

Breaking Barriers, Building Biceps: Examining the Feasibility of a Culturally-Tailored Strength Training Program for South Asian Women and its Preliminary Effects on Positive Body Image

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Dedication

I dedicate this thesis to my mom, Nilufar Yakub.

Thank you for being so strong.

Abstract

South Asian women have been underrepresented in body image literature. Research has shown that South Asian women in Western countries have poorer body image compared to women of other ethnicities (e.g., White, Black, Hispanic). South Asian beauty appearance ideals (e.g., “fair” or pale skin, slim figure), racial teasing during childhood, the enforcement of thin ideals by older South Asian women, and the negative impact of White-centric media contribute to poor body image in South Asian women. Physical activity can improve body image. However, South Asian women have lower levels of physical activity compared to other ethnicities potentially due to several sociocultural factors including stigma against women participating in physical activity. Strength training specifically is associated with improved body image but is not a popular form of exercise for women as it is also connected with masculinity in many cultures, including South Asian culture.

The primary objective of this study was to assess the feasibility of a culturally-tailored strength training program for young South Asian women. The secondary objective was to examine preliminary changes in positive body image measures following the program. Of the 22 women who contacted the researchers to express interest in the study, seven women attended a 6-week strength training program and completed measures of positive body image pre- and post-program. Given the low recruitment rates and poor adherence, it is not feasible to run the study in its present form. However, the exercise program itself was perceived as acceptable by those who did attend and adhere. Regarding preliminary efficacy, there were increases in body appreciation and embodiment, with medium and small effect sizes post-program, respectively. There is a need for further feasibility assessment of the program with an adequate sample size,

which may be achieved through a recruitment period that conforms with student schedules, more targeted recruitment strategies (e.g., recruiting at South Asian events), and building relationships with South Asian organizations. Researchers should continue exploring culturally-tailored programs for promoting various forms of exercise, including strength training, and examining how they affect positive body image in South Asian women.

Keywords: Feasibility, acceptability, South Asian, women, strength training, body appreciation, cultural-tailoring, exercise.

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Chapter 1: Introduction

Body image is a multifaceted concept involving self-perceptions and attitudes (i.e., thoughts, emotions, and actions) concerning the body's appearance and functionality (Vani et al., 2021; Cash & Smolak, 2011). Appearance, which has been the most frequently studied facet of body image, pertains to how the body looks (e.g., body shape, body size, facial appearance, skin colour), while function relates to the body's capabilities (e.g., running, creative endeavours, digestive functions, senses). Four commonly described dimensions of body image are perceptions (i.e., how accurately an individual perceives their body), affect (i.e., an individual's emotions regarding their body), cognitions (i.e., an individual's thoughts and beliefs about their body), and behaviours (i.e., the actions an individual engages in that reflect the other dimensions). Body image can be positive or negative, and these facets are unique, lying on distinct spectrums that can occur simultaneously within an individual (Tylka & Wood-Barcalow, 2015b).

Negative body image is characterized by negative thoughts and feelings towards the body's appearance or function and is associated with maladaptive health behaviors like excessive exercise or disordered eating, psychological distress (e.g., symptoms of depression, anxiety), low self-esteem, and overall poor psychological well-being (Ghaderi, 2001; Jiotsa et al., 2021; Korinth et al., 2010; Nayir et al., 2016; Rounsefell et al., 2020). Conversely, positive body image entails love, respect, appreciation, and acceptance of the body's appearance and functionality, whether it meets the ideal or not. Positive body image is associated with the adoption of healthy behaviors such as intuitive eating and exercise (Vani et al., 2021; Tylka & Wood-Barcalow, 2015). Positive body image extends beyond the absence of appearance-related distress and is

related to a variety of positive health indicators such as reduced depression and unhealthy dieting behaviours (Gillen, 2015), intuitive eating, improved mental health and feelings of happiness, embodiment, and self-care behaviours (e.g., sun protection; Andrew et al., 2016; Burychka et al., 2021; Tylka, 2011).

Body image is affected by a range of sociocultural influences, such as interpersonal relationships (i.e., family, friends, peers), media, and culture, as outlined in Cash's (2012) cognitive-behavioural model. Sociocultural theory refers to the importance of culture and society in developing cognitive and sociocultural functions, including influencing body image (Rodgers, 2016). Culture is a multifaceted social construct that groups individuals based on factors such as shared practices, traditions, languages, beliefs, historical backgrounds, geography, ethnicity, or race (Tribe, 2005). Shared culture helps foster a sense of belonging to a community with common characteristics, behaviours, values, expectations, and attitudes (Ford & Kelly, 2005; Hamer et al., 2020; Raeff et al., 2020; Tribe, 2005). Race is a term that is socially constructed and is occasionally employed to categorize a "subdivision" of the human population sharing common physical traits, ancestry, or language. It is also loosely applied to geographic, cultural, religious, or national affiliations. The term *race* is created and defined by societies and does not have a fixed or universally accepted definition (Salter et al., 2018). Ethnicity is social categorization based on an individual's membership in, or identification with, a particular cultural or ethnic group (Betancourt & López, 1993). Ethnicity is related to body image as it can influence the appearance ideal (e.g., Shaw et al., 2004; Wildes et al., 2001) and the importance of the ideal (Cash, 2012). However, existing body image research has predominantly focused on White women, limiting its generalizability to individuals of colour who have racially specific physical features, unique cultural and ethnic influences, and distinct body image experiences

(Verma & Ray, 2023; Winter et al., 2019). For example, sociocultural factors unique to specific ethnicities/races (e.g., the importance of female beauty, religious practices, body size ideals, skin colour) have historically influenced body image (Levitt, 2004). One group that has been primarily excluded from body image literature is South Asian women.

South Asian women are those who are descendants of South Asian countries including Afghanistan, Bangladesh, Bhutan, India, Nepal, Maldives, Pakistan, and Sri Lanka. Previous evidence indicates that South Asian women and girls living in Western countries (e.g., United Kingdom, United States) report poorer body image than women from other ethnicities/races (e.g., White, Hispanic, Black; Chan & Hurst, 2022; Dhillon & Gammage, 2023; Duncan et al., 2004; Mujtaba & Furnham, 2001; Mumford & Choudry, 2000; Sahay & Piran, 1997; Swami et al., 2009; Swami et al., 2013; Thomas et al., 2002). For example, in a study conducted by Swami et al. (2009), South Asian women had the lowest body appreciation scores compared to other ethnic groups (i.e., White, African Caribbean, Hispanic) in the United Kingdom, supporting the notion that they are susceptible to developing poor body image and eating disorders in Western countries.

There are several potential reasons why South Asian women living in Western countries may report higher negative and lower positive body image than women of other ethnicities. A qualitative study by Goel et al. (2021) examined South Asian American young adult women's perceptions of eating disorders and body dissatisfaction. Cultural stressors (tension as a result of clashes between the different cultural values upheld by South Asian parents [i.e., traditional, conservative, collectivistic South Asian values] and their own generation [i.e., liberal, individualistic Western values]), weight stigma, and conflicting body ideals between Western and South Asian culture were associated with body dissatisfaction in the American context. Further,

South Asian beauty ideals surrounding skin color (e.g., “fair” referred to as pale skin), body size and shape ideals (e.g., slim figure), experiences of racial teasing during childhood, the enforcement of thin ideals by older South Asian women, and the negative impact of White-centric media (Chan & Hurst, 2022; Goel et al., 2021; Hill & Bhatti, 1995; Sahi Iyer & Haslam, 2003) may also play a role in the development and maintenance of higher negative and lower positive body image.

The limited research describing body image in South Asian women living in Western countries suggests that these women are likely to experience unique challenges related to body image (Goel et al., 2021; Mishra et al., 2023; Reddy & Crowther, 2007). Given the extent of negative body image and lack of positive body image in South Asian women living in Western countries, identifying ways to reduce negative and increase positive body image is critical. Evidence suggests that exercise is one way to achieve this (Campbell & Hausenblas, 2009; Hausenblas & Fallon, 2006). For example, Campbell and Hausenblas (2009) conducted a meta-analysis of exercise intervention studies and found small, positive effects of exercise on body image. In examining moderators, they found aerobic, strength training, and combination programs to be effective. More recently, Sabiston et al. (2019) conducted a scoping review that encompassed studies investigating the relationship between physical activity (including sport and exercise) and body image. The majority of quantitative studies included in the review demonstrated that individuals who participate in physical activity report lower scores on a range of negative body image measures. However, little evidence was found about the association between physical activity and positive body image (Sabiston et al., 2019).

Different types of exercise, including strength training, have been seen to have beneficial effects on body image in previous research (Campbell & Hausenblas, 2009). A systematic review

by Santa Barbara et al. (2017) reviewed the effects of strength training on body image in adults (80% female, majority White young adults). Overall, 11 studies were included in the review. Eight of these studies reported positive effects of strength training on negative body image (e.g., appearance evaluation and social physique anxiety; Santa Barbara et al., 2017). However, all these studies had predominately White samples with a focus on negative body image outcomes.

Despite the well-established benefits of exercise and strength training for both physical and mental well-being, including improved cardiovascular health and reduced risk of depression, as well as improved body image outcomes, South Asian women living in Western countries fail to meet their respective national physical activity guidelines (Daniel et al., 2013; Higgins & Dale, 2013; Panão & Carraça, 2020; Versic et al., 2021). Additionally, comprehensive cross-national surveys conducted in Western countries, such as the United Kingdom, Australia, and the United States, consistently indicate that South Asian individuals report lower levels of physical activity in comparison to their White counterparts (Babakus & Thompson, 2012; Iliodromiti et al., 2016).

One reason for these lower levels of physical activity may be due to barriers associated with cultural values and social stigma around exercise and its environment, particularly among young South Asian women (Babakus & Thompson, 2012; Eapen et al., 2009; Stride & Flintoff, 2017). For example, mixed-sex exercise facilities, safety concerns, and a lack of social support hinder physical activity for young South Asian women (Babakus & Thompson, 2012; Sriskantharajah & Kai, 2007; Pullia et al., 2022). To promote different forms of exercise such as strength training among South Asian women, interventions should address these barriers and leverage evidence-based facilitators such as cultural influence, family health motivation, media messages, facility access, and cultural community support (Bhatnagar et al., 2021; Horne &

Tierney, 2012). By addressing the known barriers and utilizing the facilitators to exercise, an inclusive and accommodating exercise setting should be established for South Asian women.

Culturally-tailored exercise interventions educational initiatives have been effective in promoting physical activity among South Asian women of varying age groups (young adults to older adults) (Beune et al., 2022; Sriskantharajah & Kai, 2007; Vahabi & Damba, 2015). Cultural tailoring involves adjusting parts of an intervention or program to align with the cultural needs and preferences of a specific population (Joo & Liu, 2021; Torres-Ruiz et al., 2018). Despite evidence of poor body image experienced by South Asian women, and the potential for exercise to improve body image outcomes, no research has explored the impact of strength training programs on body image, and particularly positive body image, within this population. Further research is essential to explore this relationship and assess the potential feasibility and effectiveness of culturally-tailored strength training interventions targeting body image in South Asian women.

