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Females, Perceptions, and Strength Training

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Females, Perceptions, and Strength Training

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Abstract

Performing a regular strength training routine leads to a plethora of beneficial physiological and psychological changes. A gender disparity exists with participation rates of strength training. There is a possible discrepancy in knowledge and education provided to males and females based on their physical activity and exercise backgrounds. The design of this study is an effort to better understand potential barriers females may experience and serve as a needs-assessment tool to identify females' views of strength training participation. This study sought to explore views of strength training among females and to determine if consensus exists and how views may aid to increase female participation and adherence in strength training. The researchers chose Q methodology as a means to investigate subjective viewpoint(s) of females regarding strength training. Fifty-nine participants sorted 44 statements related to 5 overarching strength training themes. The statements were ranked using a Q-sort grid, from +5 (most like my view) to -5 (most unlike my view) based on personal opinion in conjunction with open ended questions. Data analysis, using factor analysis and qualitative themes, revealed two factors, Factor 1, *The Equipped Exercisers* and Factor 2, *Roadblockers* emerged as the main perspectives. Consensus between Factor 1 and Factor 2, included the importance of properly lifting weights to maintain safety, along with opposing views including whether strength training was found to be enjoyable. These two distinct views help to capture females' subjective views of strength training as a means to recognize variance in participation rates. Understanding the prevalence of strength training disparities among females may be helpful to address interest and adherence among females. This study is the first step into creating ideas that may aid with assessment and interventions advocating for increased awareness.

Keywords: women, stigma, bias, resistance exercise

Introduction

Strength training is a tool that assists individuals to live a healthy, active lifestyle (Hurley et al., 2018). Performing a regular strength training routine leads to a plethora of beneficial physiological and psychological changes. The American College of Sport Medicine (ACSM) discusses positive adaptations including, “changes in health-related biomarkers,” which include healthier body composition and blood glucose levels, increases in insulin sensitivity, and decreases in blood pressure. Strength training also helps increase bone mass and strength due to the tension put on the bones while stressing the muscles (ACSM, 2017). Greater muscular strength and lean body mass allow individuals to perform activities of daily living (ADLs) with ease (Patterson et al., 2015; Zach & Adiv, 2016; Martin Ginis et al., 2014). The risk of osteoporosis decreases in older adults when performing light to moderate intensity strength training exercises (Faro et al., 2019). Higher intensity exercise results in greater health benefits and self-efficacy. Improvements in participants’ moods were seen in the study performed by Martin Ginis, Strong, Arent, Bray, and Bassett-Gunter (2014). Concurrently, resistance exercise may aid in lowering levels of depression, anxiety, and fatigue (ACSM, 2017). With a focus on function over form, a woman’s self-consciousness or anxiety about appearance may decrease (Martin Ginis, Strong, Arent, Bray, & Bassett-Gunter, 2014). Psychological improvements include better self-esteem, self-concept, body image, and emotional well-being (Hurley et al., 2018; Patterson et al., 2015).

The design of this study is an effort to better understand potential barriers and serve as a needs-assessment tool to identify females’ views of strength training participation. A solution cannot be proposed without first giving clarification to the root of the problem of why females may be hesitant to participate in resistance exercise. This study explored female’s perceptions of

strength training as a beginning step to understand perspectives to construct avenues for helping individuals (specifically females) live a healthier lifestyle through participating and adhering to a strength training program. An insufficient amount of research has been published that is exclusive to females and strength training.

Strength training is synonymous with resistance training and resistance exercise for the purpose of this study. Muscular fitness, the overall goal of strength training, is divided into three subcategories-- muscular strength, muscular endurance, and muscular power. For ease of this exploratory study, statements regarding strength training encompassed all three subcategories of muscular fitness. Many modes of exercise may be used to perform strength training exercises, for example, free weights, machine weights, calisthenics, and resistance bands. According to ACSM recommendations, multi-joint and single-joint exercises which target agonist and antagonist muscle pairs should be employed during strength training sessions (ACSM, 2017). Physical Activity Guidelines for Americans recommend adults perform strength training exercises for all major muscle groups at least two days per week (Patterson, Umstattd, & Beville, 2015). The major muscle groups worked should include arms, shoulders, back, abdomen, chest, legs, and hips (Patterson et al., 2015).

