

Using the FITT Principle to Examine the Relationship between Exercise and Sexual Performance Indicators

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Abstract

The purpose of the study was to examine the relationship between exercise and sexual performance indicators among healthy adults. The sample consisted of 509 participants ranging in ages from 18-74 who completed a 30-item questionnaire on exercise frequency, intensity, time, and type and sexual performance indicators. Exercise was measured using the FITT principle of frequency, intensity, time, and type. Sexual performance indicators were identified as frequency of sexual arousal, ability to be easily aroused, number of orgasms in a single sexual episode, ease of orgasm, frequency of sexual intercourse, and sexual arousal then loss of interest. Spearman's rho correlations demonstrated numerous significant relationships between the exercise FITT principle and the sexual performance indicators. Analysis of the FITT principle revealed that aerobic frequency was positively correlated with more of the sexual performance indicators compared to any of the other variables associated with frequency, intensity, time, or type of exercise; while intensity of strength training had the strongest positive correlation with three of the sexual performance indicators.

Keywords: exercise, physical activity, sexual performance, arousal, orgasm

1.0 Introduction

Exercise and sexual health are integral components that make up part of an individual's overall well-being. Exercise (Raudsepp, Neissar, & Kull, 2013) and sexual well-being (Higgins, Mullinax, Trussell, Davidson, & Moore, 2011) can also contribute to an individual's level of personal and interpersonal self-worth. Much of the current literature that addresses exercise and sexual well-being focuses on improvement of sexual dysfunction among adults who have limited sexual satisfaction and/or sexual performance related to physical determinants (Collins et al., 2012; Goh & Tong, 2011; Hsiao et al., 2012; Mishra et al., 2015). However, these studies do not address how exercise might be related to a specific set of sexual performance indicators among healthy adults.

Exercise has been shown to have many physical and emotional benefits (Agarwal, 2012; Hunter et al., 2012; Roumen, Blaak, Corpeleijn, 2009; Sherrington et al., 2008; Teychenne, Ball, & Salmon, 2008). Previously published work has also demonstrated that exercise enhances sexual satisfaction (Haavio-Mannila & Kontula, 1997; Marshall, Morris, & Rainey, 2014; Waite & Joyner, 2001), sexual desirability (Penhollow & Young, 2004), and self-reported sexual performance (Penhollow & Young, 2004).

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Although various facets of exercise have been linked to improved aspects of sexual performance (Meston, 2000), this is typically examined in unhealthy adults who have been diagnosed with physical conditions such as COPD (Abd-El Salam, Mahgoub, Ghoneim, & Abou-Abdu, 2015), diabetes (Linadu et al., 2010), heart failure (Levine et al., 2012; Mohammadi, Shahparian, Fahidy, & Fallah, 2012) and obesity (Kolotkin, 2006). The current study collected self-reported data from adults of average health and wellness as well as from active adults living a multi-sport lifestyle.

Typically when exploring sexual performance, it is done in the context of exploring sexual dysfunction (Bacon, Mittleman, Kawachi, Glasser, & Rimm, 2006; Dabrowska, Drosdzol, Skrzypulec and Plinta 2010). Researchers and clinicians tend to examine issues at the points along the stages of sexual response (Kaplan, 1979; Masters & Johnson, 1966). In addition to asking participants about desire, arousal and orgasm, the current study also included questions about aspects of sexual performance not typically included in previous studies such as the number of orgasms in a single sexual episode with a partner.

The current study contributed to the existing literature by examining the relationship between exercise and sexual performance indicators among healthy adults. It was of particular interest to explore the relationship between exercise frequency, intensity, time and type and sexual performance indicators of adult men and women. The researchers used the exercise FITT principle to determine the association between exercise and self-reported levels of improved sexual performance.

Specific questions addressed in this study were: 1) Is there a relationship between frequency of exercise type and sexual performance indicators? 2) Is there a relationship between exercise intensity and sexual performance indicators? 3) Is there a relationship between time spent in different exercise types and sexual performance indicators? 4) Is there a relationship between general activity level of exercise types and sexual performance indicators?

From the proposed research questions, as well as findings from previous studies, the researchers developed four hypotheses. The specific hypotheses that were explored in this study are as follows: 1) Higher exercise frequency among the different exercise types will be positively correlated with the sexual performance indicators. 2) Higher exercise intensity among the different exercise types will be positively correlated with the sexual performance indicators. 3) Higher levels of exercise time among the different exercise types will be positively correlated with the sexual performance indicators. 4) General activity level among the different exercise types will be positively correlated with the sexual performance indicators.

