and injury is often rewarded, gymnasts and tumblers commonly hide their pain. Many take painkillers on a regular basis and ice their injuries several times a day in order to continue competing. Some even risk their lives by denying their severe and possibly fatal injuries, assuming the pain is just a normal part of the sport (Young et al., 1994). They refuse to give in to their pain, afraid they will disapprovingly be ‘beaten’ by it and are afraid to disappoint their teammates, parents, and coaches (Young et al., 1994).

Self-efficacy, Injury, and Pain Research

Future studies should explore gymnasts’ and tumblers’ self-efficacy and fear of performing gymnastic and tumbling skills. Specifically, researchers should examine how they experience pain and injuries and how previous pain and injury experiences influence future training and competition performances. Gymnasts and tumblers that have experienced an injury will likely have decreased self-efficacy and a greater fear of injury or reinjury because they have been exposed to how easy it is to become injured and may have experienced a decrease in self-confidence. Furthermore advanced gymnasts and tumblers will probably have a greater fear of injury because of the skill difficulty that corresponds with the elite levels.
APPENDIX B

FLYER
Attention ALL gymnasts and power tumblers ages 10-18!

- You have the opportunity to participate in a research study that is looking at differences in self-confidence and fears in gymnasts and power tumblers.
- The survey consists of questions you will answer about yourself. It will take you a total of 15-20 minutes to complete.
- If you would like to participate and are 18 years old, at your next practice you will be given a consent form to sign and can then complete the survey.
- If you would like to participate and are 10-17 years old, at your next practice your parents will need to sign the consent form and you will sign the assent form before you complete the survey.

If you have questions, feel free to contact:
Dr. Scott Martin, UNT Kinesiology Department
Stacy Jackson, Master's Student
Hello __________ (owner of gym),

My name is Stacy Jackson and I am a master’s student at University of North Texas. With Dr. Scott Martin as my faculty advisor, I am conducting a research study on self-confidence and fears of pain and injury in gymnasts and power tumblers. I would appreciate if you would allow me access to your competitive athletes in hopes that they would participate in my study. Participation is completely voluntary.

The athletes who are willing to participate will be asked to complete a survey packet at the beginning of one practice. It will take approximately 15-20 minutes to complete the 6-page survey. The surveys are anonymous, and the athlete’s responses will not be identifiable in any way.
APPENDIX D

INFORMED CONSENT LETTER
Title of Study: Self-efficacy and Fears of Pain and Injury in Gymnastics and Tumbling: Does a Previous Injury Matter?

Principal Investigator: Scott Martin, University of North Texas (UNT) Department of Kinesiology, Health Promotion, and Recreation.
Key Personnel: Stacy Jackson, University of North Texas (UNT) Department of Kinesiology, Health Promotion, and Recreation.

Purpose of the Study: You are being asked to participate in a research study which involves determining if there are differences in self-confidence and fears of injury in gymnasts and power tumblers. Specifically, the study will focus on gender, the level of the gymnast, how many hours are spent training per week, and the amount of time spent out of training and competition if a previous injury has occurred. Gymnastics can be extremely physically and mentally demanding. When gymnasts are not fully successful or experience an injury when attempting to acquire skills, their self-confidence may decrease and fears of an initial or continuing injury can increase.

Study Procedures: You will be asked to fill out a series of questionnaires that will take about 15-20 minutes of your time.

Foreseeable Risks: No known physical risks and limited psychological discomfort is anticipated with completing the questionnaire. The volunteer participants may stop at any time without consequence to them. No identifying information such as names, student identification numbers, etc will be collected. Thus, the identity of the participants will be kept confidential. The surveys will be sealed in a locked drawer until completion of the research project; the surveys will be destroyed with the use of a paper shredder.

Benefits to the Subjects or Others: Although this study may not provide a direct benefit to the participants, possible benefits of this study will be to provide coaches and other professionals (sports medicine doctors, physical therapist, physiotherapist, etc.) with information regarding gymnasts understanding of how previous injuries are related to self-efficacy and fears of injury or reinjury.

Compensation for Participants: You will not receive any direct compensation for your participation.

Procedures for Maintaining Confidentiality of Research Records: No identifying information such as names, student id #’s, etc will be collected on the surveys/questionnaires.
Thus, the identity of the participants will be kept confidential. The informed consent/assent sheets and surveys will be separated and sealed in a locked drawer until completion of the research project. At that time, the informed consent/assent sheets and surveys will be destroyed with the use of a paper shredder. The research data will be locked in the major professor’s office (210F) at the University of North Texas.

Questions about the Study: If you have any questions about the study, please contact Stacy Jackson or Dr. Scott Martin, the principal investigator of the study, at the University of North Texas.

Review for the Protection of Participants: This research study has been reviewed and approved by the UNT Institutional Review Board (IRB). The UNT IRB can be contacted at (940) 565-3940 with any questions regarding the rights of research subjects.

Research Participants’ Rights:

Your signature below indicates that you have read or have had read to you all of the above and that you confirm all of the following:

Dr. Martin or Stacy Jackson has explained the study to you and answered all of your questions.
You have been told the possible benefits and the potential risks and/or discomforts of the study.