Chapter 2: Literature Review

Body image is a multidimensional construct that includes self-perceptions and attitudes (i.e., cognitions, feelings, and behaviours) in relation to body appearance and function (Vani et al., 2021, Cash, 2012) and is central to many aspects of human functioning (e.g., self-esteem, emotional well-being, eating disorders, social comparisons; Cash & Smolak, 2011; Harrington & Overall, 2021; Pallan et al., 2011; Rodgers et al., 2015; Swami et al., 2018). Appearance relates to the physical (outer) appearance of the body, while function refers to what the body can do (e.g., physical activity, senses, internal body functions; Alleva et al., 2015; Cash & Smolak, 2011; Vani et al., 2021). While appearance and function are interconnected, they are distinct from each other. For example, an individual who is dissatisfied with their appearance may still be content with their functionality.

Perceptions refer to the accuracy of people's judgements about their body, including appearance-related characteristics such as size, weight, and shape, as well as functional aspects such as strength or balance, relative to their actual characteristics (Cash, 2012; Vani et al., 2021). Cognitions refer to the thoughts and beliefs individuals have about their bodies. They include cognitive appraisals (evaluations) of appearance such as body satisfaction and dissatisfaction as well as investment (importance) in aspects of the body (Cash, 2012). The affective dimension refers to the emotions individuals experience towards their own bodies. It includes positive and negative feelings such as pride and shame regarding overall shape, weight, and individual body parts, as well as functional aspects of the body such as fitness level or sport ability (Vani et al., 2021). The behavioural dimension refers to the actions and behaviours individuals engage in (e.g., exercise, intuitive eating, clothing choices, social isolation) that reflect the other body image dimensions (Vani et al., 2021).

Negative and positive body image are two distinct body image facets. Rather than being opposing ends of the same continuum, they exist on their respective continuum and can be experienced simultaneously (Tylka & Wood-Barcalow, 2015). For example, an individual can have positive feelings about certain aspects of their body and its functions while simultaneously experiencing negative feelings about other aspects. Negative body image refers to a person's negative thoughts and feelings, inaccurate perceptions, and maladaptive behaviours towards their own body (Grogan, 2017; Tylka & Piran, 2019; Vani et al., 2021). It often occurs when individuals believe they fail to meet the Western beauty ideal, which emphasizes certain physical traits that are considered attractive and desirable (Cash & Smolak, 2011). For women, this ideal is a slim, toned, and feminine-shaped physique (i.e., a slim waist and round hips) while for men it is a lean, muscular, and athletic build (Cash & Smolak, 2011; Grogan, 2017; McComb & Mills, 2022). In addition, for both men and women, the ideal is generally portrayed as White and able-bodied, with the assumption of heterosexuality and cisgender identity (Ansara & Hegarty, 2014; Cusack et al., 2022).

This beauty ideal is pervasive in Western society (e.g., media, social media, advertising, the fashion industry, and popular culture; Levine & Chapman, 2011; Zerhouni et al., 2022). Sociocultural theory outlines the negative consequences that often occur for individuals who internalize and attempt to attain the Western ideal, since most people naturally deviate from the unrealistic and generally unattainable ideal (Fioravanti et al., 2022; Quittkat et al., 2019). Negative body image has been linked to several negative outcomes including poor mental (e.g., depression, anxiety) as well as poor psychological (e.g., low self-esteem) and behavioural (e.g., eating disorders, dieting, inactivity) outcomes (Delinsky, 2011; Holland & Tiggemann, 2016; Jiotsa et al., 2021; Nayir et al., 2016; Rounsefell et al., 2020).

Negative body image is commonly reported in women in Western cultures (Vani et al., 2021). In a cross-sectional survey study examining the prevalence of body dissatisfaction in adults in the USA ($N = 1,893$, $M_{\text{age}} = 42.5$), the range of body dissatisfaction in women was between 13.4 and 31.8% (Fallon et al., 2014). More recently, Frederick et al. (2022) reported that in a sample of 11,620 adult men and women from the U.S., 36% of women reported low appearance evaluation and 30% reported high preoccupation with weight, both indicators of body dissatisfaction. Women reported more negative body image than men across all measures of body image. This significant percentage of the sample is noteworthy, as studies have indicated that negative body image is associated with reduced quality of life, including impaired social functioning and diminished self-confidence (Alleva et al., 2023; Nayir et al., 2016).

Positive body image refers to an overall respect, appreciation, and acceptance towards the body's appearance and function and is expressed through healthy behaviours (e.g., exercise, intuitive eating) and positive thoughts and feelings towards the body. As a distinct construct, it extends beyond the absence of negative perceptions of the body (Tylka & Wood-Barcalow, 2015; Vani et al., 2021). Positive body image is multifaceted and includes constructs like body appreciation, body acceptance/love, conceptualizing beauty broadly, adaptive investment in appearance, inner positivity, and interpreting information in a body-protective manner. It is also holistic (e.g., it includes all these components, not just one or two), protective (e.g., rejecting endangering messages), and shaped by social identities (e.g., age, gender, race/ethnicity; Swami et al., 2009; Tylka & Wood-Barcalow, 2015). Individuals with positive body image are more likely to focus on the body's physical capabilities and sensations (i.e., function) rather than its external appearance (Avalos et al., 2005; Tiggemann & McCourt, 2013; Wood-Barcalow et al., 2010). Positive body image has been linked to overall well-being, such as improved mental

health, self-compassion, and embodiment (Andrew et al., 2016; Burychka et al., 2021) as well as health behaviours such as physical activity and intuitive eating (Gualdi-Russo et al., 2022; Linardon et al., 2021).

Positive body image has most frequently been operationalized as body appreciation, an aspect of positive body image that refers to having positive attitudes towards the body, accepting it regardless of appearance (and how close it is to the ideal), engaging in healthy behaviors as a form of respect, and rejecting unrealistic beauty standards (Avalos et al., 2005; Tylka & Wood-Barcalow, 2015). Recent research has suggested that adolescents and young adults who engage in self-care practices, such as positive body affirmations and acceptance, tend to experience positive body image (Tort-Nasarre et al., 2023).

However, as a multidimensional construct, there are several indicators of positive body image beyond body appreciation. For example, embodiment is a separate construct that overlaps with body image and is the process of experiencing one's own body and fostering a close, connected, and intimate bond with it (Piran, 2015). Embodiment enables individuals to understand, appreciate, and express their bodily needs and wants (Piran, 2015). Authentic body pride is another indicator of positive body image. Body-related authentic pride is an emotion that individuals feel when positively reflecting on and appraising their bodies (e.g., proud of efforts to maintain or improve appearance). Fitness-related authentic pride is pride experienced as a result of what the body can do (Mack et al., 2015), such as feeling proud of efforts to increase fitness. Furthermore, experiences of fitness-related pride are related to positive health outcomes including engagement in physical activity (Castonguay et al., 2013). In general, fitness-related authentic pride, with its focus on function rather than appearance, is more consistent with the conceptualization of positive body image (Webb et al., 2015).

According to Cash's (2012) cognitive-behavioural model of body image, several historical factors impact body image experiences, including cultural socialization (Cash, 2012; Lewis-Smith et al., 2019). Culture is a multifaceted concept that includes behaviors, values, expectations, attitudes, and norms within a particular society or community (Gopalkrishnan, 2018; Raeff et al., 2020). Cultural practices, beliefs, and values are learned through socialization and can influence individuals' behaviours and aspects of their lives, including body image (Smith & Bond, 2019; Gopalkrishnan, 2019). Cultural influences impact body image as they affect norms pertaining to the body, including ideas of attractiveness and the ideal, as well as how to achieve those ideals (Cash, 2012).

Culture can be informed by numerous factors, including ethnicity and race. Understanding the impact of ethnicity on body image is important for promoting inclusive and culturally-tailored approaches to improving body image, especially in minority populations in Western society who are underrepresented in body image literature (Maphis et al., 2013). Body image research has historically focused predominantly on White, Western populations, resulting in a significant gap in the understanding of body image experiences among ethnic minorities within Western societies (Swami et al., 2010). Not only is this research not generalizable to non-White populations, but it also perpetuates the White-centric beauty ideals and overlooks the intersectionality of multiple identities that people experience (e.g., combining race/ethnicity, gender, and socioeconomic status; Olson et al., 2020; Swami et al., 2010; Winter et al., 2019). Current body image research does not acknowledge the specific and complex cultural factors that can impact body image. For example, in most South Asian sub-cultures, fair skin is seen as the beauty ideal based on historical factors relating to colonization and societal class divisions in

South Asian countries such as India. Consequently, this perspective has shaped beauty standards of individuals within the South Asian community (Nagar, 2018; Thomas, 2023).

Body Image in South Asian Women

South Asian women residing in Western societies often face complexities regarding their body image. These complexities arise due to the interplay of attempting to adopt the diverse and occasionally contradictory cultural beauty ideals from Western (dominant) society and those from their South Asian country of origin, a process known as acculturation. Previous research has shown that South Asian women who experience acculturation in Western culture as an ethnic minority are more likely to experience body dissatisfaction and disordered eating (Javier & Belgrave, 2019; Kuba & Harris, 2001; Wong et al., 2017). Conversely, some researchers have proposed that rejecting the dominant Western culture and embracing one's ethnic culture may also result in an elevated risk of developing body concerns and eating disorders because beauty ideals are typically unrealistic across many cultures (Lake et al., 2000; Shaw et al., 2004).

Cash's (2012) cognitive-behavioural model of body image also outlines sociocultural factors as impacting body image. Sociocultural factors (e.g., importance of female beauty, religious practices, body size ideals, skin colour) have historically affected body image in South Asian women (Chan & Hurst, 2022; Reddy & Crowther, 2007; Sahay & Piran, 1997). In South Asian culture, beauty ideals concerning body size and shape often favour a thin and youthful appearance, as it is associated with innocence and attractiveness (Goel et al., 2021). The influence of popular media like Bollywood, which often portrays beauty through thin bodies, contributes to the preference for slimmer figures, which can also influence South Asian women living in Western societies (Mishra et al., 2023). However, there is conflicting research showing that some regions of South Asia have a different body ideal favouring a more full figure (e.g., in

Punjabi regions of India, having a fuller body as a woman is admirable; Brady et al., 2017; Mishra et al., 2023). These differences illustrate the complexity of body image for South Asian women as they receive messages of conflicting ideals within South Asian culture, which can contribute to additional challenges with body image.

Research has shown that South Asian women are at risk of experiencing negative body image outcomes (e.g., body dissatisfaction, thin-ideal internalization; Goel et al., 2021; Swami et al., 2009). For example, a study by Chan and Hurst (2022) examined the association of body dissatisfaction and skin colour dissatisfaction with appearance-related ethnic teasing in young adult South Asian women living in the UK ($N = 107$, $M_{\text{age}} = 24.6$ years). Participants reported significant levels of skin colour dissatisfaction and body dissatisfaction regardless of association with other variables such as appearance-related ethnic teasing and cultural identification (Chan & Hurst, 2022). Furthermore, Reddy and Crowther (2007) examined body image correlates among young South Asian women living in the USA ($N = 74$, $M_{\text{age}} = 24$ years) and found that South Asian women reported high ideal body internalization (Reddy & Crowther, 2007).