2. Methods

2.1 Research Design

A non-experimental research design was utilized to collect quantitative data through the use of an online self-report survey. The data collected were used to provide descriptive and correlational analyses regarding the interaction between exercise and sexual performance indicators. Researchers utilized this approach to: 1) achieve a higher level of confidentiality and anonymity regarding questions surrounding exercise and sexuality, and 2) to achieve larger sample size by using a self-selected sample and a self-report survey.

This research design allowed the researchers to collect sensitive data on subjects' exercise and sexual behavior with greater protection of the subjects' privacy, without compromising the reliability of the study design. Previous research has demonstrated that internet samples provide sufficient diversity with respect to gender, socioeconomic status, geographic region, and age (Ritter, Lorig, Laurent, & Matthews, 2004; Gosling, Vazire, Srivastava, & John, 2004). Internet findings can be generalized across presentation formats without compromising reliability. In addition, they are not adversely affected by non-serious or repeat responders and are consistent with findings from traditional methods (Basnov, Kongsved, Bech, & Hjollund, 2009; Kongsved, Basnov, Holm-Christensen, & Hjollund, 2007). Based on support from previous studies, the researchers concluded that internet data collection methods may contribute towards many areas of behavioral studies without compromising validity, reliability, and response rates.

2.2 Subjects

Individuals for this study were recruited through four different social networking sites. These included Facebook, Twitter, IamTri, and Active.com. Individuals were also recruited from an email listserv of triathlon clubs provided by the USA Triathlon Organization (USAT). Individuals were adults between 18-74 years of age that either a) viewed an ad containing an online invitation to the study via one of the social networking platforms, or b) received an invitation email through the USAT email listserv.

2.3 Procedures

This research was reviewed and approved by the university's Institutional Review Board. The researchers recruited individuals for the study by sending emails to the USAT email listserv and by posting an advertisement on four different social networking sites.

First, the researchers used the email listserv provided by USAT to contact all USAT club organizers in each state across the United States. Researchers provided the USAT club organizers with an email describing the study which they could then forward to their club members asking for their voluntary participation in the study. A link to the online survey was provided in the email. Individuals could click on this link, which would open the online survey supported by Qualtrix. After reviewing the study description and consent form, they could click on the button indicating consent, which would allow them to proceed to the 30-item questionnaire that asked various questions regarding exercise and sexual performance indicators.

Second, the researchers placed an ad on four social media sites which included Facebook, Twitter, I am Tri, and Active.com. This ad described the study and included an invitation to the study. Individuals interested in participating in the study could select the link and then were routed to the online survey. Once directed to the study site, they could also review the study description and consent form, provide consent, and then complete the 30-item questionnaire that asked various questions regarding exercise and sexual performance indicators.

All of the data collected from the participants was anonymous and confidential. No personal identifiers were collected, and all information collected was assigned arbitrary code numbers via the Qualtrics database system which de-identified subjects' data.

2.4 Testing Instrument

The instrument used for this study was a self-report questionnaire which included demographic items, items related to sexual performance, and items related to exercise. Four items were taken from the Sexual History Form (SHF) that addressed sexual performance indicators (Nowinski & LoPiccolo, 1979). One item addressed frequency of sexual intercourse by asking, "How frequently do you and your partner have sexual intercourse or activity?" One item addressed the number of orgasms in a single sexual episode by asking, "When thinking about your sexual activity, on average, how many orgasms do you have in a single sexual episode?" Two questions were specific to men. These two items included: 1) "How often do you wake from sleep with a firm erection?" and 2) "How often do you wake with a partial erection?" These two items had a Cronbach's alpha of 1.0, while previous research that utilized these items from the SHF found that the temporal stability ranged from .92 (Creti et al, 1988) to .98 (Libman et al, 1989). The SHF was originally developed for clinical use but has frequently been used item-by-item to assess sexual behavior frequency and sexual functioning.

Eight items were used from the Changes in Sexual Functioning Questionnaire (CSFQ). Two of the items addressed sexual performance indicators specific to men. These included: 1) "How often do you have an erection related to sexual activity?" and 2) "Do you get an erection easily?" One item addressed a sexual performance indicator specific to women which was, "How often do you have adequate vaginal lubrication for sexual activity?" Five items addressed sexual performance indicators for both men and women. These included: 1) "How often do you desire to engage in sexual activity?" 2) "How often do you become sexually aroused?" 3) "How often are you easily aroused?" 4) "How often do you become aroused and then lose interest?" and 5) "Are you able to have an orgasm when you want to?" Total item correlations for the CSFQ ranged from .45-.60. Cronbach's alpha coefficient of internal reliability ranged from .90 for females to .89 for males (Keller, McGarvey & Clayton, 2006). Internal consistency of the CSFQ demonstrated a Cronbach's alpha from .84-.86 across three different studies while item total correlations ranged from $r = .41$ to $.77$. Reliability of the CSFQ was also addressed over a four-week test-retest period with $r = .82$ (McIntyre-Smith & Fisher, 2010).

