

## CURRENT PHYSICAL ACTIVITY, BARRIERS AND MOTIVATORS TO EXERCISE AMONG RETIRED FEMALE COLLEGIATE GYMNASTS

AMBER HELTEMES\*, ABIGAIL LARSON

Department of Kinesiology and Outdoor Recreation, Southern Utah University, Utah, USA.

\*Email: amberheltemes@suuemail.net

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### ABSTRACT

*This study examined current levels of physical activity, exercise barriers and exercise motivators among former female collegiate gymnasts. Participants included 143 former female National Collegiate Athletic Association (NCAA) Division I-III gymnasts. All participants completed three questionnaires: a researcher designed demographics questionnaire, the Godin Leisure-Time Exercise questionnaire, and the Twin Cities Walking Survey. The demographics questionnaire assessed gender, age, current sport participation status, and sports-related injuries. The Godin Leisure-Time Exercise questionnaire assessed current physical activity levels. The Twin Cities Walking Survey assessed exercise barriers and motivators. Participants were categorized as physically active or sedentary according to self-reported physical activity using the Godin Leisure Time Exercise questionnaire. Results revealed that 82% of the former gymnasts were categorized as physically active, and 44% reported collegiate sports injuries that currently impair physical function. The most commonly reported injured body part was the knee (30%). There was an inverse relationship between exercise barriers and physical activity score ( $r = -0.328$ ) and a positive relationship between exercise motivators and physical activity score ( $r = 0.331$ ). The exercise motivator that participants most commonly selected as "strongly agree" was "lose weight or improve shape" (62%), followed by "build muscular strength" (57%). The exercise barrier most commonly selected as occurring "very often" as a reason not to exercise was "lack of time" (30%), followed by "lack of energy" (20%). This study enhances our understanding of exercise behaviors among retired collegiate athletes, specifically gymnasts. Results indicate the vast majority remain physically active but almost half suffer from physical impairments due to previous gymnastics-related injuries. This research can be used by strength and conditioning professionals when working with female collegiate gymnasts to help promote intrinsic motivation for exercise and improve safety guidelines to reduce the number of lasting physical impairments due to gymnastics-related injuries.*

**Keywords:** NCAA, retired gymnasts, physical activity, exercise barriers, exercise motivators.

### 1. INTRODUCTION

Physical activity is any movement of the body that requires energy expenditure. It has been estimated that only 22.9% of the adult population meet the minimal physical activity levels required to reduce cardiovascular disease risk, as set forth by the Department of Health and Human Services federal guidelines (Blackwell, & Clarke, 2018). Physical activity is of particular importance as one ages; participating in regular, moderate to vigorous, aerobic exercise and resistance training has been shown to have numerous health benefits including, maintenance of a healthy body weight, reduced risk of chronic disease, improved mental state, and improved quality of life (Warburton, Nicol, & Bredin, 2006). As such, it is imperative to

understand physical activity levels of various populations as well as perceptions of exercise barriers and motivators.

Exercise motivators can be described as an individual's reason to participate in physical activity. Common categories of exercise motivation include intrinsic and extrinsic. Intrinsic motivation involves engaging in a behavior because it is personally fulfilling, while external motivation is influenced by the act of earning a reward or avoiding a punishment. Exercise barriers are the opposite of exercise motivators and can be described as the obstacles that may inhibit or impair an individual's ability to exercise (Mohammad, & Ahsan, 2016).

It is a common misconception that physical activity early in life as an adolescent or young adult reduces risk of hypokinetic conditions later in life. Although competitive sport athletes require high intensity and volume exercise training in order to be successful, all individuals who participate in competitive sport eventually reach a point where retirement is necessary. Former competitive athletes need to remain physically active to maintain optimal physical and mental health but retirement from competitive sport is often a difficult transitional period in an athlete's life and some former athletes stop engaging in regular physical activity (Simon, & Docherty, 2017).