In addition to being at risk for negative body image, research has also shown South Asian women may be at risk for lower positive body image compared to other ethnic groups. For example, a 2009 study by Swami et al. reported that South Asian women in the UK ($N = 122$, $M_{\text{age}} = 21.3$ years) had the lowest body appreciation scores compared to other ethnic groups such as White, African Caribbean, and Hispanic, which is consistent with the suggestion that they are at an increased risk for developing negative body image and eating disorders (Swami et al., 2009).

Regarding skin tone, there has been a historical preference for fair or lighter skin tones in South Asian culture (in contrast to Western cultures, in which a preference for tanned skin has

been part of the ideal; Trekels et al., 2018), which is influenced by colourism. Colourism refers to discrimination based on skin color, where lighter skin is often considered more desirable and associated with beauty (Craddock et al., 2023). The preference for fair skin can be historically linked to colonialism, when European colonizers were considered superior, leading to the association of lighter skin with higher status and beauty (Nagar, 2018; Thomas, 2023). In a study by Sahay and Piran (1997), it was observed that South Asian women exhibited a higher level of dissatisfaction with their skin tone compared to women of other ethnicities. The research specifically highlighted that, when contrasted with their White Canadian counterparts, South Asian Canadian women reported greater dissatisfaction with their skin color (Sahay & Piran, 1997).

There are several reasons why South Asian women in Western countries may report poorer body image than women of other ethnicities. Some of these factors include culture-specific experiences including pressure to uphold South Asian beauty ideals and skin colour discrimination from relatives and South Asian community members (Goel et al., 2021; Mishra et al., 2023). A qualitative study by Goel and colleagues used focus groups to examine South Asian women's ($N = 54$, $M_{\text{age}} = 20.1$ years) conceptualization of body dissatisfaction and eating disorders. Pressure from extended family and community members to uphold appearance ideals (i.e., lighter skin and a thinner body) was reported (Goel et al., 2021). Further, women revealed that pressures to achieve competing body and appearance ideals between Western and South Asian cultures negatively impacted their body esteem (Goel et al., 2021), introducing further complexity to beauty ideals for South Asian women, who must navigate these contrasting notions of beauty. For example, Western culture ideals involve revealing clothes, while South Asian

culture ideals perpetuate modest fashion with minimal skin showing (e.g., chest, arms, legs, and buttocks are covered; Mustafa et al., 2017; Wong et al., 2017).

Mishra and colleagues (2023) also conducted focus groups to examine body image experiences of South Asian women ($N = 22$, $M_{\text{age}} = 30$ years) in the UK. In this study, participants expressed that they had experienced colourism and weight stigma from relatives, which negatively impacted their body image (Mishra et al., 2023). Previous research has also found that racial teasing during childhood and the negative influence of White-centric media in Hollywood potentially contribute to poorer body image in South Asian women (Chan & Hurst, 2022; Goel et al., 2021; Sahi Iyer & Haslam, 2003; Hill & Bhatti, 1995). Given that South Asian women in Western countries are likely to experience higher negative and/or lower positive body image, it is important to investigate ways to improve body image in this group. One way is through exercise.

Exercise and Body Image

Studies have explored the relationship between exercise and body image. Previous meta-analyses have consistently found associations between participation in exercise and reduced negative body image outcomes (e.g., body dissatisfaction), indicating that engagement in exercise activities may be related to improved body image (Campbell & Hausenblas, 2009; Hausenblas & Fallon, 2006; Reel et al., 2007). A more recent scoping review by Sabiston et al. (2019) also supports that physical activity (defined as both structured exercise and leisure/lifestyle physical activity) and sport are associated with less negative body image (e.g., objectified body consciousness) and more positive body image outcomes (e.g., body satisfaction) (Sabiston et al., 2019), although evidence regarding positive body image outcomes was limited.

Different types of exercise (i.e., aerobic training, strength training, combination of both) have been found to be beneficial for women's body image (Campbell & Hausenblas, 2009; Hausenblas & Fallon, 2006; Reel et al., 2007). For example, Martin Ginis et al. (2014) conducted a randomized controlled trial comparing the effects of aerobic training and strength training on body image among 46 young adult women ($M_{age} = 21.5$ years) with pre-existing body image concerns. The 8-week intervention consisted of supervised exercise three days a week. The aerobic training program was done on either an elliptical exercise machine or a treadmill with 30 minutes of continuous activity in their target heart rate zone. The strength training program involved both upper and lower body exercises on resistance machines and with free weights. The results indicated that both aerobic training and strength training interventions led to significant improvements in body image (i.e., improved appearance evaluation and reduced physique anxiety) among the participants, suggesting both types of exercise can be beneficial for enhancing body image perceptions in young women with pre-existing concerns (Martin Ginis et al., 2014).

In young adult women, exercise behaviour has also been shown to be associated with positive body image measures including body satisfaction and internal body orientation (i.e., awareness of the body's signals such as hunger; Arigo et al., 2016; Tylka & Homan, 2015). To date, few studies have examined the effects of an exercise program on positive body image outcomes in young adult women exclusively. Annesi (2005) conducted a study examining the effects of exercise classes on positive body image (i.e., body esteem) in adult women (aged 21 to 60 years, $M_{age} = 41.4$ years; Annesi, 2005). The classes consisted of cardiovascular training, and the exercise plans were standardized and included three classes per week for 12 weeks, for 20 to 30 minutes per class, at a somewhat difficult intensity. The authors found significant

improvements in body esteem in the sample after completion of the exercise program (Annesi, 2005).

Regarding the type of exercise, meta-analyses have shown body image improvements from both strength and aerobic exercise, and there has been some indication that strength training may be particularly beneficial to body image (Williams & Cash, 2001). A systematic review by Santa Barbara et al. (2017) reviewed the effects of strength training on body image in adults (80% female, majority young adults). Overall, 11 studies were included in the review, with three studies considered high quality. Eight of these studies reported positive effects of strength training on body image, including higher body satisfaction and appearance evaluation, and lower social physique anxiety (Santa Barbara et al., 2017). Taspinar et al. (2014) conducted a study comparing the effects of strength training with Hatha yoga and a control group on body image in sedentary young adult men and women ($N = 80$, $M_{\text{age}} = 26.7$ years). The findings showed that there were greater improvements in body image satisfaction (as measured by the Body Cathexis Scale; Secord & Jourard, 1953) in the strength training group compared to the yoga and control groups (Taspinar et al., 2014). A study by Henry and colleagues (2006) compared the effects of strength training and aerobic training on body image in young adult women ($N = 72$, $M_{\text{age}} = 21.4$ years). It was reported that strength training was associated with greater improvements in overall appearance evaluation (Henry et al., 2006).

However, not all studies have shown the same benefits of strength training. For example, Koplak et al. (2012) conducted a study examining the effects of strength training compared to a control group on body satisfaction and found that there were no significant improvements in either group (Koplak et al., 2012). Further, Martin Ginis et al. (2014) found aerobic exercise generally led to larger improvements in body image outcomes than strength training (i.e.,

appearance evaluation), however, both modes of exercise yielded significant improvements (Martin Ginis et al., 2014). Similarly, a study by Gammage et al. (2016) looked at the effects of a single resistance or yoga class on state body image (body satisfaction and social physique anxiety) in young adult women ($N = 46$, $M_{\text{age}} = 19$ years). While both types of exercise led to decreases in social physique anxiety, only yoga was associated with increases in body satisfaction (Gammage et al., 2016).

A qualitative study by Walters and Hefferon (2020) found that strength training was linked to positive body image and psychological well-being in women ($N = 12$, $M_{\text{age}} = 40.9$ years). Women noted that strength training allowed them to focus less on their weight and being smaller and rather on being strong, focusing on the function of the body, and enhancing self-care (Walters & Hefferon, 2020).

Given the overall beneficial effects of strength training on body image, Santa Barbara et al. (2017) provided preliminary recommendations for resistance training programs to improve body image. Specifically, most studies showing benefits reported 2-3 sessions per week, a program duration of at least 6 weeks, 30-60 minutes per session (2-3 sets of 8-12 exercises for the full body), and moderate to high intensity, although it was not possible to determine specific dose-response relationships.

While the findings from previous research are informative, these studies examined predominantly White samples. There is little to no research on the effects of strength training on South Asian women, even though they are at a greater risk of body dissatisfaction than other ethnic groups and are relatively inactive compared to White women (Daniel & Wilbur, 2011; Ye et al., 2009).

Exercise in South Asian Canadian Women

The current physical activity guidelines for adults aged 18 to 64 years recommend 150 minutes of moderate to vigorous intensity aerobic activity per week to achieve health benefits (e.g., lower risk of mortality, cardiovascular disease, diabetes; Canadian Society for Exercise Physiology [CSEP], 2021) and strength training at least twice a week (CSEP, 2021). Evidence from previous Canadian studies show that South Asian women report the lowest physical activity levels compared with other ethnicities (i.e., Black, Middle Eastern, Latin American, Aboriginal, White; Bryan et al., 2006; Dogra et al., 2010; Rana et al., 2014). These findings are consistent with comprehensive cross-national surveys conducted in Western countries such as the UK, Australia, and the USA, which consistently reveal that South Asian individuals report lower levels of physical activity compared to their White counterparts (Babakus & Thompson, 2012). Iliodromiti et al. (2016) compared the physical activity levels of South Asians ($N = 148$, $M_{\text{age}} = 49$ years, 49.3% women) and White Europeans ($N = 163$, $M_{\text{age}} = 49$ years, 49.1% women) and found that South Asian women had significantly lower levels of moderate-intensity physical activity compared to White women.

In 2020, between 46-51% of females aged 18-64 years met the guidelines for muscle-strengthening physical activity in Canada (Prince et al., 2023). However, the proportion of Canadians meeting the strength recommendation was lower among immigrants and non-White ethnicities, including South Asian women, although precise rates of strength training in South Asian women living in Western countries are unknown. To increase physical activity (including strength training) in South Asian women, it is important to address barriers and facilitators to strength training in this group.

Barriers to Exercise in South Asian Women

In terms of barriers to strength training specifically, there is yet to be research examining South Asian perspectives. However, there is previous research that has investigated barriers to strength training in predominately White samples of women. Hurley et al. (2018) investigated potential barriers to strength training in college-aged women and found that the most significant barriers included being too busy, a lack of desire, and too much discipline required to continuously take part in a regular strength training program (Hurley et al., 2018). A systematic review by Vasudevan and Ford (2022) identified barriers for women initiating and maintaining strength training. The most frequently observed barriers to strength training include gender-based stigmas, discouragement, boredom, poor gym accessibility, a lack of supervision or routine, and difficulty balancing work and family life (Vasudevan & Ford, 2022). Regarding gender-based stigmas, women reported that a barrier to initiating strength training was the desire to “not look like a man” (Bopp et al., 2004; Vasudevan & Ford, 2022). There have also been experiences of discouragement in which women were told that they should not be muscular by other individuals at the gym (Bopp et al., 2004). A study by Peters and colleagues (2019) investigated barriers to strength training in a predominately White sample of college-aged women ($N = 223$, $M_{age} = 19.7$ years). Women who had not initiated strength training reported the most prominent barriers were the fear of looking weak or uncoordinated, lack of strength training knowledge, and discomfort around men at fitness facilities (Peters et al., 2019).