The researchers also developed four additional items, two for women and two for men, to assess likelihood of orgasm and time between multiple orgasms (i.e. refractory period). The two questions specific to men included: 1) "During a single sexual episode in which you had an orgasm, how likely were you able to reach additional erections in order to re-engage in sexual activity?" and 2)

"During a single sexual episode in which you had an orgasm, approximately how long after your first orgasm did it take to reach erection in order to re-engage in sexual activity?" For the two items unique to men, the Cronbach's alpha was .97. The two questions specific to women included: 1) "During a single sexual episode, how likely are you to reach multiple orgasms?" and 2) "During a single sexual episode in which you had multiple orgasms, approximately how long after your first orgasm did it take you to reach your second orgasm?" For the two items unique to women, the Cronbach's alpha was .89.

To measure the FITT principle, the researchers utilized four items from the Behavior Risk Factor Surveillance Survey (BRFSS) that addressed exercise frequency, exercise intensity, time spent exercising, and type of exercise during the past 30 days. Exercise frequency was categorized as low, moderate, and high frequency. Low frequency was defined as a range from "never to 2-3 times per month." Moderate frequency was defined as a range from "once a week to 2-3 times per week." High frequency was defined as "daily to more than once a day." Exercise intensity was measured using the Borg CR10 Scale. This scale can be used to document the perceived level of exertion (RPE) during exercise (Borg, 1970). The Borg CR10 scale is an adaptation of the original Borg RPE Scale which rated perceived level of exertion on a scale of 6-20. The adapted Borg scale ranges in number from 0-10, with 0 indicating no effort at all to normal breathing, while 10 identifies extreme intensity and breathlessness during exercise (Borg, 1998). Low intensity was defined as "did not participate to light and easy breathing (0-2)." Moderate intensity was defined as "moderate breathing to becoming uncomfortable to breathe (3-6)." High intensity was defined as "very hard to breathe to impossible to maintain (7-10)." Time spent in exercise (exercise duration) was also categorized as low, moderate, or high. Low duration was defined as "never or less than 30 minutes." Moderate duration was defined as "approximately 30 minutes to 45-60 minutes," and high duration was defined as "more than 60 minutes." General level of activity as it related to exercise type was categorized as low, moderate, and high activity. Low activity was defined as "never or physically inactive or irregular activity." Moderate activity was defined as "regular activity," while high activity was defined as "regular and vigorous activity." These four items demonstrated a high level of consistency with a Cronbach's alpha of .997.

The final version of the instrument used to collect data for this study consisted of 30 questions which also included items related to sexual satisfaction but were not used for analysis in this study. Reliability of the data using Cronbach's alpha for all of the scaled items used for this study was .927.

2.5 Data Analysis

All data were collected via Qualtrics utilizing an online survey. Once the questionnaire was completed through the online link, data for each participant were automatically stored with no personal identifiers in this online database. Data were cleaned and then analyzed using SPSS to perform descriptive statistics to summarize data according to various demographic variables and determine measures of central tendencies regarding self-reported levels of exercise and sexual performance indicators. Correlation analyses were used to test the statistical hypotheses and determine the strength of the relationship between exercise frequency, exercise intensity, exercise time, exercise type, and the sexual performance indicators.

3.0 Results

The final sample consisted of 509 participants who completed the online survey (Table 1). The age of participants ranged from 18 to 74 years, with the highest percentage (23.6%) of the participants falling within the 18-24 age groups, while the majorities (55.6%) of the participants were between 18 to 34 years old. Forty-five percent were males while 55% were females. The majority of the participants were white (81%) and most (58%) had completed a college degree. Roughly 26% of the participants reported an annual income at less than twenty thousand dollars while the majority (50%) of the participants reported an annual income of \$50,000.