Previous studies have examined physical activity behaviors of former athletes (Reifsteck, Gill, & Brooks, 2013; Saarni et al., 2006), but it is still unclear why some former collegiate athletes become sedentary and the underlying reasons for sedentary behaviors. Common speculations for sedentary behaviors include previous sports related injury and lack of knowledge on exercise programming. It has been found that many athletes have physical limitations from previous sports related injuries (Simon, & Docherty, 2017). The severity of sports related injuries often correlate with the amount of forceful contact the sport requires. Simon and Docherty (2016), found collision athletes to have significantly lower health-related quality of life scores and worse physical and mental summary scores when compared to contact and limited-contact athletes ( $p < 0.01$ ). Kerr et al. (2015), examined collegiate sports injuries from 2009-2014 and found, of the 25 sports examined, wrestling had the highest overall injury rate among men (13.1 per 1,000 athlete-exposures) and gymnastics had the highest overall injury rate among women (10.4 per 1,000 athlete-exposures). Among female gymnasts the most common injury mechanisms were contact with a surface (33.7%) and overuse (29.8%) (Kerr et al., 2015; Mohammad, 2015a,b,c). Alternatively, former athletes may be accustomed to following a strict training regime and do not have the knowledge to create an exercise program for themselves (Alexandra-Camelia, & Nicolae, 2017). These speculations are potential exercise barriers that may reduce physical activity and overall health and wellbeing.

The National Collegiate Athletic Association (NCAA) is the governing body of collegiate athletics, and as of 2018 there were 494,992 NCAA Division I-III student-athletes throughout the U.S., 44% of which were women, and 4 million retired NCAA student-athletes (NCAA, 2020). At the time of this study there were 81 gymnastics teams sanctioned within NCAA Division I-III (NCAA, 2020). Previous research has examined the differences between genders among former NCAA athletes, and found no significant differences in physical activity levels and athletic identity scores between retired male and female collegiate athletes (Reifsteck, Gill, & Brooks, 2013).

Within this population of retired athletes, samples representative of athletes in specific sports have also been examined. Plateau, Petrie, and Papathomas (2017) examined former female collegiate athletes and found that the majority reported a decrease in exercise volume and intensity after retirement from collegiate sports. Clowes, Lindsay, Fawcett and Knowles (2015) found similar results among former elite gymnasts. Additionally, some of the former gymnasts reported the need for cessation of all physical activity immediately after retirement from sport, but eventually felt a need to return to regular physical activity (Clowes et al., 2015). The former gymnasts expressed difficulty with the loss of their athletic physique

(Clowes et al., 2015). This difficulty with the loss of an athletic physique could contribute to the need for the return to a physically active lifestyle.

The purpose of the present study was to assess the physical activity levels, exercise motivators and exercise barriers among retired female NCAA collegiate gymnasts. Female collegiate gymnasts are exposed to high intensity sport-specific physical activity as well as aesthetic judgment throughout their athletic careers. This exposure leads to the hypothesis that the most common exercise motivator among former gymnast is physical appearance, and the most common exercise barrier is physical limitations from previous gymnastics related injuries.

## 2. METHODS AND MATERIALS

### 2.1 Participants

This study was approved by the Southern Utah University IRB committee (IRB APPROVAL #06-042020a) prior to participant recruitment. Participants represented a convenience sample of 143 former female NCAA Division I-III gymnasts. All former gymnasts were officially retired from collegiate sports at the time they completed the survey, and were not currently participating in a professional competitive sports league. Participants read and accepted the terms stated in the informed consent before partaking in the study.

### 2.2 Procedure

Former NCAA Division I-III gymnasts were contacted via a flyer posted on social media that explained the study purpose and procedures. The flyer included a link to a web-based questionnaire on the Qualtrics platform. The first question included the informed consent. Retired collegiate gymnasts who accepted the terms of the informed consent and agreed to participate in the study clicked “Yes, I consent” after which they were directed to the rest of the survey. Participants were encouraged to complete the entire survey as honestly as possible. The survey consisted of four questionnaires including a demographics survey, the Godin Leisure-Time Exercise questionnaire, the exercise barriers section of the Twin Cities Walking Survey and the exercise motivators section of the Twin Cities Walking Survey. The data was collected during the initial phase of the 2020 COVID-19 pandemic. During this time access to workout facilities and equipment was limited. As such, participants were instructed to recall their exercise routine PRIOR to the COVID-19 pandemic and answer accordingly.