While researchers have yet to investigate barriers to strength training in South Asian women, barriers to exercise in general for this group have been identified. Many of these barriers are related to cultural expectations and norms. South Asian women have reported that fear of being judged negatively for engaging in exercise instead of focusing on domestic duties (as is appropriate for women) by family members and friends from the South Asian community is a

barrier to exercise (Babakus & Thompson, 2012). It is common in South Asian culture to stigmatize exercise for women because it is seen as “selfish” and not compliant with gender roles of taking care of the home; however, it is also important to acknowledge that most research on this topic focuses on older South Asian women (30 to 65+ years of age] Ige-Elegbede et al., 2019; Thanawala et al., 2020). It is important to consider that younger South Asian women may not experience or be influenced by the same expectations as older women. Women attending university may be less likely to have their own families to take care of. Furthermore, gender expectations and domestic duties to prioritize time and energy into taking care of the house and family as a woman leave little to no time to engage in leisure-time physical activity and exercise (Bhatnagar et al., 2021). Additionally, the exercise and fitness industry in the West are unlikely to consider South Asian cultural expectations and norms that can create barriers to exercise (Mahmood et al., 2022). Mixed-sex fitness facilities that do not consider women’s cultural or religious beliefs pose a barrier to engaging in physical activity (Babakus & Thompson, 2012; Ige-Elegbede et al., 2019). While many gyms are starting to create small women’s only sections or limited women’s only hours, these are not available in all cities (in particular, smaller cities) and are not accessible to all South Asian women (Coen et al., 2018). Thus, South Asian women may not have the necessary social support and environment to be physically active (Babakus & Thompson, 2012).

Facilitators of Exercise for South Asian Women

There are various factors that facilitate engagement in physical activity for South Asian women such as recognizing the significance of self-care and personal time (Bhatnagar et al., 2021). Further, exercise classes and facilities that acknowledge South Asian culture by creating an inclusive environment (e.g., accommodate for modest attire, exercise space is exclusive to

women; Bhatnagar et al., 2021; Jepson et al., 2012) serve as facilitators to exercise. Social facilitators of exercise include having access to women-only facilities, peer encouragement from other South Asian women for motivation and a sense of community, and supportive South Asian communities and family members in promoting exercise (Bhatnagar et al., 2021; Horne & Tierney, 2012; Jepson et al., 2012). By utilizing these facilitators, an inclusive and accommodating exercise setting can be established for South Asian women.

Culturally-Tailored Exercise Interventions for South Asian Women

To improve the body image and physical activity levels of South Asian women, exercise interventions should be tailored to address their specific needs and overcome barriers (Vahabi & Damba, 2015). A culturally-tailored exercise program is one that acknowledges and respects the unique cultural backgrounds, beliefs, and identities of individuals, ensuring that exercise activities are inclusive and considerate of their diversity. It involves creating an environment that promotes understanding, appreciation, and empathy for different cultures and subcultures, while also tailoring physical activity settings to align with cultural preferences and values (Banerjee et al., 2017; Montayre et al., 2020).

In a qualitative study by Kandula et al. (2013), South Asian women were more likely to engage in physical activity when exercise interventions and programs were culturally-tailored (Kandula et al., 2013). It is necessary that physical activity interventions consider sociocultural factors to ensure the effectiveness and acceptability of the intervention for South Asian women, given that low physical activity levels are prevalent in this population. Creating a sense of community by bringing together women of similar cultural backgrounds and experiences can also be effective in promoting physical activity among this population (Kandula et al., 2013; Sriskantharajah & Kai, 2007). Culturally-tailored exercise programs conducted within

community settings offer group cohesion, support, social interaction, comfort with other South Asian women exclusively, and enjoyment, all of which assist in addressing barriers to exercise. These motivating factors have been highlighted in qualitative studies involving South Asian immigrants (Jepson et al., 2012). In previous research, cultural dance has been frequently employed to establish a culturally-familiar exercise environment for South Asian women, as it is seen as enjoyable and motivating (Vahabi & Damba, 2015). For example, Bollywood dance is a popular cultural dance style that originated from the Hindi film industry (i.e., Bollywood) and has been used in previous culturally-tailored exercise interventions targeting South Asian women (Vahabi & Damba, 2015).

Rationale

Positive body image is important for overall well-being and mental health, as it fosters a sense of comfort and satisfaction with one's appearance and function (Cash & Smolak, 2011; Vani et al., 2021). Among South Asian women, the prevalence of low levels of positive body image and high levels of negative body image is concerning, affecting their quality of life and mental health (Bush et al., 2001; Goel et al., 2021; Swami et al., 2009). It is also beneficial to include diverse ethnicities and cultures in body image research for issues related to equity and to promote inclusivity in the field.

However, there is a lack of body image research on ethnic minority samples from Western countries, highlighting the need for research specifically focusing on these populations (Hausenblas & Fallon, 2006; Vani et al., 2021). Exercise in the form of strength training is known to play a significant role in improving body image by reducing negative body image (Santa Barbara et al., 2017) in young adult women, as demonstrated in previous interventions (Depcik & Williams, 2004; Henry et al., 2006; Martin Ginis et al., 2014). However, there

remains a knowledge gap regarding the influence of strength training on positive body image outcomes in women. Furthermore, there is an absence of research examining how strength training affects positive body image outcomes in young adult South Asian women, a population that should be targeted by strength training interventions (Ntuk et al., 2017). Despite the potential benefits of strength training on body image, South Asian women exhibit low physical activity levels in general, including strength training (Mahmood et al., 2022; Rana et al., 2014). This can be attributed to various barriers, including cultural expectations and norms, a lack of representation in exercise programs, and concerns about stigma from the South Asian community. Therefore, to improve physical activity levels that may lead to more positive body image in this population, it can be beneficial to address these barriers with a culturally-tailored strength training program that implements previously reported facilitators, and reduces the known barriers to physical activity, to a strength training program for South Asian women (e.g., women's-only classes, modest attire, South Asian music). However, given the lack of evidence regarding effective components of a culturally-tailored strength training program for young South Asian women, and the acceptability of such a program, it is important to determine first what such a program might entail.

Purpose

The purpose of this study was to investigate the feasibility of a culturally-tailored strength training program targeting young South Asian women, as well as the preliminary effects of the program on positive body image outcomes including body appreciation, functionality appreciation, fitness-related authentic pride, and embodiment in young South Asian women. Specifically, the following research questions were addressed for the primary purpose: a) What are the recruitment rates? b) What are the attendance rates for those who enrol? c) What is the

feasibility of the intervention?, d) What is the acceptability of the intervention?, e) What is the implementation fidelity? and f) What components of the program were favoured by participants?

For the secondary purpose, the following research question was addressed: Are there changes in positive body image from pre-to-post intervention?

Chapter 3: Methodology

Study Design

This was a single-group, repeated measures feasibility study with a cohort of young adult women of South Asian descent. This study served as a proof-of-concept for a culturally-tailored strength training intervention tailored to young South Asian women, with the goal of improving positive body image outcomes. It aimed to provide preliminary evidence for the feasibility and acceptability of the program and the findings may inform the potential implementation of a randomized control trial in future research (Eldridge et al., 2016). Those who consented to participate completed a 6-week strength training program as well as baseline and post-program body image questionnaires. In addition, post-program measures of feasibility and program evaluation were completed.

Study context. This study aimed to provide preliminary evidence as to whether a strength training program designed with culturally-tailored strategies for adherence was feasible and could improve body image in young South Asian women. The strength training program was specifically designed for beginners who had limited experience and knowledge in strength training (i.e., had not strength trained in the past year). Evidence-based barriers to exercise for South Asian women were addressed in the development and implementation of the culturally-tailored strategies for the program, for the purpose of maintaining adherence to the program. This strength training program was tailored for South Asian women by including a multi-lingual (e.g., Hindi, Punjabi) South Asian instructor, South Asian dance forms incorporated into the warm-up, popular Bollywood and South Asian music, and holding the class in a private space exclusive to women for cultural and religious boundaries. To avoid revealing the secondary objective of the study focusing on positive body image outcomes, participants were recruited for a study

investigating strength training and well-being in South Asian women. Additionally, the researcher of the present study is a young South Asian woman whose identity and lived experiences may relate to the participants and influence the interpretation of data reported.

Participants

The target sample size for this study was approximately 25 participants. This sample size was based on recommendations by Whitehead et al. (2016) for sample sizes in pilot studies. For a power of 90% and an alpha of 0.5, with a small effect size (as reported in Campbell & Hausenblas, 2009), 25 participants were recommended. A total of 12 individuals were recruited from the Niagara Region and 7 participants completed the study.

The inclusion criteria for the study were: (a) self-identifying South-Asian cis-gendered woman (cultural/ethnic background from South Asian countries including Afghanistan, Bangladesh, Bhutan, India, Nepal, Maldives, Pakistan, and Sri Lanka); (b) between the age of 18 and 29 (i.e., young adult, consistent with Government of Canada and Statistics Canada; Government of Canada, 2011; Statistics Canada, 2015); (c) able to read, write, and understand English; and (d) no contra-indications to exercise (e.g., uncontrolled arrhythmias, unstable diabetes, deep vein thrombosis, etc.). Women were excluded from the study if they were diagnosed with condition(s) that affected the ability to safely perform the physical activity (e.g., exercise-induced asthma, recent fracture within the past 8 weeks). Initially, there were exclusion criteria regarding engagement in strength training in the past year and high positive body image scores (scoring higher than 3.5/5 on a measure of body appreciation). However, given the small number of participants who were interested in participating in the study, these exclusion criteria were removed in order to retain the sample size.

Measures

Participants completed the following questionnaires (see Appendix A for a copy of all questionnaires):

Medical history screening and physical activity clearance. Prior to participation in the study, participants were asked to complete the CSEP Get Active Questionnaire (CSEP, 2017), a 9-item measure that assessed whether an individual could perform physical activity safely. Participants answered *yes* or *no* to each item. Participants that responded “no” to all items were able to safely participate in physical activity. If they answered “yes” to any of the questions, they were asked to provide a doctor’s note, clearing them for participation in the strength training program.

Demographics. Demographic information (gender, age, ethnicity, year of study, major, employment status, marital status, number of children, birth country, years in Canada) was self-reported pre-intervention for descriptive information about the sample.

Recruitment. Several aspects of recruitment were measured including the number of interested individuals who contacted the research team, the number enrolled in the program, the number of interested individuals from each recruitment source, the dropout rate, and the final number of participants, all of which were recorded on a spreadsheet. Participants who dropped out were asked to share reasons for declining participation over email.