Table 1: Self-Reported Demographic Characteristics of Participants (N = 509)

Variable	N	%	Cum%
Age			
18-23	120	23.6	23.6
24-29	91	17.9	41.5
30-34	72	14.1	55.6
35-39	60	11.8	67.4
40-49	97	19.1	86.5
50-59	52	10.2	96.7
60-69	15	2.9	99.6
70+	2	0.4	100.0
Gender			
Male	231	45.4	45.4
Female	278	54.6	100.0
Race/Ethnicity			
White	411	80.7	80.7
Black	52	10.2	90.9
Hispanic	15	2.9	93.8
Asian	14	2.8	96.6
Other	17	3.4	100.0
Education			
High school/GED	8	1.6	1.6
Some college	134	26.3	27.9
College degree	182	35.8	63.7
Graduate degree	115	22.6	86.2
Advanced degree	70	13.8	100.0
Income			
10,000-19,999	131	25.7	25.7
20,000-29,999	33	6.5	32.2
30,000-39,999	40	7.9	40.1
40,000-49,999	50	9.8	49.9
50,000-69,999	71	13.9	63.9
70,000-99,999	78	15.3	79.2
100,000+	106	20.8	100.0

Frequency distribution for exercise type indicated that the majority of participants (78%) reported low levels of participation in sports, such as basketball, football, softball, tennis, or golf. Results determined that about half of the participants (51%) also reported low levels of participation in recreation; this included canoeing, hiking, fishing, hunting or leisurely walking. Half of participants (50%) had high levels of participation in aerobics, which included running, cycling, swimming, aerobics class, or power walking. About half of participants (54%) reported moderate levels of participation in strength training; this included basic calisthenics, weight-lifting, yoga and Pilates (Table 2).

Table 2: Self-Reported Characteristics of Exercise Participation (N = 509)

Variable	N	%	Cum%
Aerobics Participation			
Never	31	6.1	6.1
< Once a month	12	2.4	8.4
Once per month	16	3.1	11.6
2-3 times per month	14	2.8	14.3
Once per week	22	4.3	18.7
2-3 times per week	129	25.3	44.0
Daily	143	28.1	72.1
> Once per day	79	15.5	86.7
Missing data	63	12.4	100.0
ST Participation			
Never	55	10.8	10.8
< Once a month	17	3.3	14.1
Once per month	20	3.9	18.1
2-3 times per month	48	9.4	27.5
Once per week	72	14.1	41.7
2-3 times per week	173	34.0	75.6
Daily	52	10.2	85.9
> Once per day	9	1.8	87.6
Missing data	63	12.4	100.0
Sports Participation			
Never	224	44.0	44.0
< Once per month	68	13.4	57.4
Once per month	33	6.5	63.9
2-3 times per month	24	4.7	68.6
Once per week	36	7.1	75.6
2-3 times per week	27	5.3	80.9
Daily	23	4.5	85.5
> Once per day	11	2.2	87.6
Missing data	63	12.4	100.0
Recreation Participation			
Never	66	13.0	13.0
< Once per month	42	8.3	21.2
Once per month	41	8.1	29.3
2-3 times per month	78	15.3	44.6
Once per week	88	17.3	61.9
2-3 times per week	81	15.9	77.8
Daily	38	7.5	85.3
> Once per day	12	2.4	87.6
Missing data	63	12.4	100.0

Spearman rho analyses were conducted to determine the strength and direction of the linear relationships between exercise frequency, exercise intensity, exercise time, exercise type and sexual performance indicators. After performing preliminary analyses to ensure that there were no violations of normality, linearity, and homoscedasticity, the Spearman's rho analyses affirmed a number of significant relationships between the exercise FITT principle and sexual performance indicators.

Results of the Spearman's rho analyses revealed a statistically significant relationship between frequency of exercise type and the frequency of sexual arousal ($p < .001$), ease of arousal ($p < .001$), ease of orgasm ($p < .001$; $p < .05$), frequency of sexual desire ($p < .001$), and sexual arousal then loss of interest ($p < .001$) (Table 3). The strongest positive correlation was between frequency of aerobic exercise and frequency of sexual desire ($r_s[446] = .20$, $p < .01$). Squaring the correlation coefficient demonstrated that only four percent of the variance was explained by the frequency of aerobic exercise. Frequency of aerobic exercise also had a positive significant correlation with frequency of sexual arousal ($r_s[446] = .19$, $p < .001$), ease of orgasm ($r_s[446] = .18$, $p < .001$), and ease of arousal ($r_s[446] = .15$, $p < .001$). There was also a significant negative correlation between frequency of aerobic exercise and sexual arousal then loss of interest ($r_s[446] = -.18$, $p < .01$). Frequency of strength training was positively correlated with ease of orgasm ($r_s[446] = .11$, $p < .05$). There was no significant correlation between frequency of exercise type and number of orgasms in a single sexual episode and frequency of sexual intercourse.