Our current population struggles to exercise and to eat in a way that is most beneficial to their health (Zach & Adiv, 2016). Faro et al. described the 2015 American College Health Assessment survey which resulted in 50% of college males and 43% of college females meeting ACSM guidelines for moderate to vigorous physical activity (2015). In the same self-reported survey, 45% of males and 33% of females met ACSM recommendations for resistance training (Faro et al., 2015). Zach and Adiv found that less than 20% of participants in sports and physical activities are female (2016). Although these self-reported surveys provide researchers with

subjective data, the general public tends to overestimate their time spent exercising. Objective data would provide researchers with a more accurate idea of current participation rates and at what intensities (Faro et al., 2015). Researchers have also begun looking into how to improve adherence to regular strength training exercise. Attempts to promote adherence via females self-selecting intensity of resistance training failed to change participant's behavior (Faries & Lutz, 2016). Faro et al. proposed that performing functional resistance training exercises which more closely resemble activities of daily living would increase female participation rates (2015).

Further research is needed as to whether performing more functional strength training movements which result in greater levels of enjoyment and energy expenditures also results in greater participant adherence (Faro et al., 2015). Patterson, Umstattd, and Beville developed an integrated behavioral model which determined the greatest predictive factors of college age women meeting strength training recommendations to be self-efficacy, intention, and moderate-to-vigorous physical activity (2015). Wagner et al. found that 76.7% of university age females would be more likely to participate in regular strength training activities if taught how to do so properly (2016).

A gender disparity exists with participation rates of strength training. Just under half of college men and only one third of college females meet ACSM resistance training recommendations according to a self-reported survey by Faro et al. (2015). Common barriers individuals may face include insufficient time, lack of motivation, physical limitations, fear of judgement, feeling uncomfortable in public, unknowledgeable of performing exercises, and lack of social support (Hurley et al., 2018). Whereas males and females may experience similar barriers preventing effective strength training, those listed above seem to be more applicable and common in the experiences of females (Hurley et al., 2018). There is a possible discrepancy in

knowledge and education provided to males and females based on their physical activity and exercise backgrounds. Females seem to be influenced in the way they strength train based on their past experiences with others, including males. It is not uncommon for females to have experienced attitudes from males that have negatively impacted their desire to strength train in a public setting, such as local fitness facilities. More females perform cardiorespiratory (aerobic) training versus strength training due to a belief that cardiorespiratory exercise produces greater health benefits (Hurley et al., 2018). Comparatively, females attending a gym are also more commonly motivated by weight loss, and males are motivated by developing definition and functionality of musculature. Females may use some strength training machines which they believe will help exercise a certain body part and improve aesthetics, which is “self-gendered policing” (Coen, Rosenberg, & Davidson, 2018). Alternatively, females may experience being pressured to leave a space where males are exercising or planning on exercising (Coen et al., 2018). They may cut their exercise time or content short in order to minimize tensions, especially when males or more experienced individuals were around (Coen et al., 2018). Some females may be victim to micro-aggressions in which males are unwilling to share equipment, ask females to give up space at a certain piece of equipment before asking another male to give up space, or deliver “sexualized gazes and interactions” (Coen et al., 2018). If a female was to feel this way, she may minimize her consumption of space in a gym setting.

Besides extrinsic versus intrinsic motivations for strength training, it is easier for individuals to estimate their workload that is close to recommended ACSM guidelines while performing aerobic exercise. The same cannot be said for resistance training performance. College age females tended to self-select an intensity below the guidelines during a study performed by Faries and Lutz (2016). Their choice of intensity did not promote adherence to

performing resistance training exercise regularly (Faries & Lutz, 2016). Nearly two-thirds of college age females in the study performed by Patterson, Umstatted, and Beville (2015) participated in under two days of strength training per week. Individuals who previously participated in moderate to vigorous physical activity are more likely to adhere to a strength training exercise regimen. This may be due in part to a greater self-efficacy (Patterson et al., 2015). Male and female physical education student teachers are also not immune to strength training participation discrepancies. According to Zach and Adiv (2016), approximately “80% of the females participating in strength training used light-moderately light resistance in their routine” (Zach & Adiv, 2016). The association between strength training and masculinity is still pervasive in western culture. According to the ACSM, “a woman who believes that resistance training will lead to looking “muscular” or “masculine” will be unlikely to start a resistance training program if these traits are perceived as undesirable” (2017). A majority of males surveyed by Makela, Thomas, and Ackerman (2016) were not found to support such a discrepancy. They did not believe females who regularly strength train develop bulky muscles or are less feminine; and the men did not view strength training as “a macho male activity” (Makela et al., 2016).