Adherence. Attendance (using participant ID numbers) was taken at the beginning of each class to measure adherence. The average number of attended classes was calculated.

Feasibility. For the primary purpose of the study, a feasibility measure was administered after completion of the program. The Feasibility of Intervention Measure (FIM; Weiner et al., 2017) assessed the feasibility of the intervention and contained four items (e.g., “This strength training program seems implementable.”) with a 5-point scale ranging from 1 = *completely*

disagree to 5 = *completely agree*. A score was obtained by calculating a mean score, and greater scores indicated greater feasibility. The internal consistency analysis in the present study revealed a Cronbach's alpha of .83 post-intervention

Acceptability. The Acceptability of Intervention Measure (AIM; Weiner et al., 2017) was used to assess the acceptability of the program and contained four items (e.g., "This strength training program meets my approval.") with a 5-point scale ranging from 1 = *completely disagree* to 5 = *completely agree*. A mean score was calculated and greater scores indicated greater acceptability. The Cronbach's alpha for the AIM was .94 post-intervention.

Program Evaluation. Participants completed multiple choice and open-ended questions asking about their thoughts on the program characteristics (e.g., length of the classes and program, the difficulty level of classes), which aspects of the program participants liked and disliked the most, suggestions to improve the program, and which aspects of the program encouraged participants to sign up and continue attending the classes. Components of the program that were selected for the questionnaire were drawn from facilitators to physical activity for South Asian women (e.g., South Asian dance; Bhatnagar et al., 2021; Jepson et al., 2012; Vahabi et al., 2012), as well as specific components of the study (e.g., ticket raffle)

Cue Checklist. The fidelity of class instruction was measured with a cue checklist. The checklist included each exercise with corresponding cues recorded. Any inaccurate, additional, or inappropriate cues by the instructor, including language related to the appearance of the body, were recorded as well. Once data collection was complete, the primary researcher calculated the total number of incorrect, inappropriate, or additional cues (e.g., a cue not in the checklist or a missed cue) in each class. See Appendix C for the cue checklist.

Body appreciation. The Body Appreciation Scale-2 (BAS-2; Tylka & Wood-Barcalow, 2015) was used to measure body appreciation (Tylka & Wood-Barcalow, 2015). The BAS-2 is a 10-item scale (e.g., “I respect my body”) that has evidence for adequate internal consistency, reliability, and validity among young adult female populations, including South Asian women (Cox et al., 2019; Kelly & Stephen, 2016; Swami et al., 2009). Each item was rated on a 5-point Likert scale, with responses ranging from 1 = *never* to 5 = *always*. A mean score was calculated, and higher scores indicated higher body appreciation. The Cronbach’s alpha of the BAS-2 was .95 pre-program and .64 post-program. Although the post-program internal consistency reliability of this measure was somewhat low, it was considered acceptable for the exploratory purposes of this study.

Functionality appreciation. The Functionality Appreciation Scale (FAS; Alleva et al., 2017) assessed appreciation of body functionality. The FAS is a 7-item (e.g., “I appreciate my body for what it is capable of doing”) scale with evidence of internal consistency, test-retest reliability, criterion-related, and construct (convergent, discriminant, incremental) validity of its scores in samples of young adult women (Linardon et al., 2020). Each item was rated on a scale ranging from 1 = *strongly disagree* to 5 = *strongly agree*. Scores on the FAS were averaged, and higher scores indicated higher levels of functionality appreciation. The FAS had a Cronbach’s alpha of .94 pre-program and a Cronbach’s alpha of .67 post-program.

Authentic pride. The Body Self-Conscious Emotions: Fitness-Related Instrument – Authentic Pride Subscale (BSCE-Fit; Castonguay et al., 2016) is a 4-item (e.g., “proud of my actions to achieve my fitness goals”) subscale of the BSCE-Fit and it assessed a sense of achievement or accomplishment from completing fitness-related goals (Castonguay et al., 2016). Participants rated the degree to which each statement applies to them on a 5-point Likert scale

from 1 = *never* to 5 = *always*. Higher scores indicated higher levels of fitness-related aspects of authentic pride. The Authentic Pride subscale has temporal stability over a 2-week period, concurrent, convergent, and discriminant validity in a sample of young adults (Castonguay et al., 2016). The Cronbach's alpha pre-program was .98, and post-program is .54.

Embodiment. The Body Responsiveness Scale (BRS; Daubenmier, 2005) was used to measure embodiment. The BRS is a 7-item scale which assessed the extent to which participants were attuned to their bodies and behaved according to their bodies' needs. It has been used as an indicator of embodiment among adult women (18 years of age and older; Daubenmier, 2005; Piran et al., 2020). Each item (e.g., "I enjoy becoming aware of how my body feels.") was rated on a 7-point scale from 1 = *not at all true of me* to 7 = *always true of me*. A mean score was calculated and higher scores indicated greater body responsiveness. The BRS has demonstrated adequate internal consistency reliability (Cronbach's $\alpha = .83$; Daubenmier, 2005) in a sample of young women. Reliability analysis revealed a Cronbach's alpha of .88 pre-program, and post-program of .85.

Cover story measures. In addition to study measures, several measures were administered to uphold the cover story advertised to participants (i.e., strength training and well-being). They included the Positive and Negative Affect Schedule, assessing overall mood (PANAS-SF; Watson et al., 1988), the Perceived Stress Scale, assessing stress perceptions (PSS; Cohen et al., 1983), and the Exercise Motivations Inventory, assessing reasons for exercise (EMI-2; Markland & Ingledew, 1997). These measures were not included in the data analysis.

Procedures

Clearance from the Brock University Office of Research Ethics was secured before recruitment began (see Appendix B for the Brock University Office of Research Ethics clearance

form). Posters were posted on the social media accounts (e.g., Instagram, LinkedIn) of the research team and their peers. South Asian student organizations at the university were contacted to share the recruitment poster on their social media pages as well (e.g., Instagram, LinkedIn). Posters were also placed on campus at Brock University. Snowball sampling was also used; individuals who saw one of the advertisements were encouraged to share the researchers' contact information with others who may have been eligible and interested.

Interested participants were asked to contact the principal student investigator through email. They received an email outlining eligibility criterion and a copy of the consent form and were encouraged to seek clarification via email if they had any questions.

If still interested, participants received an email containing a link to pre-screening tools via Qualtrics: the Get Active questionnaire from CSEP (CSEP and Health Canada, www.csep.ca), the BAS-2 questionnaire to screen out individuals with a score higher than 3.5 for preventing ceiling effects, and a questionnaire to confirm that they were novice or inexperienced in strength training and match the general eligibility criteria (i.e., gender, ethnicity, age, strength training history). If respondents answered "Yes" to any questions on the Get Active questionnaire, they needed to obtain a doctor's note. As the study progressed, exclusion criteria regarding strength training experience and high body appreciation scores were removed due to the small sample size.

Once eligibility was confirmed, participants were provided with a link to access informed consent and baseline surveys via Qualtrics. These surveys included the demographic questionnaire, assessments of positive body image (i.e., body appreciation, functionality appreciation, fitness-related authentic pride, and embodiment), and cover story measures. Measures of body image and the cover story measures were randomized to avoid order effects.

Once submitted, participants were emailed information on the exercise program (i.e., location, days/times), and what to bring.

Based on facility and instructor availability, three classes were offered weekly for the strength training program. Participants were asked to attend two of the weekly classes based on their preferences and availability, on non-consecutive days, consistent with 24-hour movement guidelines (CSEP, 2021). This frequency has been shown to be ideal for allowing time to rest between classes in previous strength training interventions (Santa Barbara et al., 2017). Then, participants underwent the 6-week strength training program. This duration is consistent with a systematic review by Santa Barbara et al. (2017) showing benefits of strength training interventions on body image in as short as 6 weeks and a meta-analysis conducted by Campbell and Hausenblas (2009) which found no significant moderating effects of exercise program length on body image outcomes with exercise programs ranging from 4 to 52 weeks in length. Data was collected from March 2024 to April 2024.

Upon the completion of the strength training program at Week 6, participants were emailed a link to Qualtrics to complete the feasibility, acceptability, and program evaluation measures as well as the same body image and cover story measures. At this time, participants received a continuing consent form that informed participants of the true secondary objective of the study (i.e., impact of a strength training program on positive body image) and they were asked to provide continuing consent to use their data.

Strength training intervention. Participants were asked to not make changes to other aspects of their lifestyle, including their regular physical activity and eating behaviours. The strength training program was based on the strength training class from a study conducted by Gammage et al. (2016), comparing the effects of a yoga intervention to a strength training

intervention on a sample of college women ($N = 46$, $M_{\text{age}} = 19$ years). The classes were designed by the first author and her supervisor. The strength training program was designed to be suitable for women who are beginners to strength training working at a moderate intensity level (Gammage et al., 2016). Each class was approximately 45 minutes in length, with a 5-minute warm-up, followed by 30 minutes of free-weight and body weight strength training. The strength training exercises (e.g., bicep curls, shoulder presses) targeted each of the major muscle groups (i.e., upper body, lower body, core) and were performed in a circuit format. Two rounds of the circuit were intended to be performed, with 45 seconds of exercise and 15 seconds of rest. However, in weeks 1 and 2, because more instruction was needed, only one round of each exercise was completed. Modifications were provided for each exercise. After strength training, there was 5 minutes of cool-down stretches that target each major muscle group that was used during the class. Dumbbells ranging from 1 pound to 10 pounds and yoga mats were provided at each class. The exercise difficulty progressed at Week 4 by making heavier dumbbells available for participants who wanted to use them. See Appendix D for the class outline.

Culturally-tailored strategies. Culturally-tailored strategies were integrated into the strength training program to assist with participation and adherence to the strength training program. The instructor was a young adult South Asian woman who was multi-lingual (e.g., Hindi, Punjabi) and could provide multi-lingual one-on-one verbal cues on proper form (e.g., keep the back straight during deadlifts) to make the environment more welcoming to South Asians. The clothing worn by the instructor was modest to be appropriate for traditional South Asian values. The 5-minute warm-up was inspired by South Asian and Bollywood dance styles to prepare the body for strength training. South Asian music, predominately in Hindi and Punjabi, was played throughout the duration of the classes to help foster a sense of comfort and

familiarity (Natesan et al., 2015). To address cultural and religious preferences to exercise in women's-only facilities, all classes were held in a private fitness classroom with no windows for privacy. The research team members present at the classes were also young adult South Asian women. These strategies aimed to address the South Asian culture-specific barriers to physical activity engagement compared to White women.

Instructor. One instructor taught all of the classes. The instructor, a South Asian woman, had an undergraduate and a Master's of Science in Kinesiology, and was completing her Ph.D. within the same research lab. She had over five years of experience teaching group exercise classes in-person and online to a variety of populations (e.g., older adults, South Asian women), and is also certified in First Aid/CPR. The instructor guided participants through the exercises emphasizing proper form and technique. She wore attire that was appropriate for strength training while maintaining modesty for South Asian culture (e.g., trackpants/leggings, a t-shirt, and a head covering). A researcher, who was also a young adult South Asian woman, was present in each of the classes to track attendance and record instructor cues to assess consistency.