Table 3: Correlations for Frequency of Exercise Type and Sexual Performance Indicators

	<i>Sport</i>	<i>Aerobics</i>	<i>Recreation</i>	<i>Strength Training</i>
SA	.114*	.185**	.044	.044
EA	.029	.150**	.055	.065
EO	-.008	.180**	.047	.110*
SD	.080	.197**	.052	.073
SA/LI	.013	-.183**	-.049	-.068

SA – frequency of sexual arousal; EA – ease of arousal, EO – ease of orgasm, SD – frequency of sexual desire, SA/LI – sexual arousal then loss of interest. * $p < .05$ and ** $p < .001$.

Spearman's rho analyses revealed a statistically significant relationship between time spent in the different exercise types and frequency of sexual arousal ($p < .001$), ease of arousal ($p < .001$; $p < .05$), ease of orgasm ($p < .001$), frequency of sexual desire ($p < .001$; $p < .05$), and sexual arousal then loss of interest ($p < .001$) (Table 4). The strongest positive correlation was between time spent in aerobic exercise and frequency of sexual desire ($r_s[441] = .18$, $p < .01$). Time spent in aerobic exercise and time spent in strength training yielded the second highest significant positive correlation with ease of orgasm ($r_s[441] = .16$, $p < .01$). Squaring the correlation coefficient demonstrated that only three percent of the variance was explained by time spent in aerobic exercise and time spent in strength training. Time spent in aerobic exercise also had a significant positive correlation with ease of arousal ($r_s[441] = .15$, $p < .001$) and ease of orgasm ($r_s[441] = .15$, $p < .001$). There was also a significant negative correlation between time spent in aerobic exercise and sexual arousal then loss of interest ($r_s[441] = -.17$, $p < .01$). Time spent in strength training was positively correlated with frequency of sexual desire ($r_s[441] = .16$, $P < .005$), frequency of sexual arousal ($r_s[441] = .13$, $p < .001$), and ease of arousal ($r_s[441] = .12$, $p < .05$). Time spent in recreation had a positive significant correlation with frequency of sexual desire ($r_s[441] = .10$, $p < .05$). There was no significant correlation between time spent in the different exercise types and number of orgasms in a single sexual episode or frequency of sexual intercourse.

Table 4: Correlations for Time Spent in Different Exercise Types and Sexual Performance Indicators

	<i>Sport</i>	<i>Aerobics</i>	<i>Recreation</i>	<i>Strength Training</i>
SA	.131**	.162**	.093	.130**
EA	.034	.151**	.071	.120*
EO	.046	.145**	.087	.162**
SD	.070	.178**	.106*	.160**
SA/LI	-.022	-.168**	-.079	-.051

SA – frequency of sexual arousal; EA – ease of arousal, EO – ease of orgasm, SD – frequency of sexual desire, SA/LI – sexual arousal then loss of interest. * $p < .05$ and ** $p < .001$.

Spearman's rho analyses revealed a statistically significant relationship between general activity level of exercise type and frequency of sexual arousal ($p < .001$; $p < .05$), ease of arousal ($p < .001$), ease of orgasm ($p < .001$), frequency of sexual desire ($p < .001$), and frequency of sexual intercourse ($p < .05$) (Table 5). The strongest positive correlation was between general activity level of strength training and ease of orgasm ($r_s[136] = .30$, $p < .001$). General activity level of strength training was also positively correlated with frequency of sexual desire ($r_s[136] = .28$, $p < .001$) and frequency of sexual arousal ($r_s[136] = .28$, $p < .001$), ease of arousal ($r_s[136] = .24$, $p < .001$), and frequency of sexual intercourse ($r_s[136] = .20$, $p < .05$). Squaring the correlation coefficient demonstrated that nine percent of the variance was explained by the general activity level of strength training. General activity level of recreation demonstrated a significant positive correlation with frequency of sexual arousal ($r_s[136] = .15$, $p < .05$). There was no significant correlation between general activity level of exercise type and number of orgasms in a single sexual episode or sexual arousal and then loss of interest.

Table 5: Correlations for General Activity Level of Exercise Type and Sexual Performance Indicators

	Sport	Aerobics	Recreation	Strength Training
SA	.052	.159	.145*	.275**
EA	.017	.195	.081	.235**
EO	-.038	.038	.082	.301**
SD	.001	.083	.050	.276**
SI	.017	.185	.079	.197*

SA – frequency of sexual arousal; EA – ease of arousal, EO – ease of orgasm, SD – frequency of sexual desire, SI – frequency of sexual intercourse. * $p < .05$ and ** $p < .001$.