There are few articles containing information about female’s view of resistance training, however none were found that provide data that is both qualitative and quantitative. Capturing feelings and perceptions females have towards resistance training in an objective manner can be difficult; therefore, Q-methodology was utilized. Q-methodology is a form of mixed-method research that gathers data and provides qualitative and quantitative results. This is accomplished through factor analysis and by gathering opinions of the surveyed population (qualitative) while also addressing the strength of the statements and factor loading based on those statements

(quantitative). The overall goal of this study is to provide information pertaining to perceptions of females and strength training in order to contribute to existing literature. Q-methodology uses a number of statements (in this study, 44 were developed for use) and asks participants to rank the statements on a scale from -5 to +5, with -5 meaning most unlike my view, 0 meaning neutral, and +5 meaning most like my view.

The expected views of females participating in this study were that they possessed a limited knowledge of health related benefits of strength training. Being unfamiliar with setting SMART goals (specific, measurable, attainable, realistic, and timely) would result in individuals not beginning a general exercise or strength training program. Extrinsic motivators were more common among populations newly participating in resistance exercises. It was believed that females would feel uncomfortable at the gym for various reasons, such as lack of self-confidence, low self-efficacy, fear of being judged, etc. The qualitative portion of this Q-study allowed the true views of females to be expressed. The data obtained was sorted based on differences in age, occupation/state in life, and body mass index (BMI). Because each participant has different experiences, each perspective obtained through research was expected to vary.

This study sought the answers to the following research questions:

Research Question 1: How many unique views about strength training exist among females? Research Question 2: What consensus about strength training exist among females?

Research Question 3: What differentiates the views of strength training among females?

Research Question 4: Can the views that emerge provide content to develop an educational awareness program to help educate and improve strength training participation rates among females?

Methodology

Q-methodology, a mixed method technique, has the unique ability to capture subjective views using the PQMethods software for factor analysis. Data gathered from individual Q-sorts combined with qualitative responses, groups participants based on their varying views depending upon factor loading results. Subjectivity can be difficult to analyze but Q-methodology provides the ability to reveal common threads or themes that emerge regarding participants perceptions of strength training.

Fifty-nine adult females, mean age 24.17, +/-14.03 standard deviation, were recruited and volunteered for the study. There were no set criteria for subject inclusion, any age female 18+ who agreed to participate were included regardless of their exercise experience. Permission from the Institutional Review Board was obtained before the research was conducted. Prior to their participation, the study was explained to the participants, and they signed an informed consent form. Basic demographics of the participants shows a wide variety of exercise experience (see Table 1).

Table 1: Participant Demographics

Avg. Age	Avg. BMI	How many exercise?	Own equipment?	Gym membership?	Student vs. Non-Student
24.14 \pm 14.03	25.37kg/m ² \pm 4.73	37	20	36	51 vs. 8

The researchers chose Q methodology as a means to determine the subjective viewpoint(s) of females regarding strength training. The strength of Q methodology is that it does not seek to find the mean of a series of responses similar to Likert surveys, but rather

uncovers the multiple views that exist about a particular topic (McKeown B, Thomas D 1988).

The sorting activity and survey were completed once by each participant within one session lasting approximately 30 minutes. The Q-sort contained 44 statements (Table 2) that were to be sorted according to each individual's view on the statement, ranked on a scale from -5 (most unlike my view) to +5 (most like my view) (see Figure 1).

Table 2: The 44 statements read and sorted for the Q-sort by participants

No.	Statement	No.	Statement
1	Strength training improves quality of sleep.	23	After resistance training mood and mindset improve.
2	It is important to have a regular weight training schedule each week.	24	Strength training in a private setting (or at my own home) is more comfortable than a gym setting.
3	I have access to equipment I need to perform the resistance training exercises.	25	The cost to exercise (memberships, equipment) is too expensive for my budget.
4	Women who have defined muscles are less attractive.	26	Women should perform different resistance training exercises than men.
5	Strength training results in an increase in body size.	27	Setting personal fitness goals is important to me.
6	Wearing athletic exercise clothing makes me feel uncomfortable.	28	Feeling awkward and uncomfortable while strength training is a concern.
7	I enjoy strength training.	29	Women are commonly offered unsolicited (not asked for) advice on how to properly lift weights while at the gym.
8	Strength training improves health.	30	Exercise that reduces overall body weight is more important to me than increasing lean muscle mass.
9	Strength training can help manage stress, anxiety, and depression.	31	Women who strength train feel empowered.