The strength training class design, including appropriate exercise modifications and instructional and motivational cues, were provided to the instructor before the start of the program. The instructor was asked to teach a practice class to the research team prior to the program. The study supervisor has approximately 32 years of experience teaching a variety of group fitness classes and 20 years of training and assessing instructors. Feedback regarding the flow of the program, the types of exercises chosen, exercise schedule modifications, and cues were provided by the study supervisor to the instructor to ensure they could deliver the strength training intervention appropriately. The instructor taught a second practice class to the research lab and received feedback on pacing as well. During the second practice class, it was confirmed

that the instructor could deliver the class with at least 90% accuracy based on an instructor consistency check (please see the section below). Once the research team was satisfied with the instructor's ability to deliver the classes safely and in keeping with the cue and body image language guidelines, she was eligible to teach.

Intervention fidelity. To ensure that the strength training classes were delivered consistently (e.g., same exercises, instructions, and cues), the primary researcher and/or research assistant attended the classes with a class checklist to ensure the same exercises, instructions, and cues and were used by the instructor each class. The total number of inaccurate cues was divided by the number of total cues for each class and expressed as a percentage to yield an accuracy of cues score for each class.

Body image language within the program. The instructor was asked to refrain from using language directly referencing the physical appearance of the body (e.g., "this exercise will give you toned muscles or help you lose weight") to prevent the promotion of exercise for extrinsic purposes. Additionally, appearance-related cues have been shown to modify the effects of exercise classes on body image (Engeln et al., 2018).

Statistical Analysis

Descriptive statistics were calculated for all demographic, physical activity, and body image variables using SPSS Version 29. For continuous variables (body appreciation, functional appreciation, fitness-related authentic pride, embodiment, feasibility, and acceptability), means and standard deviations were reported. For categorical variables (e.g., ethnicity, program evaluation), frequencies were reported. Paired t-tests were conducted to determine changes in body image variables before and after the program and G-power was used to calculate the effect sizes (Cohen's d) for each variable.

For the program evaluation measure, frequencies and percentages were calculated for multiple choice measures. Responses to open-ended qualitative questions were systematically reviewed for common ideas, which were grouped together in themes and illustrated by quotes. The themes were organized by question and identified by either being mentioned multiple times or by being unique and meaningful for the study (e.g., insight on suggestions for future studies).

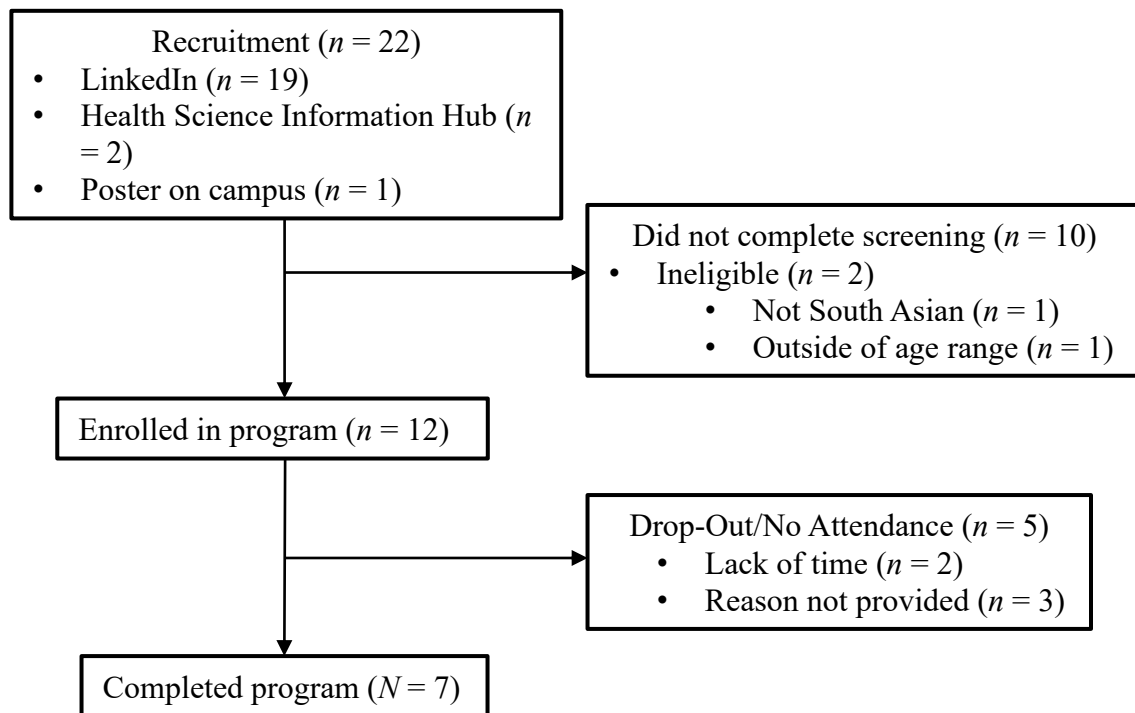
Chapter 4: Results

Program Feasibility

Recruitment and flow-through. Figure 1 shows an overview of participant recruitment and completion. Individuals learned about the program from multiple sources, including both social media and in-person sources.

Figure 1

Recruitment and Participant Flow-Through



Over a recruitment period of two weeks, the research team was contacted by a total of 22 women who saw the study advertised on LinkedIn, the Health Science Information Hub for Brock University students, and campus posters. LinkedIn was the most effective source of potential participants, with the post garnering over 700 views, and the greatest interest (19 of 22 inquiries, 4 of 7 participants) recruited through LinkedIn. Ten individuals (45%) who contacted

the researchers to express interest did not complete the pre-screening, and two individuals (9%) were ineligible to participate in the program (i.e., one was not of South Asian descent and one was outside of the age range), leading to a total of 12 participants being enrolled in the program after completing screening and baseline measures. Thus, almost 45% of participants who expressed initial interest in the study did not actually enroll. Of the 12 participants, five participants (42%) dropped out or did not attend the exercise program. Of the five dropouts, two participants cited a lack of time as the primary reason for withdrawal; the remainder did not indicate their reason. This may be due to the fact that there was almost two weeks between completing initial measures and the actual start of the program for those who dropped out, which could have contributed to a loss of interest from too much time passing. It is also important to note that the mean age of those who dropped out was noticeably higher than those who stayed in the program. This may be potentially due to older individuals possibly having more responsibilities and commitments than younger individuals. The program was completed by a total of seven participants (32% of those who initially contacted the research team regarding the study). All seven participants who began the exercise program completed the baseline and post-program assessments.

Of the seven participants, most were of Indian origin and most were students. The ages ranged between 18 and 24 years with a mean age for the sample of 20.29 years ($SD = 2.75$). Table 1 presents the demographic characteristics of the participants at baseline.

Table 1*Demographic Characteristics of Participants at Baseline*

Baseline Characteristic	<i>M (SD)</i>	Frequency (%)	<i>M (SD)</i> Dropout	Frequency (%) Dropout
Age (years)	20.29 (2.75)		25.40 (3.25)	
Height (cm)	161.43 (5.50)		159.58 (3.74)	
Weight (lbs)	149.71 (23.36)		140.73 (5.33)	
Ethnicity				
Indian		3 (42.86)		4 (80)
Sri Lankan		2 (28.57)		0 (0)
Bengali		1 (14.29)		1 (20)
Pakistani		1 (14.29)		0 (0)
Employment Status				
Unemployed		1 (14.29)		0 (0)
Student		5 (71.43)		5 (100)
Part-time		1 (14.29)		2 (40)
Full-time		1 (14.29)		1 (20)
Retired		0 (0)		0 (0)
Highest Educational Level				
Some high school		2 (28.57)		0 (0)
Completed high school		1 (14.29)		0 (0)
Completed trade or technical training		1 (14.29)		0 (0)
Some university		2 (28.57)		5 (100)
Completed university		1 (14.29)		0 (0)
Marital Status				
Not married		3 (42.86)		2 (40)
Engaged		2 (28.57)		0 (0)
In a relationship		2 (28.57)		3 (60)
Married		0 (0)		0 (0)
Child Dependents				
Yes		0 (0)		0 (0)
No		7 (100)		5 (100)
Birth Country				
Canada		4 (57.14)		3 (60)
United States		1 (14.29)		0 (0)
India		1 (14.29)		2 (40)
Scotland		1 (14.29)		0 (0)

Adherence. The average number of classes attended by each participant was 4.86 out of the 12 classes they were asked to attend ($M = 40.5\%$, $SD = 4.18$), with a range between 1 (8%) and 12 (100%) classes attended per participant. Sixteen out of the 18 classes offered (88.89%) were attended by participants.

Retention. All seven participants (100%) fully completed screening and post-program measures. Baseline measures were fully completed by six participants (85.71%). One participant did not complete the FAS and BSCE-Fit measures at baseline. There were no dropouts from the study among the seven participants.

Intervention fidelity. All 18 classes were offered as intended. Throughout the program, the instructor adhered to 98.91% of the pre-planned cues. Twenty-three additional cues that were unrelated to body image were used. There were no incorrect cues used. Class format, instructions, and culturally-tailored aspects (i.e., music, dance, exclusivity to South Asians) were delivered as intended.

The program initially took place in a private studio within a fitness center for older adults and those living with chronic disease and disability on Brock University's campus. This location was selected for its convenient access for potential participants from the Niagara community as well as students from Brock University and Niagara College, as it was on a bus route, and had free parking available. At Week 2, the program relocated to a private research lab on the main campus because some members at the original location were not welcoming to study participants and researchers, as comments about age and ethnicity were made (i.e., young South Asian adult women). For example, verbal comments were made by the fitness center members towards the research team and participants as they walked to the studio about not fitting the age demographic

of the center. In addition, a class was interrupted by a center member who expressed dissatisfaction about the room being exclusively reserved for young South Asian women.

Feasibility measures. Overall, the sample reported that the strength training program was implementable. The mean score for the FIM was $M = 4.50$ ($SD = .43$), indicating high feasibility of the program.

Acceptability measure. The sample reported high scores for this measure. The mean score for the AIM was $M = 4.39$ ($SD = .67$), which may indicate high acceptability of the program. However, the poor attendance contradicts the high scores on this measure.

Program evaluation. Data pertaining the program evaluation is shown in Table 2. The most selected reasons for joining the program include exclusivity to women, exclusivity to South Asians, the group fitness setting, and no cost for the program. The least reported reasons for joining the program included the duration of the program, the gift card raffle, the class frequency, the length of the classes, and strength training as the form of exercise.

The most reported reasons for continuing attendance in the program selected by participants were the South Asian dance warm-up, exclusivity to South Asians, quality of instruction, and the group fitness setting. The least reported reasons for continuing attendance include the duration of the program, the class frequency, the length of the classes, and the convenience of the location.