Spearman's rho analyses revealed a statistically significant relationship between exercise intensity (RPE) of the different exercise types and frequency of sexual arousal ($p < .001$; $p < .05$), ease of arousal ($p < .001$; $p < .05$), number of orgasms in a single sexual episode ($p < .001$), ease of orgasm ($p < .001$), and frequency of sexual intercourse ($p < .001$; $p < .05$) (Table 6). The strongest positive correlation was between intensity of strength training and ease of orgasm ($r_s[432] = .17$, $p < .01$). Intensity of strength training was also positively correlated with frequency of sexual intercourse ($r_s[432] = .12$, $p < .05$), frequency of sexual arousal ($r_s[432] = .12$, $p < .05$), and ease of arousal ($r_s[432] = .11$, $p < .05$). Squaring the correlation coefficient demonstrated that only three percent of the variance was explained by the level of intensity of strength training. There was also a positive significant correlation between intensity of aerobic exercise and frequency of sexual arousal ($r_s[432] = .15$, $p < .001$), frequency of sexual intercourse ($r_s[432] = .15$, $p < .001$), ease of arousal ($r_s[432] = .13$, $p < .001$), and ease of orgasm ($r_s[432] = .13$, $p < .001$). Intensity of recreation was positively correlated with number of orgasms in a single sexual episode ($r_s[432] = .14$, $p < .001$) and ease of arousal ($r_s[432] = .10$, $p < .05$).

Table 6: Correlations for Exercise Intensity (RPE) and Sexual Performance Indicators

	Sport	Aerobics	Recreation	Strength Training
SA	.054	.153**	.069	.115*
EA	-.047	.134**	.099*	.114*
NO	.066	-.015	.136**	.053
EO	.016	.126**	.045	.168**
SI	.027	.150**	.057	.118*

SA – frequency of sexual arousal; EA – ease of arousal, NO – number of orgasm in single sexual episode, EO – ease of orgasm, SI – frequency of sexual intercourse. * $p < .05$ and ** $p < .001$.

4.0 Discussion

In this study, researchers collected data using various social networking sites and an email listserv to determine the relationship between the exercise FITT principle and various sexual performance indicators. Variables were analyzed using basic frequency counts and Spearman's rho correlations.

Results of the study supported all of four of the hypotheses, demonstrating that exercise frequency, exercise intensity, exercise time, and general activity level of exercise type are positively related to the sexual performance indicators, which included frequency of sexual arousal, ease of arousal, ease of orgasm, frequency of sexual desire, frequency of sexual intercourse.

Correlations for frequency of exercise type and the sexual performance indicators demonstrated that frequency of aerobic exercise was positively correlated with all of the sexual performance indicators, except for sexual arousal then loss of interest, which had a significant negative correlation. Frequency of aerobic exercise may improve the frequency of sexual arousal, ease of arousal, ease of orgasm, the frequency of sexual desire, and decrease loss of interest after being sexually aroused. These findings are consistent with work completed by Pujols, Metson, & Seal (2010) which demonstrated that individuals who frequently engage in aerobic exercise and spend greater amounts of time participating in aerobic exercise are likely to be at a healthy weight and have a healthy body image and self-esteem. Such factors are significantly related to sexual image and sexual desirability (Penhollow and Young, 2004).

Time spent in different exercise types revealed the greatest number of overall positive correlations among the sexual performance indicators. Time spent in aerobic exercise and strength training was significantly related to frequency of sexual arousal, ease of arousal, ease of orgasm, and frequency of sexual desire. Time spent in aerobic exercise was negatively correlated with sexual arousal then loss of interest, but this finding demonstrates a decrease in loss of interest once aroused. These findings support previous work (Martinez, Ferreira, Castro, & Gomide, 2014) which has shown that strength training strengthens one's core and pelvic platform. Original work by Kegel (1948) regarding strength training and restoration of pelvic floor muscles connects with current research (Braekken, Majida, Engh, & Bo, 2015) that also supports a correlation between strength training and ease of orgasm during sexual episodes.

Correlations for general activity level of exercise type demonstrated significant positive correlations between strength training, frequency of sexual arousal, ease of arousal, ease of orgasm, frequency of sexual desire, and frequency of sexual intercourse. In addition, general activity level of recreation was positively correlated with frequency of sexual arousal. These findings support previous work (Li, Holm, Gulanick, Lanuza, & Penckofer, 1999) which demonstrated that levels of physical activity could decrease distressful sexual symptoms like vaginal dryness and improve sexual desire. The correlation between general activity level of recreation and frequency of sexual arousal may be explained by improved body awareness and body image. Research in outdoor recreation experiences showed that women who participated in a three-day out-door recreation experience reported more positive feelings towards their bodies (Pfirman, 1988), and more current findings revealed that body image issues can impact all domains of sexual functioning (Woertman & van dem Brink, 2012).