10	I have concerns that I am too weak, with inadequate muscles.	32	Doing both strength training and aerobic exercise takes too much time. I would rather find one fitness activity that is beneficial.
11	Lifting weights causes women appear more masculine.	33	Strength training does not aesthetically improve a woman's appearance.
12	Resistance training is too much work, too tiring to perform, and causes muscle soreness.	34	Strength training will better help me take care of people dependent on me.
13	Watching strength training on social media motivates me to train and be committed to fitness.	35	Strength training is useful to maintain weight and improve appearance.
14	Strength training is something everyone should do	36	I prefer aerobic exercise more than strength training.
15	I am too out of shape (unfit) for strength training.	37	I am comfortable performing strength training exercises like dumbbell squats, chest presses, bicep curls, and leg extensions.
16	Focusing on aerobic exercise (instead of strength training) produces greater benefits to health and body appearance.	38	It is important to me that my family and friends prioritize active living and strength training.
17	I need to lose weight before I begin strength training.	39	My time/schedule permits for regular resistance training exercises.
18	Family and work commitments take time away from being able to exercise.	40	Strength training is a predominantly male activity.
19	People think strength is based on body size.	41	Strength training is more enjoyable when lifting only my own body weight or light/easy weights (versus heavy lifting).
20	I would be more likely to participate in strength training activities if my friends joined me.	42	I grew up in a family who did not exercise (aerobic or strength training).
21	It is important to lift weights properly to avoid injuries.	43	There are more positive reasons to strength train than negative reasons.
22	I feel that men judge women in the weight room.	44	Resistance training makes performing daily tasks easier.

Most UNLIKE my view										Most LIKE my view
-5	-4	-3	-2	-1	neutral 0	1	2	3	4	5

Figure 1: Q-sort grid for 44 statements

These 44 statements (Table 2) were grouped into the following six major categories relating to strength training: knowledge, attitudes, overall health, barriers, stigma, and social in relation to strength training. Information including participants’ personal reasoning for sorting the statements into their Q-sort was collected. These questions were collected at the conclusion of the Q-sort, along with demographics (age, height, weight, occupation) and their current exercise regime. Additional data was collected of individual responses to four survey questions upon completing the Q-sort. This information was analyzed for many themes to help with interpretation of the views that emerged. Participants responded to questions related to their own exercise routine and personal reflection for their Q-sort.

Results and Discussion

Upon completion of data collection, fifty-nine participants completed the Q-sort data and two distinct factors/viewpoints emerged. Forty-one loaded onto Factor 1, eight participants comprised Factor 2. Ten individuals were not specifically associated with either factor. Each of these groups are further discussed below.

Factor 1: The Equipped Exercisers. The Factor 1 participants had a broad understanding of the importance of strength training, owned equipment, and were well aware of how to perform resistance training and best described as females with an equipped view of being prepared for strength training. These females valued strength and health over thinness or body size concerns. For many of *The Equipped Exercisers*, their understanding promoted the intent to strength train which resulted in action. The average age and BMI of the females who fell in this category was 24.78 years old and 25.41 kg/m². The statements that best represent their “most like” and “most unlike” views are shown in Table 3. These *Equipped Exerciser* individuals acknowledged barriers to strength training; however, many performed it anyway and experience the health benefits. One participant commented, “Saying you ‘don’t have time’ is so easy an excuse. Just do what you can with the time you can squeeze in, i.e. 5 minutes every hour.” This factor shows an active understanding of the overall health benefits of exercise (Statements 9 and 23) and a possession of knowledge regarding how to exercise (statements 21 and 8). The statements *The Equipped Exercisers* most disagreed were reflective of attitudes, barriers, and stigmas to strength training. Based on the extended responses to the survey questions following the Q-sort, many of these females valued healthiness or strength over thinness. Views like, “I love the feeling of ‘I did it!’” reflect the intrinsic motivation some of *The Equipped Exercisers* have, especially if they are reaping the health benefits of regular physical activity. Recognizing that regular exercise needs a proper mindset, effective accountability, and participant willingness set these females apart from their Factor 2 counterparts.