### 2.3 Instruments

The **demographics questionnaire** was designed by the researcher and included four multiple choice questions and one short answer question. It assessed the participant’s gender, age, collegiate sport(s) played, current sports participation status, and sports-related injuries that currently impair physical activity.

The **Godin Leisure-Time Exercise questionnaire** has two sections and includes short response and multiple choice questions. The first section asks how many times during an average 7-day period one participates in strenuous, moderate and mild exercise for more than 15 minutes (Amireault, & Godin, 2015). Examples of strenuous exercise include running, swimming, and long distance biking. Examples of moderate exercise include fast walking, tennis, and short distance biking. Examples of mild exercise include easy walking, yoga, bowling, and golfing. To score the first section, the frequency of strenuous exercise is multiplied by nine, the frequency of moderate exercise is multiplied by five and the frequency of mild exercise is multiplied by three (Amireault, & Godin, 2015). The scores were then

summed and categorized. A score of 24 or higher is considered active, a score of 23 or less is considered inactive (Amireault, & Godin, 2015). The second section of the Godin Leisure-Time Exercise questionnaire was not used. The reliability for this questionnaire was found to be between  $r = 0.45$  and  $r = 0.65$  and the validity was deemed satisfactory (Amireault, & Godin, 2015).

The exercise barriers section of the Twin Cities Walking survey includes 15 potential exercise barriers that participants are asked to rate how often they occur on a scale from 1 (Never) to 5 (Very Often). The scores from the 15 items are summed for a total score (Oakes, Forsyth & Schmitz, 2007). The test-retest reliability score for the exercise barrier section of this survey range from  $r = 0.42$  to  $r = 0.78$  (Forsyth, Oakes, & Schmitz, 2009).

The exercise motivators section of the Twin Cities Walking Survey includes 10 potential exercise motivators that participants are asked to rate how often they occur on a scale from 1 (Strongly disagree) to 5 (Strongly agree). The scores from the 10 items were summed for a total score (Oakes, Forsyth, & Schmitz, 2007). The test-retest reliability score for the exercise motivators section of this survey is  $r = 0.83$  (Forsyth et al., 2009).

## 2.4 Analysis

Physical activity levels prior to the COVID-19 pandemic were measured using the Godin Leisure-Time Exercise survey and results were used to categorize the former gymnasts as physically active ( $\geq 24$ ) or physically inactive ( $\leq 23$ ). A Pearson's Product Correlation was used to assess the relationship between physical activity level and exercise barriers score and motivators score, respectively. Statistical significance was set at  $p < 0.05$ , and Microsoft Excel version 14.7.0 was used to analyze data.

## 3. RESULTS

**Table 1: Participant age ranges**

Age Ranges	%	N
25 and under	33.6	48
26 - 35	40.6	58
36 - 45	19.6	28
46 - 55	6.3	9
Total	100	143

**Table 2: Participant competitive sports status**

Category - Competitive Sports Status	%	n
Compete professionally in same sport	0	0
Compete professionally in different sport	0	0
Compete in same sport at recreational level	0.7	1
Compete in different sport at recreational level	11.2	16
Participate in same sport but not competitively	3.5	5
Participate in different sport but not competitively	5.6	8
Do not participate or compete in any sports but exercise/are physically active on a regular basis	69.2	99
Do not participate or compete in any sport and are physically inactive	7.0	10
Other	2.8	4
Total	100	143

Demographic information regarding participant age and demographic information regarding participant competitive sports status are presented in Table 1 and Table 2,

respectively. The majority of the former gymnasts reported they do not participate or compete in any sport, but are physically active.