Correlations for exercise intensity (RPE) and sexual performance indicators also revealed a number of significant positive correlations. Aerobic and strength training intensity were positively related to frequency of sexual arousal, ease of arousal, ease of orgasm, and frequency of sexual intercourse. The researchers also found a positive relationship between recreation intensity, ease of arousal, and number of orgasms in a single sexual episode. These findings may be explained through a number of reasons. High intensity training is related to increased levels of testosterone (Khoo, et al, 2013; Tanner, Nielsen, & Allgrove, 2013) and increased testosterone improves sexual desires (Davis & Braunstein, 2012). In addition, aerobic and strength training exercise promotes healthy blood pressure (Cornelissen & Smart, 2013) and numerous studies (Dabrowska, Drosdzol, Skrzypulec & Plinta, 2010; Margus et al., 2011; Spatz, Canavan, Desai, Krumholz & Lindau, 2013) demonstrate that hypertension is related to decreased sexual function. These particular sexual performance indicators are also aspects of libido, which improves as a result of exercise (Friedenreich, et al, 2010). Furthermore, previous work also showed that strength training intensity correlates with ease of orgasm (Bo, Talseth, & Vinsnes, 2000; Braekken, Majida, Engh, & Bo, 2015; Kegel, 1952; Zahariou, Karamouti, & Papaioannou, 2008).

Interestingly, intensity in recreation was the only exercise variable that revealed a significant positive correlation with number of orgasms in a single sexual episode. As mentioned previously, the correlation between recreation and sexual performance indicators may be related to increased body awareness (Copland, 1994) and more positive feelings about self-image (Pfirman, 1988).

This type of recreation activity, such as hiking, canoeing, and wilderness trips, may help individuals reconnect with their physical body through a process that includes elements of risk taking, team-building, and trusting. Through these elements, positive feelings of self-image and increased body awareness may develop which can contribute to the likelihood of multiple orgasms. This concept of body awareness and multiple orgasms has been supported by research (Sayin, 2012) showing that women who are more aware of their bodies are more likely to have stronger, more intense, prolonged, or expanded orgasms (Sayin, 2012).

Overall results from this study seem to indicate that the exercise FITT principle plays a significant role in overall sexual performance for healthy adults. Previous studies (Penhollow & Young, 2008; Penhollow & Young, 2004; Simon et al., 2015) support this claim by revealing that adults who report higher fitness levels also report better sexual performance. Karatas and colleagues (2009) found that female athletes scored higher on the Female Sexual Function Index as compared to sedentary healthy females indicating better clitoral blood flow and better overall sexual function. It appears that superior levels of fitness and exercise type correlates with better sexual performance for healthy adults.

4.1 Limitations

This study's primary limitation is that it only explores the relationship between the exercise FITT principle and the sexual performance indicators which included frequency of sexual arousal, ease of arousal, ease of orgasm, frequency of sexual desire, sexual arousal then loss of interest, frequency of sexual intercourse and number of orgasms in a single sexual episode. Previous research has demonstrated that other facets of sexual performance, such as relationship status and relationship satisfaction as well as psychological or emotional characteristics of individuals contribute to an individual's perceived overall sexual performance (Janssen, McBride, Yarber, Hill, & Butler, 2008). To provide a more comprehensive understanding as to what variables or sets of variables have the most significant relationship with sexual performance indicators, these factors should also be considered in the context of future work related to exercise and sexual performance.

Other limitations that are associated with the present study are those commonly attributed to self-reported data. Participants may over-report or under-report their behaviors and perceived levels of participation as it relates to exercise frequency, exercise intensity, time spent in exercise, and exercise type. In addition, providing information regarding personal sexual behavior may be uncomfortable to some individuals and they may have a greater likelihood not to report behavior such as ease of orgasms, number of orgasm, and frequency of sexual intercourse. Furthermore, since the responses were anonymous and confidential, they could not be traced to individuals who may participate in a multi-sport lifestyle. This prevented the researchers from categorizing participants by groups who engaged in general exercise types verses exercise types specific to triathlon. Therefore, these results are unique to the study sample and should not be generalized among the general fitness population or individuals who participate in triathlon.