Although many individuals agreed with the Factor 1 statements, approximately half of *The Equipped Exercisers* described personal physical activity routines that did not meet ACSM exercise recommendations. Strong feelings regarding the statements did not translate to action

for all Factor 1 participants. Some extended responses indicated that they chose the top four statements most unlike their views because they seemed like common, weak excuses to not engage in physical activity. Certain of *The Equipped Exercisers* did not believe that men offer unsolicited advice in the weight room. Upon further investigation of their physical activity habits, many of those who held this view reported primarily participating in aerobic exercise and not strength training. None of the Factor 1 females denied the existence that a stereotype exists. One female described how men address her in the weight room and tell her how to lift even though she has performed Olympic weightlifting for four years. Regarding perceptions of statement 4, some commented that, “women define their own beauty,” and “masculinity is relative.” It was also mentioned that natural strength training-- without the use of steroids-- is what makes a female attractive.

Table 3: Factor 1 top four (4) most like/most unlike statements

Statement No.	Statement	Grid Position
9	Strength training can help manage stress, anxiety, and depression.	5
21	It is important to lift weights properly to avoid injuries.	5
8	Strength training improves health.	5
23	After resistance training mood and mindset improve.	5
33	Strength training does not aesthetically improve a woman's appearance.	-5
15	I am too out of shape (unfit) for strength training.	-5
17	I need to lose weight before I begin strength training.	-5
4	Women who have defined muscles are less attractive.	-5

Factor 2: Roadblockers. The average age and BMI of the females who fell in this category was 22.13 years old and 25.98 kg/m². The researchers came up with this name for those in Factor 2 because many participants did not seem to understand the long term benefits of physical activity, or if they did understand, they had current barriers they had not overcome. The *Roadblockers* have various reasons that contribute to their lack of interest in strength training. The main reasons for their lack of interest and participation include not having anyone to strength train with, a general dislike for strength training, feeling that they will be judged, and preferring to strength train privately. Each of these so called “roadblocks” are impactful for these individuals when they consider the option of strength training, and help researchers to identify barriers for females when it comes to strength training. Not surprisingly, these individuals do not meet the ACSM exercise recommendations. The Factor 2 female participants overall have not navigated past barriers to exercise (Table 4). Two participants wrote comments, “I just lack time and motivation for it,” when referencing strength training, and another, “I thought about everyone I know that exercises regularly and I couldn’t imagine myself doing that.” These females are really looking for social support (statement 20), with many wanting encouragement and accountability, with one participant writing that she is, “more comfortable if I have friends with me for motivation and encouragement.” *Roadblocker* females also seemed to want friends to join in order to feel less awkward, showing a ‘safety in numbers’ type of thinking. Some of them have a want/ need to learn how to perform strength training exercises and they feel unequipped. Many participants felt that men judge women in the weight room (statement 22) and give unsolicited advice, and many females prefer to work out in a private setting (statement 24). *Roadblockers* also includes females who believe aerobic exercise is needed to be thin, and strength training is not related to losing weight and/or being skinnier. In addition, many did not

find strength training enjoyable (statement 7), even though as a group, most had access to a workout facility and the financial aspect of exercising was not a barrier (statement 25). From the Q-sort, the researchers found that females in *Roadblockers* group found exercise clothing to be comfortable (statement 6). A few individuals also noted that it does not matter to them whether their friends and family exercise and/or strength train (statement 38). They also did not derive motivation to participate in physical activity from social media (statement 13), which was an interesting find since this group stated they were more willing to do physical activity when accompanied by a friend. This gave the impression that in person social support is more powerful than fitness pages on social media. Overall, these females have multiple barriers preventing them from full consideration of strength training, and for the females that are regularly exercising, they see a need to do so with others.

Table 4: Factor 2 top four (4) most like/most unlike statements

Statement No.	Statement	Grid Position
21	It is important to lift weights properly to avoid injuries.	5
20	I would be more likely to participate in strength training activities if my friends joined me.	5
24	Strength training in a private setting (or at my own home) is more comfortable than a gym setting.	5
22	I feel that men judge women in the weight room.	5
13	Watching strength training on social media motivates me to train and be committed to fitness.	-5
7	I enjoy strength training.	-5
25	The cost to exercise (memberships, equipment) is too expensive for my budget.	-5
6	Wearing athletic exercise clothing makes me feel	-5

	uncomfortable.	
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Unrepresented Sorters. There were 10 participants who did not load onto Factor 1 nor Factor 2. Qualitative themes that emerged from the data for these participants, reflected a greater interest in aerobic exercise and physical activity rather than strength training specifically. The majority of participants acknowledged that strength training is good for them, but it is not their highest priority. A few runners fell into this category and possessed the view that, “I need to slim down before I allow muscles to start building up.” Participants who used running as their primary mode of exercise in this group possessed specific health fitness aerobic goals rather than comprehensive ACSM general recommendations for both strength and aerobic exercise recommendations. Some of these individuals reported using their time exercising to organize personal thoughts alone during their activity sessions while others reported being more excited and motivated for the social aspect and to work out with friends. A few of the *Unrepresented Sorters* do not regularly participate in structured exercise, due to barriers of being too weak and self-conscious or due to labor intensive jobs. *Unrepresented Sorters* often mentioned scheduling/time as a barrier.