Overall, the length of the strength training classes and strength training program were reported to be satisfactory by all participants. The difficulty of the program was perceived in a range between “too easy” and “hard”, with perceptions spread relatively equally across the choices.

Table 2*Program Evaluation*

Question	Frequency	Percentage (%)
What aspects of the study encouraged you to sign up?		
Exclusivity to South Asians	5	71.43
Exclusivity to women	6	85.71
Group fitness setting	6	85.71
Strength training for the selected form of exercise	2	28.57
A class frequency of twice per week	1	14.27
Length of classes (45 minutes)	2	28.57
Duration of the program	0	0.00
No cost	5	71.43
Other: Gift card raffle	1	14.27
What aspects of the program made you want to continue attending the sessions?		
Exclusivity to South Asians	5	71.43
Exclusivity to women	4	57.1
South Asian language communication availability	3	42.9
South Asian dance warm-up	6	85.71
South Asian music playlist	4	57.1
The instructor's modest attire	2	28.57
Strength training for the selected form of exercise	2	28.57
Modifications offered for exercises	3	42.9
Variety of exercises	2	28.57
Quality of instruction	5	71.43
Group fitness setting	5	71.43
A class frequency of twice per week	1	14.27
Length of classes (45 minutes)	1	14.27
Duration of the program	0	0
No cost	3	42.9
Other: Convenience of location	1	14.27
Other: Low to medium intensity exercises (no high impact exercises used), inclusive to beginners and intermediates, fun and interesting use of cardio (dancing), friendly and enthusiastic atmosphere	1	14.27
What do you think of the length of each strength training class?		
Too short	0	0
Short	0	0
Satisfactory	6	85.71
Long	0	0
Too long	0	0
What do you think of the length of the strength training program?		
Too short	0	0
Short	0	0
Satisfactory	5	71.43
Long	1	14.27
Too long	0	0
What do you think of the difficulty of the sessions?		

Question	Frequency	Percentage (%)
Too easy	1	14.27
Easy	2	28.57
Satisfactory	2	28.57
Hard	2	28.57
Too hard	0	0

At the end of the post-program survey, open-ended questions were asked to determine the quality of the instruction, which aspects of the strength training program were favoured and disliked, and suggestions for improving the strength training program (see Table 3). Participants reported that the instructions were clear and easy to understand. Some participants also reported their favourite components of the program. One participant favoured the South Asian space, and another participant found the comfortable setting to be their favourite aspect. One participant expressed that the South Asian dance warm-up was her favourite component. Conversely, some aspects of the program were disliked by participants. One participant disliked the in-person component, another participant disliked the small class sizes, and a third participant disliked the frequency of classes they were expected to attend. Suggestions for program improvements were providing education on nutrition and aftercare for muscle soreness, virtual access to classes, larger class sizes, and lower frequency of classes that were expected to be attended.

Table 3

Open-Ended Responses for Program Evaluation Questions

Question	Responses
Please comment on the quality of the instruction.	<p>Clarity: <i>“Clear, encouraging and easy to understand.”</i> <i>“Easy to follow.”</i> <i>“Very clear-cut, direct, helped a lot with visuals and reminders.”</i> <i>“Very clear and friendly.”</i></p> <p>Comfortable Setting: <i>“Really inclusive, you could go at your own pace and still follow along [with] the program, coordinators and instructors were really nice, friendly and encouraging which helped with making it feel easier to workout and less awkward or uncomfortable.”</i> <i>“Getting stronger and the comfortable setting.”</i></p> <p>Overall Positive: <i>“Great!”</i> <i>“Very thorough and consistent, friendly.”</i></p>
What aspects of the strength training program did you like best?	<p>Cultural Space: <i>“South Asian space.”</i></p> <p>Dance Warm-Up: <i>“The dance warm-up, got to make a friend out of it.”</i> <i>“The dance warm-up and consistency.”</i></p> <p>Instruction: <i>“Focus on form.”</i></p>
What aspects of the strength training program did you not like?	<p>In-Person Classes: <i>“The physical attendance.”</i></p> <p>Class Size: <i>“I wish the class sizes were bigger.”</i></p> <p>Frequency of Sessions: <i>“Twice a week.”</i></p>

Question	Responses
What suggestions do you have for improving this program?	<p data-bbox="824 226 1421 430">Additional Education: <i>“I know it’s an exercise program but maybe including something about how participants should approach their diet while doing the program or things they can do on off days to help sore muscles.”</i></p> <p data-bbox="824 462 1421 556">Virtual Access: <i>“A pre-recorded program you can attend from home.”</i></p> <p data-bbox="824 598 1421 661">Class Size: <i>“Increase the class sizes.”</i></p> <p data-bbox="824 693 1421 762">Frequency of Sessions: <i>“Once a week might be better for students.”</i></p>

Preliminary Efficacy

Means and standard deviations for pre- and post-program body image values are shown in Table 4. Body appreciation and embodiment increased from baseline to post-program.

Table 4

Pre- and Post- Means and Standard Deviations for Body Image Variables

Body Image Measure	Pre-Program <i>M</i> (<i>SD</i>)	Post-Program <i>M</i> (<i>SD</i>)
BAS-2	2.87 (.86)	*3.61 (.29)
FAS	3.98 (.67)	3.97 (.22)
BRS	4.08 (.57)	4.37 (.44)
BSCE-Fit	3.33 (1.14)	3.33 (.47)

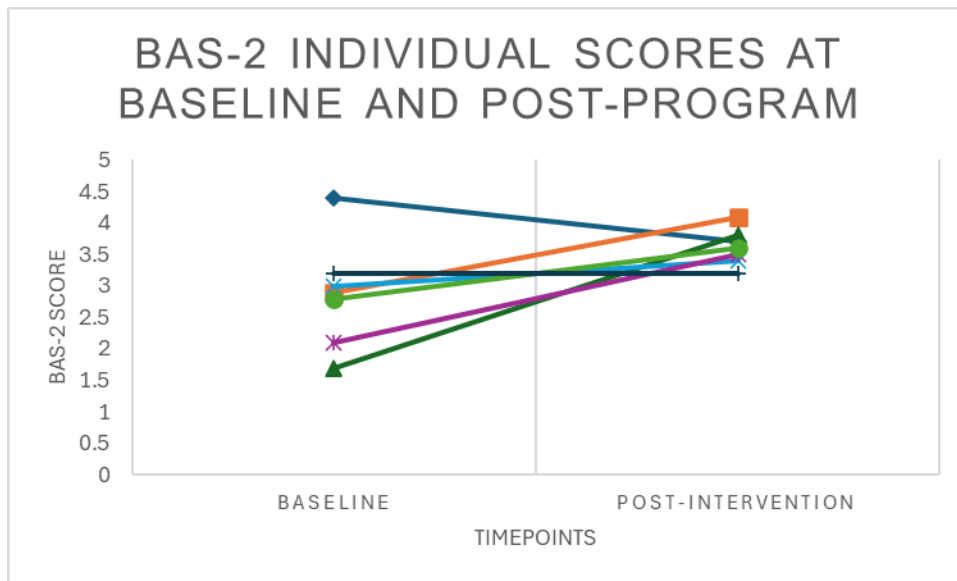
Note. BAS-2 = Body Appreciation Scale-2, ranges 1-5; higher score indicates higher body appreciation; FAS = Functionality Appreciation Scale, ranges 1-5; higher score indicates higher functionality appreciation. BRS = Body Responsiveness Scale, ranges 1-5; higher score indicates higher embodiment, BSCE-Fit = Body Self-Conscious Emotions-Fitness Related Authentic Pride Scale, ranges 1-5; higher score indicates higher fitness-related authentic pride.

* $p < .05$

Body appreciation. Body appreciation did not significantly change post-program, although there was a trend for an increase in body appreciation following the program with a medium effect size, $t(6) = -2.10$, $p = .080$, $d = .79$. Given the small number of participants and nature of the study, we plotted body appreciation scores for each participant. As can be seen in Figure 2, the majority of participants reported increases in body appreciation, with one participant showing a decrease and one participant showing no change. It should be noted that the participant who exhibited a decrease in body appreciation attended only two classes.

Figure 2

Body Appreciation Individual Scores at Baseline and Post-Program

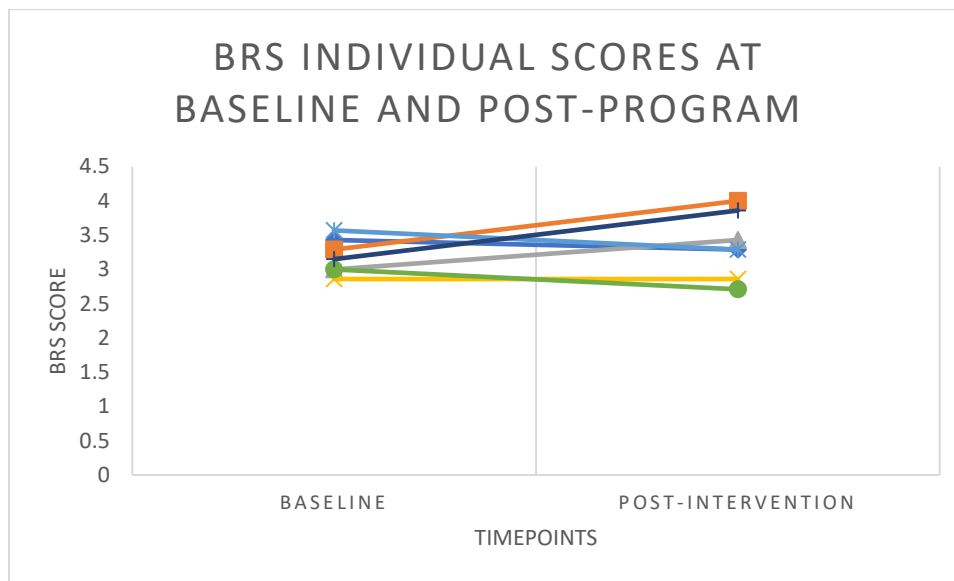


Note. Each line represents one participant and is differentiated by colour/symbol. BAS-2 = Body Appreciation Scale.

Embodiment. Embodiment did not significantly change post-program. However, there was a non-significant increase observed after completion of the program with a small effect size, $t(6) = -1.50, p = .183, d = .33$. Figure 3 shows that three participants experienced an increase in embodiment, with the rest of the sample reporting no change or a slight decrease in embodiment post-program.