When categorizing time spent in exercise, the researchers did not include categories that might be more specific to individuals who participate in triathlon training. For example, many triathletes report exceeding seven hours or more in weekly training. Additional categories for time spent in exercise that exceeded "high duration-60 minutes or more" were not included. Lack of these categories limits the findings to correlations that can only explain a broad range relationship between time spent in exercise and sexual performance indicators. Exercise duration categories beyond 60 minutes would have allowed the researchers to determine if time spent in exercise that exceeds the gold standard of sixty minutes, six days per week produces stronger correlations between the exercise the FITT principle and sexual performance indicators.

Future studies may want to compare differences in reported sexual performance indicators between multi-sport lifestyle participants and general exercise participants. Additionally, future studies may want to consider the relationship of the exercise FITT principle that falls well beyond recommended standards for exercise frequency, exercise intensity, exercise time, and exercise type, and determine if there are a set of exercise variables that may predict improved sexual performance. Participants who report exceedingly high levels of exercise using the FITT principle may or may not demonstrate improved sexual performance indicators beyond that of those individuals who engage in the recommended standards for exercise.

5. Conclusions

Exercise and sexuality continue to be lifestyle factors that contribute to overall quality of life (Chodzko-Zajko, 2014; Skorupska, Szeligowska, & Mamcarz, 2013). This comes as no surprise as previous research has demonstrated that exercise is linked to improved cardiovascular function (Gibala, Little, MacDonald, & Hawley, 2012), body image (Hausenblaus & Fallon, 2006; Mehnert et al., 2011; Penhollow & Young 2008), self-esteem (Barton, Griffin, & Pretty, 2013), and overall quality of life (Gibala, Little, MacDonald, & Hawley, 2012; Mehnert et al., 2011; Myers et al., 2013). Healthy sexuality is linked to overall quality of life (Gelfand, 2000; Robinson & Molzahn, 2007) and is an important component of healthy relationships (Penhollow, Young, & Denny, 2009).

The current study demonstrated that there is a relationship between the exercise FITT principle and sexual performance indicators which included frequency of sexual arousal, ease of arousal, ease of orgasm, frequency of sexual desire, frequency of sexual intercourse, and number of orgasms in a single sexual episode. Previous work has demonstrated that healthy cardiovascular function improves blood flow to both male and female genitalia, which is required for healthy sexual function and orgasm (Karatas et al., 2009; Spatz, Canavan, Desai, Krumholz, & Lindau, 2013). Findings from this study support previous work (Cormie et al., 2013; Lara et al., 2015; Meston 2000; White, Case, McWhirter, & Mattison, 1990) indicating that exercise is related to improved sexual performance.

Moreover, aerobic exercise frequency and time spent in aerobic exercise was positively correlated with a greater number of the sexual performance indicators than the frequency, intensity, and time spent in any other exercise type. Strength training intensity had the highest positive correlations with the sexual performance indicators. This may suggest that individuals wanting to improve their sexual performance may want to consider exercise prescriptions that include frequent aerobic exercise with bouts of aerobic exercise that are longer in duration. In addition, high intensity strength training should also be considered as part of the overall exercise regimen.

Furthermore, it is interesting that recreation was the only exercise type significantly related to multiple orgasms in a single sexual episode. Although this finding was initially surprising to the researchers, review of earlier studies (Copland, 1994; Pfirman, 1988) in recreation shows that individuals can develop self-awareness, trust, and positive feelings of self-image through this exercise type. These traits are related to improved sexuality (Sayin, 2012). Therefore, exercise types that primarily focus on factors such as weight loss, muscular strength, muscular endurance, and general fitness may not improve sexual performance as well as exercise types that include these factors but also promote self-awareness and development of positive self-image.

This type of study adds to the current body of literature by utilizing the exercise FITT principle to determine the relationship between exercise frequency, exercise intensity, time spent in exercise, exercise type, and sexual performance indicators. This study's sample was uniquely collected from a large pool spanning a broad age range and included participants who were recruited from an email listserv of people who maintain a multi-sport lifestyle along with participants who were recruited from social networking sites accessed by the general public (Marshall, Morris & Rainey, 2014).

Future work could focus exclusively on individuals who report excessive exercise frequency, exercise intensity, and exercise time among different exercise types to determine if exercise prescription that greatly exceeds the recommended gold standard enhances or reduces self-reported sexual performance indicators. Researchers could also consider randomized control trials to compare the effects of a behavioral intervention using prescribed exercise participation to better assess the degree of influence the exercise FITT principle may have on sexual performance.

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