Distinguishing and consensus statements. The Q-sort data revealed statements ranked by participants that were similar and contrastingly, which assists with differentiating views between Factor 1 and Factor 2 (see Tables 5 & 6). For example, statement 7, “I enjoy strength training,” was on average placed at +4 for those females that loaded on Factor 1 whereas Factor 2 participants on average placed that statement at -5. Another difference is that Factor 1 sorters agreed with statement 2, emphasizing the necessity of regularly strength training to see physiological and mental benefits. Factor 2 participants may have disagreed with this statement

because strength training is not a priority in their lifestyle, and they acknowledge few, if any, extrinsic or intrinsic motivations to regularly engage in resistance exercises. This difference in viewpoint is important as it shows a barrier for Factor 2 females about the value of strength training regularly. This barrier may originate from the distaste for strength training itself or from a lack of knowledge of benefits that strength training provides. While both factors positively ranked, “Strength training can help manage stress, anxiety, and depression,” (statement 9) Factor 1 ranked this ‘as most like my view’ (+5) whereas Factor 2 ranked as a +1, therefore solidifying the variance in views between the two groups. Opposing views between factors also emerged on the following statements: 37, 24, 28, and 36.

Table 5: Factor array with distinguishing statements indicated for Factor 1.

No.	Statement	Factor 1 Grid Position	Factor 2 Grid Position
9	Strength training can help manage stress, anxiety, and depression.*	5	1
8	Strength training improves health.*	5	2
23	After resistance training mood and mindset improve.*	5	1
7	I enjoy strength training. *	4	-5
2	It is important to have a regular weight training schedule each week.*	4	-4
27	Setting personal fitness goals is important to me. *	4	-1
31	Women who strength train feel empowered. *	4	2

35	Strength training is useful to maintain weight and improve appearance.*	3	0
37	I am comfortable performing strength training exercises like dumbbell squats, chest presses, bicep curls, and leg extensions. *	3	-3
1	Strength training improves quality of sleep. †	3	2
44	Resistance training makes performing daily tasks easier. *	2	-2
24	Strength training in a private setting (or at my own home) is more comfortable than a gym setting.*	2	5
14	Strength training is something everyone should do.*	2	-2
18	Family and work commitments take time away from being able to exercise. *	1	4
22	I feel that men judge women in the weight room.*	1	5
20	I would be more likely to participate in strength training activities if my friends joined me. *	1	5
29	Women are commonly offered unsolicited (not asked for) advice on how to properly lift weights while at the gym. *	1	3
13	Watching strength training on social media motivates me to train and be committed to fitness.*	0	-5
38	It is important to me that my family and friends prioritize active living and strength training.*	0	-4
28	Feeling awkward and uncomfortable while strength training is a concern. *	0	4
34	Strength training will better help me take care of people dependent on me.*	-1	-4
36	I prefer aerobic exercise more than strength training.*	-1	4

16	Focusing on aerobic exercise (instead of strength training) produces greater benefits to health and body appearance.*	-1	3
41	Strength training is more enjoyable when lifting only my own body weight or light/easy weights (versus heavy lifting). *	-1	3
25	The cost to exercise (memberships, equipment) is too expensive for my budget. *	-2	-5
5	Strength training results in an increase in body size. *	-3	1
26	Women should perform different resistance training exercises than men. †	-3	-1
30	Exercise that reduces overall body weight is more important to me than increasing lean muscle mass.*	-3	2
40	Strength training is a predominantly male activity. *	-3	1
10	I have concerns that I am too weak, with inadequate muscles. *	-4	0
6	Wearing athletic exercise clothing makes me feel uncomfortable.*	-4	-5
12	Resistance training is too much work, too tiring to perform, and causes muscle soreness.*	-4	-2
11	Lifting weights causes women appear more masculine.*	-4	0
15	I am too out of shape (unfit) for strength training.*	-5	-3
17	I need to lose weight before I begin strength training. *	-5	-1
4	Women who have defined muscles are less attractive. *	-5	-3