**Table 3: Participant currently limiting sports injuries, and body part injured**

Category	%	N
<b>Currently Limiting Collegiate Sport(s) Injuries</b>		
No	55.9	80
Yes	44.1	63
Total	100	143
<b>Body Part Injured</b>		
Ankle/Foot	25.0	21
Knee	29.8	25
Hip	4.8	4
Back	16.7	14
Shoulder/Elbow/Wrist	22.6	19
Concussion	1.2	1
Total	100	84

Information regarding collegiate sports injuries that currently impair physical function and body part(s) injured is presented in Table 3. Of note, approximately half of the former gymnasts have a sports injury that currently limits physical activity; knee injuries are the most commonly injured body part.

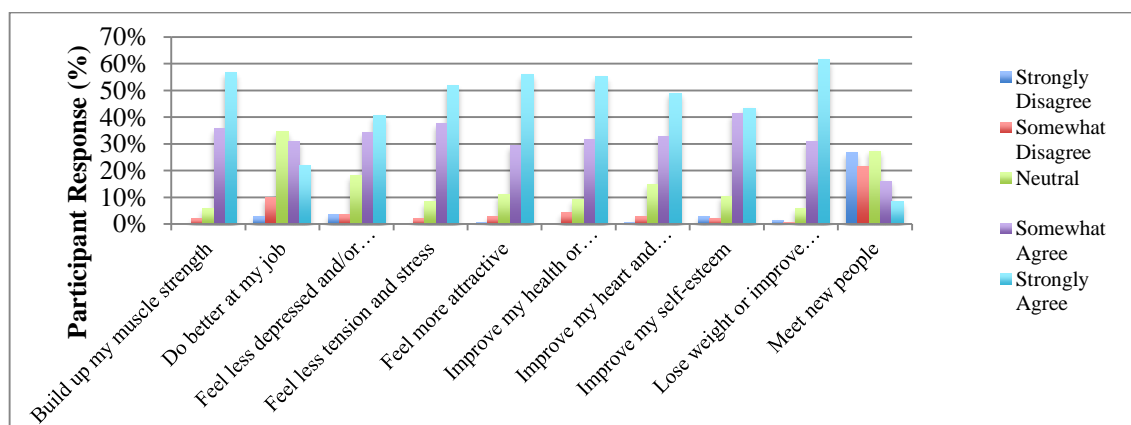
**Table 4: Percentage of physically active former NCAA gymnasts, based on Godin Leisure-time questionnaire score (>24 physically active; < 23 physically inactive)**

Subscale	%	N
Physically active	81.8	117
Physically inactive	18.2	26

Descriptive statistics regarding participant physical activity categories from the Godin Leisure-Time Exercise questionnaire is presented in Table 4. The majority of the former gymnasts had an activity score of 24 or greater and therefore considered active.

Descriptive statistics regarding the exercise motivators section of the Twin Cities Walking Survey is presented in Figure 1. Figure 1 reveals the most common exercise motivators among the former gymnasts are to “lose weight or improve shape” and “build muscular strength”.

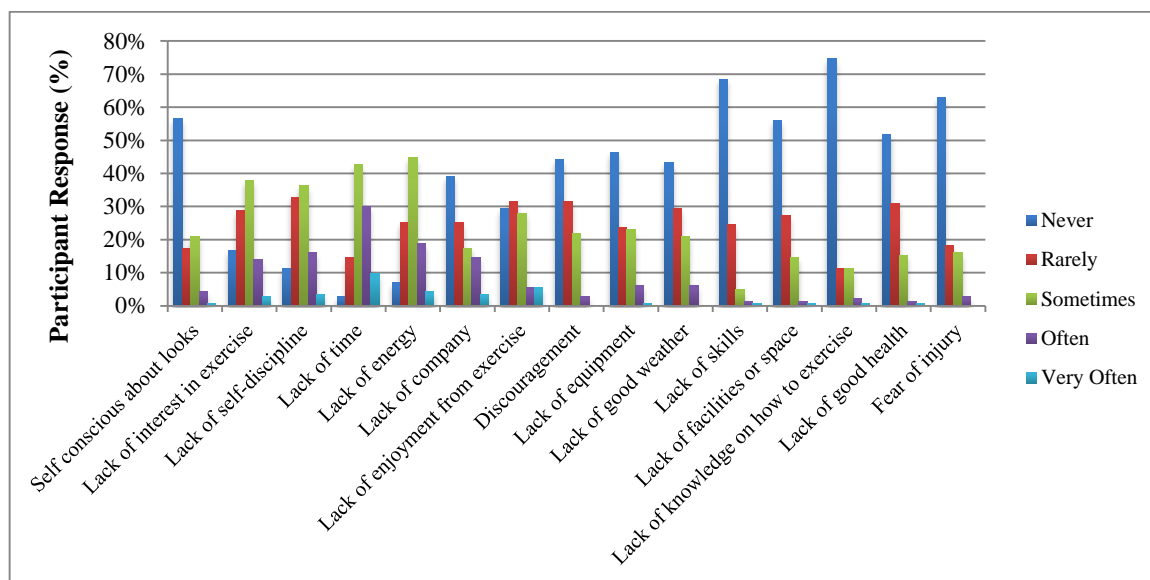
**Figure 1: Responses from the twin cities walking survey on exercise motivators**