You understand that you do not have to take part in this study, and your refusal to participate or your decision to withdraw will involve no penalty or loss of rights or benefits. The study personnel may choose to stop your participation at any time.

You understand why the study is being conducted and how it will be performed.

You understand your rights as a research participant and you voluntarily consent to participate in this study.

You have been told you will receive a copy of this form.

________________________________
Printed Name of Participant

________________________________                ____________
Signature of Participant                     Date

For the Principal Investigator or Designee:

I certify that I have reviewed the contents of this form with the subject signing above. I have explained the possible benefits and the potential risks and/or discomforts of the study. It is my opinion that the participant understood the explanation.

__________________________________________                ____________
Signature of Principal Investigator or Designee   Date

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APPENDIX E

CHILD ASSENT LETTER
University of North Texas Institutional Review Board

Informed Consent Form – Parent Consent and Child Assent Letter

Before agreeing to your child’s participation in this research study, it is important that you read and understand the following explanation of the purpose, benefits and risks of the study and how it will be conducted.

**Title of Study:** Self-Efficacy and Fears of Pain and Injury in Gymnastics and Tumbling: Does a Previous Injury Matter?

**Principal Investigator:** Scott Martin, University of North Texas (UNT) Department of Kinesiology, Health Promotion, and Recreation.

**Key Personnel:** Stacy Jackson, University of North Texas (UNT) Department of Kinesiology, Health Promotion, and Recreation.

**Purpose of the Study:** You are being asked to allow your child to participate in a research study which involves determining if there are differences in self-confidence and fears of injury in gymnasts and power tumblers. Specifically, the study will focus on gender, the level of the gymnast, how many hours are spent training per week, and the amount of time spent out of training and competition if a previous injury has occurred. Gymnastics can be extremely physically and mentally demanding. When gymnasts are not fully successful or experience an injury when attempting to acquire skills, their self-confidence may decrease and fears of an initial or continuing injury can increase.

**Study Procedures:** Your child will be asked to fill out a series of questionnaires that will take about 15-20 of your child’s time.

**Foreseeable Risks:** No known physical risks and limited psychological discomfort is anticipated with completing the questionnaire. Your child may stop at any time without consequence to them. No identifying information such as names, student identification numbers, etc will be collected. Thus, the identity of your child will be kept confidential. The surveys will be sealed in a locked drawer until completion of the research project; the surveys will be destroyed with the use of a paper shredder.

**Benefits to the Subjects or Others:** Although this study may not provide a direct benefit to your child, possible benefits of this study will be to provide coaches and other professionals (sports medicine doctors, physical therapist, physiotherapist, etc.) with information regarding gymnasts understanding of how previous injuries are related to self-efficacy and fears of injury or reinjury.

**Compensation for Participants:** Your child will not receive any direct compensation for your participation.

**Procedures for Maintaining Confidentiality of Research Records:** No identifying information such as names, student id #’s, etc will be collected on the surveys/questionnaires.
Thus, the identity of your child will be kept confidential. The informed consent/assent sheets and surveys will be separated and sealed in a locked drawer until completion of the research project. At that time, the informed consent/assent sheets and surveys will be destroyed with the use of a paper shredder. The research data will be locked in the major professor’s office (210F) at the University of North Texas.

Questions about the Study: If you have any questions about the study, please contact Stacy Jackson or Dr. Scott Martin, the principal investigator of the study, at the University of North Texas.

Review for the Protection of Participants: This research study has been reviewed and approved by the UNT Institutional Review Board (IRB). The UNT IRB can be contacted at (940) 565-3940 with any questions regarding the rights of research subjects.

Research Participants’ Rights: Your signature below indicates that you have read or have had read to you all of the above and that you confirm all of the following:

Stacy Jackson has explained the study to you and answered all of your questions. You have been told the possible benefits and the potential risks and/or discomforts of the study.

You understand that you do not have to allow your child to take part in this study, and your refusal to allow your child to participate or your decision to withdraw him/her from the study will involve no penalty or loss of rights or benefits. The study personnel may choose to stop your child’s participation at any time.

You understand why the study is being conducted and how it will be performed.

You understand your rights as the parent/guardian of a research participant and you voluntarily consent to your child’s participation in this study.

You have been told you will receive a copy of this form.

________________________________
Printed Name of Parent or Guardian

______________________________                      ____________
Signature of Parent or Guardian                    Date

For the Principal Investigator or Designee: I certify that I have reviewed the contents of this form with the parent or guardian signing above. I have explained the possible benefits and the potential risks and/or discomforts of the study. It is my opinion that the parent or guardian understood the explanation.

______________________________                 _______
Signature of Principal Investigator or Designee                  Date
Child Assent Form

You are being asked to be part of a research project being done by the University of North Texas Department of Kinesiology, Health Promotion, and Recreation.

This study involves collecting information about the way you think about yourself and your experience in gymnastics or tumbling. This is a survey, not a test.

You will be asked to answer questions about yourself that will take about 15-20.

If you decide to be part of this study, please remember you can stop participating any time you want to.

If you would like to be part of this study, please sign your name below.

__________________________                _______________
Printed Name of Child             Date

__________________________                _______________
Signature of Child             Date

__________________________                _______________
Signature of Principal Investigator             Date
REFERENCES