Note: Dagger (†) indicates $P < 0.05$, versus Asterisk (*) indicates significance at $P < 0.01$

In addition, there were statements that were ranked similarly by the participants in both Factors 1 and 2 (see Table 6) and these consensus statements help to identify parallels. Both factors agreed that, “It is important to lift weights properly to avoid injuries,” (statement 21) revealing basic understanding and fundamental basics of body mechanics. Both *The Equipped Exercisers* and *Roadblockers* agreed with statement 43 that the positives outweigh the negatives of strength training, providing general knowledge the importance of strength training plays on good health. Consensus was again found as both factors disagreed with, “Strength training does not aesthetically improve a woman’s appearance,” (statement 33). Statement 39 discussed having time to regularly strength train, and both groups ranked this statement that they did not have time. Time is an interesting concept as some Factor 1 females acknowledge that they do not have time but still make strength training a priority regardless of their busy schedules. Those that prioritize and regularly engage in exercise reported health benefits (stress management, feel better, etc.) in comparison to participants who reported health benefits ‘least like my view’. This contrast in participation and recognition of health benefits is an important difference between factors, noting that *The Empowered Exercisers* who have ‘bought in’ to the claim that exercise has multiple benefits, reported stronger views with participating in strength training. Many females reported they have access to equipment and they acknowledged that they need to perform resistance training exercises. Some recognized that their own body weight or “free weights” could be easily used as modes of strength training easily accessible in their living environment, such as 30 gallon jugs of water was suggested by one female. Many participants who reported as college students, mentioned access to campus equipment using their free student membership to Student Recreation Center. Other statements that align with similarities “Consensus Statements” include: 1 (both factors agreed), 3 (agreed), 19 (ranked at 0, neutral), 26

(disagreed), 32 (disagreed), and 42 (disagreed). Overall, these statements reflect that females view strength training positive and beneficial. These statements related to participants having accessibility and beliefs that strength training is essential to an overall fitness routine and ranked that their own families growing up were physically active as *'most like their view'*. In summary, females agreed that the activities they perform do not need to differ from exercises that males perform, with neutral views concerning the relationship between an individual's strength and body size. Findings from the data emerged more distinguishing factors than consensus statements between factors which permitted the researchers to view differences in perspectives among participants' views of strength training.

Table 6: Consensus Statements that do not distinguish between any pair of factors

No.	Statement	Factor 1 Grid Position	Factor 2 Grid Position	General description of position
1	Strength training improves quality of sleep.	3	2	like
3	I have access to equipment I need to perform the resistance training exercises.	2	4	like
19	People think strength is based on body size.	0	0	neutral
21	It is important to lift weights properly to avoid injuries.	5	5	like
26	Women should perform different resistance training exercises than men.	-3	-1	unlike

32	Doing both strength training and aerobic exercise takes too much time. I would rather find one fitness activity that is beneficial.	-2	-2	unlike
33	Strength training does not aesthetically improve a woman's appearance.	-5	-4	unlike
39	My time/schedule permits for regular resistance training exercises.	-2	-1	unlike
42	I grew up in a family who did not exercise (aerobic or strength training).	-2	-3	unlike
43	There are more positive reasons to strength train than negative reasons.	3	3	like

Comparison of findings. Based on our expected outcomes, *The Equipped Exercisers* were very knowledgeable about health related benefits and expressed confidence in how to implement strength training into their daily routines. Some of these females reported years of experience participating in strength training settings. It was dependent on the individual, but many of *The Equipped Exercisers* found benefits in setting physical activity goals to be ideal for adherence to regular exercise and strength training. Both *The Equipped Exercisers* and *Roadblockers* had participants who felt uncomfortable exercising at a gym or fitness facility. Reasons for this hesitation to engage in training, included fear of being judged and not wanting to be watched while exercising. Social support of family or friends was highly desired by *Roadblockers* group. Although both groups acknowledged a stigma exists with females and strength training, it was a central view of Factor 2 *Roadblockers*. *Roadblockers* responded strongly to statement 4, “Women can look however they want” ‘as most like their view’. This statement is representative

of young females' views that beauty, femininity, and masculinity are relative and defined by the individual. In other words, society should not insist females look a certain way. It reflects a feeling that self-confidence is not determined by body size. All participants, Factor 1, Factor 2, and non-loading, reported height and weight and the average BMI rankings differed among groups. The average BMIs of Factor 1 and Factor 2 participants are $>25.00 \text{ kg/m}^2$ which places them in the overweight category. This is representative of national trends in the United States reported from 2015-2016 that 76.1% of adults 20 years of age are overweight or obese (CDC, 2019).