Descriptive statistics regarding the exercise barriers section of the Twin Cities Walking Survey is presented in Figure 2. Figure 2 reveals that the most common exercise barrier among the former gymnasts was lack of time (30.1% reporting this barrier occurs often). It also reveals that 74.7% of the former gymnasts indicated that lack of knowledge on how to exercise was never a barrier to participating in physical activity.

**Figure 2: Responses from the twin cities walking survey on exercise barriers**



The scores from each item of the exercise motivators and exercise barriers questionnaires were summed for a total exercise motivator score and a total exercise barriers score. The minimum total score for the exercise motivators is 10 and the maximum total score is 50. Scores closer to 50 indicate increased exercise motivators. The average exercise motivator score among the former gymnasts was  $41 \pm 5$ . The minimum total score for the exercise barriers is 15 and the maximum total score is 75. Scores closer to 15 indicate decreased exercise barriers. The average exercise barriers score among the former gymnasts was  $31 \pm 7$ . A Pearson's correlation, was used to assess the relationship between exercise motivators and exercise barriers to physical activity. Scores ranging from 0.0 to  $\pm 0.30$  are considered negligible, scores  $\pm 0.30$  to  $\pm 0.50$  are low correlations, scores  $\pm 0.50$  to  $\pm 0.70$  are moderate correlations, scores  $\pm 0.70$  to  $\pm 0.90$  are high correlations, and scores  $\pm 0.90$  to  $\pm 1$  are a very high correlation (Mukaka, 2012). Results revealed a low positive linear relationship between exercise motivators score and physical activity,  $r = 0.331$ , and a low inverse linear relationship between exercise barriers score and physical activity,  $r = -0.328$ .

#### 4. DISCUSSION

Physical activity is an important aspect to improve and maintain health, wellness and daily functioning. The purpose of the present study was to assess the physical activity levels, exercise motivators and exercise barriers among retired female NCAA collegiate gymnasts. Overall, it was found that the majority of former gymnasts sampled have remained physically active after retirement from NCAA gymnastics. Reifsteck, Gill and Brooks (2013) examined male and female NCAA Division I athletes, and also found the former collegiate athletes remain physically active after retirement from sports. Additionally, results from a study by

Strawbridge (2001) indicate that previous participation in competitive sports positively influences current physical activity level.

Knowledge and an understanding of exercise motivators and barriers is essential in order to facilitate life-long exercise adherence. The current research found that the most common exercise motivators were to lose weight and improve shape, to build muscular strength, feel less tension and stress, feel more attractive, and to improve physical health. Results from a study by Plateau, Petrie, and Papathomas (2017) also found that exercise motivators associated with physical health and appearance were the most common among former collegiate gymnasts and divers. The general physique of a female gymnast is categorized as ectomorphic mesomorph (Joao & Filho, 2015), which means they have a small stature, but are very muscular. The results from the current study indicate that muscular strength continues to be an important factor after retirement, and former gymnasts appear to have more extrinsic exercise motivators that revolve around physical appearance and physique. Reifsteck, Gill and Labban (2016) found contradicting results in that intrinsic motivation regulations were associated with increased levels physical activity,  $p < 0.01$ , and extrinsic motivation regulations were related to reduced levels of physical activity,  $p < 0.01$  among former collegiate athletes.

Exercise motivators are generally more stable than exercise barriers, and increasing motivation often helps individuals to overcome barriers (Mohammad, & Ahsan, 2016). Exercise barriers relating to both intrinsic and extrinsic motivation can be experienced simultaneously. Exercise barriers associated with intrinsic motivation can be reduced by increasing exercise participation (Capdevila et al., 2007). An example of an exercise barrier related to intrinsic motivation is fatigue. The current research showed that only 4.20% of the former gymnasts reported lack of energy was very often a barrier to physical activity. This supports the idea that individuals with higher levels of exercise participation are less impacted by this barrier associated with intrinsic motivation. The results of the current research also revealed that the most common exercise barrier among the former gymnasts was lack of time. Mariam and Mazin (2019) found that the most common exercise barriers were lack of time, lack of energy and lack of willpower among female employees from Yarmouk University. The female employee population from Yarmouk University may better represent a general cross-section of adult woman in the United States compared to the former gymnast population. It should be noted that the Yarmouk University female employees had low physical activity levels and were all considered inactive (Mariam, & Mazin, 2019), while 81.8% of the former gymnasts from the current research were considered active. This difference among the physical activity levels could illuminate why the female employees from Yarmouk University had more exercise barriers associated with intrinsic motivation than the former gymnasts.

Previous research has speculated that retired athletes may be unable to adhere to exercise without a mandatory or strict program being provided for them (Alexandra-Camelia, & Nicolae, 2017). The current research does not support this speculation. It was found that 74.7% of the former gymnasts reported that lack of knowledge on how to exercise was never a barrier to physical activity. It has also been speculated that former athletes are unable to exercise due to physical limitations as a result from previous sports related injuries (Simon & Docherty, 2016; Simon, & Docherty, 2017; Cowee, & Simon, 2019). The results of the current research partially support this finding. The current research revealed 44.1% of the former gymnasts reported collegiate sports injuries that currently impaired physical function. A portion of the participants, 15.4% and 16.1%, indicated that lack of good health and fear of injury were sometimes a barrier to physical activity, respectively.

This study enhances our understanding of exercise behaviors among retired collegiate gymnasts, and indicates that improving physique and building muscle is the main motivation for physical activity among former gymnasts. The findings of this study may be used by

strength and conditioning professionals when working with female collegiate gymnasts to help promote intrinsic motivation for exercise and improve safety guidelines for gymnastics to reduce the number of lasting physical impairments due to gymnastics-related injuries.

A potential limitation of this study included possible self-reporting bias from the participants. This potential bias was controlled by informing participants that their results would remain anonymous. Another limitation included the specific type of participants that were selected (former female NCAA gymnasts), which leads to the results being more applicable to female athletes, gymnasts in particular rather than the general population.

Future research regarding exercise barriers and motivators of former athletes should include examining both male and female athletes and comparing differences among collision, contact and limited-contact sports. The information garnered may provide a more precise understanding of what type of athletes become sedentary, and if it is more likely to occur in a specific sport, or among specific types of athletes.

## 5. CONCLUSION

The current study revealed that the vast majority of the former gymnasts remain physically active after retirement. It also revealed that while approximately half of the former gymnasts reported a gymnastics-related injury that currently impairs physical function the most common exercise barrier was lack of time. Only 36.4% of the former gymnasts selected lack of health and fear of injury as reasons not to exercise at least some of the time. Additionally, it was found that the most common exercise motivators were to lose weight and improve shape, and to build muscular strength. The findings indicate that both intrinsic and extrinsic motivation can lead to increased physical activity levels, and participation in competitive gymnastics has a positive influence on physical activity levels later in life.

## 6. ACKNOWLEDGEMENTS

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