Table 7: Average age and BMI of females in *Factors 1 & 2*

	Factor 1	Factor 2
average age (yrs)	24.78	22.13
average BMI (kg/m^2)	25.41	25.98

Limitations. The current study is helpful to continue establishing and compiling information concerning females' views and perspectives on strength training. However, as in any study, there were limitations. The researchers desired to survey females of all ages, using random sampling based on convenience, and there were participants who ranged from 18 to 81 years of age, however the participants surveyed had an average age of 24.14 ± 14.03 , resulting in a younger than anticipated sampling. As a result, the data may be more representative of younger females' views. In addition, the data in this study is entirely self-reported, and it is possible that participants overestimated the time they engage in physical activity and/or structured exercise. Q-methodology is not generalizable like quantitative studies involving large numbers of participants; however, the factors that emerge are generalizable within the population. Some

factors present in society may not have emerged due to the limited number of participants beyond college-age. The strength of is that it does not seek to find a mean of a series of responses, as Likert surveys, but rather determines what views exist and to persevere meaning (McKeown & Thomas, 1988).

An interesting finding among the participants who did not load onto neither Factor 1 nor Factor 2, is the notion of body size as a barrier to participating in strength training. Two *Unrepresented Sorters*, reported responses related low self-esteem and self-efficacy regarding their own body size. Interestingly, one participant reported with a low BMI and the other a high BMI in the Obesity type II category both noted negative perceptions for participating due to their own body size not being ideal for strength training. One expressed the need to gain weight first to feel larger and stronger, and the other reported the need to lose weight prior to strength training. Overall, these participants did not feel ready to engage in strength training and desired social support in their physical activities and exercise routines. This may be an area that future researchers consider for populations in contemplation and precontemplation stages of change in regards to exercise in general and specifically strength training. Incorporating more statements in future Q-sorts that may capture body size perceptions might be important to fully understand females' views of their readiness to engage in strength training in relation to their views of their own body size.

Areas for Further Research. Due to the low average age of participants, crafting a Q-sort which focuses specifically on college-age women, separate from professional career working women, may be beneficial for suggesting methods of addressing barriers in specific populations. Comparison of the perceptions of different aged females would provide researchers with incite to appropriately tailor exercise or physical activity interventions for specific age groups. Certain

Factor 1 females described a history of participating in competitive sports. Further investigation would reveal if previous participation in competitive sports aligns with a view represented by *The Equipped Exercisers*, and consequently if this experience promotes adherence to strength training. Ideally, gathering previous exercise experience information with the demographic questions, including sports, should be considered for future studies. Education on the difference between physical activity and exercise is pertinent to provide females with a better understanding of their current health status and potential risk factors for various diseases. Females with physically demanding jobs would benefit from further investigation of their activities to know if it is vigorous enough to produce health benefits as their body becomes accustomed to the physical demands of their job. One of the participants reported, “I perform a manual labor job, so I don’t want to do [strength training] in my free time.” Injury prevention via strength training should be further researched and applied to populations such as these. Some participants commented on their insights gained by participating in the research and performing the Q-sort. Females already exercising were inspired to keep performing regular physical activity, whereas individuals contemplating exercise were motivated to start or get back into a routine. A subset of females commented on how they discovered how much they dislike strength training.

Findings from this study provides unique understanding related to female views of strength training. Understanding the prevalence of strength training disparities among females may be helpful to address participation and adherence rates of females. This study serves as an initial exploratory project to hopefully propel more research into the subject of females and strength training. The hope is to absolve barriers to strength training for females, and that females will feel knowledgeable and comfortable about strength training and find it enjoyable. The long-term goal is to promote a healthy, active lifestyle, as there are many benefits that come

from strength training and exercising. Many insights were gained through this mixed method research and subjective opinions emerged providing ideas of what females experience. This is the first step into creating ideas that can aid to narrow the gender disparities of strength training participation. Healthy lifestyles should consist of regular aerobic exercise, strength or resistance training, a balanced diet along with other key lifestyle habits to protect individuals from common health issues prevalent with habitual sedentary living.

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