Figure 3

Embodiment Individual Scores at Baseline and Post-Program

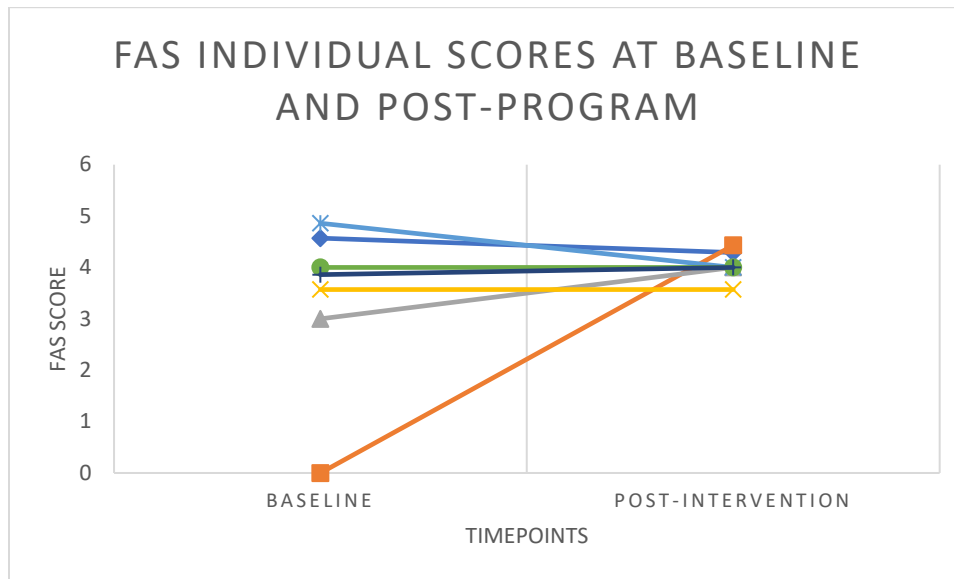


Note. Each line represents one participant and is differentiated by colour/symbol. BRS = Body Responsiveness Scale.

Functionality appreciation. Regarding functionality appreciation, there was no change, $t(5) = 0.02$, $p = .985$, $d = .02$. With one exception of a participant who started with a very low functional appreciation, most participants remained unchanged post-program, as seen in Figure 4.

Figure 4

Functional Appreciation Individual Scores at Baseline and Post-Program

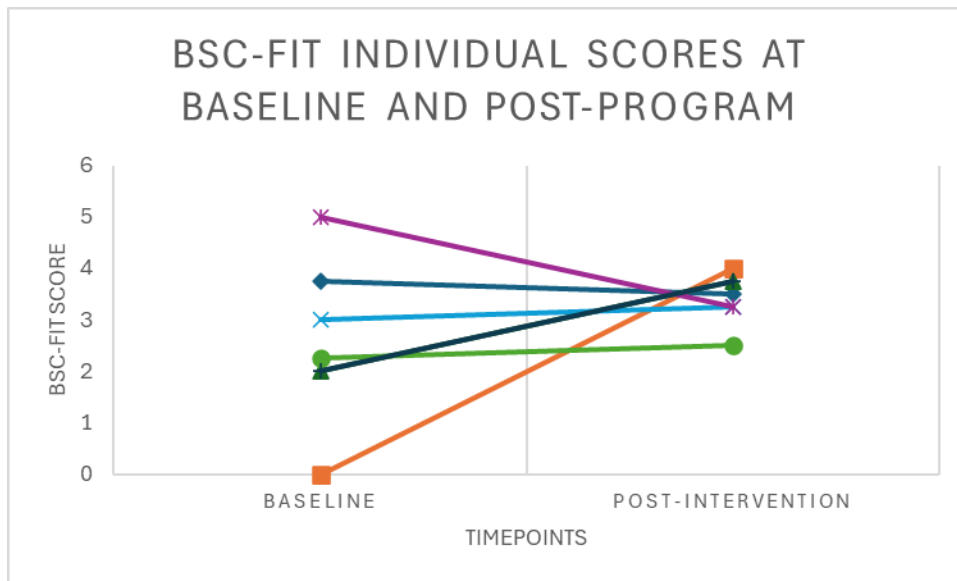


Note. Each line represents one participant and is differentiated by colour/symbol. FAS = Functional Appreciation Scale.

Fitness-related authentic pride. Fitness-related authentic pride did not change after completion of the program, $t(5) = .00, p = 1.000, d = .00$. Figure 5 shows that most participants either had no change or a decrease in fitness-related authentic pride post-program, except for one participant who started with a very low value at baseline.

Figure 5

Fitness-Related Authentic Pride Individual Scores at Baseline and Post-Program



Note. Each line represents one participant and is differentiated by colour/symbol. BSC-FIT = Body Self-Conscious Emotions Scale – Fitness-Related Authentic Pride Subscale.

Chapter 5: Discussion

The primary purpose of this study was to examine the feasibility of a 6-week culturally-tailored strength training program for young South Asian women. The secondary purpose was to examine the preliminary effects of the strength training program on positive body image outcomes. Overall, there were challenges encountered during the study, particularly with recruitment of participants. The strength training program was deemed acceptable by participants according to the AIM scores, but the poor attendance indicates otherwise. There were high completion rates for the questionnaires. Further, fidelity to deliver the intervention, including format and content itself, was high, although the location was changed in week two. However, attendance was poor throughout the program. Preliminary (but non-significant) changes were observed in body appreciation and embodiment, while functional appreciation and fitness-related authentic pride did not change post-program.

Research Question 1: Feasibility of the Culturally-Tailored Strength Training Program

Feasibility refers to whether a study can be done (Gadke et al., 2021) and whether an intervention is likely to be successful (i.e., implemented as planned; Weiner et al., 2017). It assesses aspects of a study such as recruitment, study procedures, and implementation or fidelity (i.e., if the intervention can be implemented as planned; Bowen et al., 2009). Quantitative data from the 4-item FIM questionnaire indicated that participants perceived the intervention to be feasible. However, feasibility findings for other aspects of trial conduct (e.g., recruitment, class adherence) of the study were mixed.

Recruitment. Recruitment was a challenge for the program. Only 22 individuals expressed interest in the study, which was much lower than anticipated, and lower than previous studies targeting South Asian young adult women for exercise interventions (Banerjee et al.,

2017; Beune et al., 2022, Vahabi & Damba, 2015). Low interest in the study may reflect that the timing of the recruitment was problematic. The recruitment period started in early March, when many students within the target age demographic were doing midterm exams and assignments, and competing priorities may have made it difficult to enroll into an exercise program with a commitment to exercise twice per week. This is supported by feedback from some individuals who reached out on social media to learn more about the study, but who declined participation for reasons including lack of time, schedule conflicts, location (i.e., not living in the same city as the program), in-person attendance, and no guaranteed financial incentive. Thus, time was a significant reason for not participating.

In addition, the recruitment strategy may have contributed to poor recruitment rates. Given the target age range, recruitment on social media was implemented. In general, social media recruitment has broader reach than traditional recruitment strategies (i.e., printed posters, emails, in-person promotion; Ellington et al., 2022). In the present study, several researcher personal social media platforms were used to advertise the study, including Instagram, LinkedIn, and Twitter. Instagram was anticipated to be most effective, as it is a popular social media platform for reaching young adults for participation in research studies (Ford et al., 2019). Recruitment on Instagram was done by members of the research team who were also individuals from the South Asian community and had contacts with the South Asian community. It is possible that, given the research team's social media accounts were private, they simply did not get shared enough to recruit sufficient numbers of participants. In addition, seven South Asian student organizations at Brock University were contacted during the recruitment period through their Instagram accounts and emails to request they share the research poster with their followers. However, only one student organization responded back and shared the research

poster on their Instagram account, and no participants were recruited through this method.

Establishing connections with South Asian student organizations as well as South Asian community partners prior to recruitment would be beneficial for ensuring the poster gets shared more broadly on their social media.

In addition to social media, physical study recruitment posters were placed on general poster boards on the university campus; while this was accessible to the entire university community, it was not targeted to South Asian women specifically and it was not accessible to young women outside the university community. In previous studies examining the feasibility of culturally-tailored exercise programs for South Asian women, recruitment posters were placed in multiple physical locations that targeted the South Asian community, including local community centers for South Asians (Beune et al., 2022), family services for South Asians, and mosques (Banerjee et al., 2017; Kandula et al., 2016). It can be beneficial to recruit from such settings because they have a higher proportion of potentially eligible individuals, and partnerships with the South Asian community can make the program more credible for cultural appropriateness (Quay et al., 2017). However, samples from previous exercise programs for South Asians consist of predominately middle-aged to older adult women; whether in-person recruitment is as effective (compared to social media) for young adult samples is less clear, given their high usage of social media. For example, a 2024 report of social media use in Canada indicates that Gen Z (currently 12-27 years of age) use more social media platforms than any other generation, and in particular are more likely to use Instagram than other age groups (Envionics Research, 2024).

Given the in-person nature of the exercise program, in-person recruitment is also supported by a systematic review on recruitment (social media and in-person) for exercise studies, which found that traditional recruitment procedures are more effective at recruitment for

in-person exercise programs than social media (Ellington et al., 2022). Previous research recruiting young adult women for in-person exercise interventions have recruited from university campuses (e.g., Gammage et al., 2016), similar to the present study (i.e., physical posters). However, whether this would be as effective today, given the rise of social media in this time, is unclear.

Considering that recruitment was unsuccessful, more exhaustive and targeted methods to recruit this population should be explored prior to running a follow-up study. A scoping review examining facilitators and barriers to recruiting South Asians in health research highlighted that the most effective recruitment strategies include using South Asian community partnerships, incentives, language support, and personal contact as opposed to written contact (Quay et al., 2017). For successful recruitment of an adequate sample size, future studies recruiting young South Asian women for in-person exercise programs should establish and mobilize South Asian community partnerships for in-person (i.e., promoting the study at events) and social media recruitment.

Adherence. Attendance was generally poor, although it varied greatly across the sample. Four participants attended as few as one to two classes (out of 18). The attendance rate was quite low compared to other studies examining culturally-tailored exercise programs for South Asian women. For example, a feasibility study of a culturally and gender specific dance program by Vahabi and Damba (2015) reported that 85% of the participants attended each class over the six-week program, with classes held on weekdays as well (Vahabi & Damba, 2015).

In the present study, the primary reason for missing exercise classes was lack of time, and this is consistent with previous research examining barriers to participating in strength training for women (Hurley et al., 2018). A second barrier to attending classes was schedule conflicts

with classes and work. Three classes were offered during the weekdays (one early afternoon, one late afternoon, and one evening class) and participants were asked to attend two per week; this was done to provide flexibility for participants. Although three classes were offered in the week, with the earliest class offered at noon and the latest class offered at 5:00 PM, the times overlapped with school and work for several participants. The most attended time slot was Mondays at 5:00 PM, and the least attended time slot was Wednesdays at 12:00 PM. An evening time or weekend time for classes may work better as school classes typically occur during the daytime during weekdays.

Strength training program. It is possible that both recruitment and adherence challenges were related to the type of exercise in the present study. Strength training as the selected form of exercise was not a popular reason for participants to sign up or maintain attendance in the program (only two out of seven participants chose strength training as an influence for signing up and adhering to the program). It is possible that, given the low interest in the study, the type of exercise, strength training, may have served as a barrier to participation. Participants may not have chosen to sign up for the study due to strength training's association with masculinity, as identified in previous studies examining barriers to strength training among predominantly White women (Bopp et al., 2004; Vasudevan & Ford, 2022). Further, the overlapping identities of being a woman who also identifies with South Asian culture may also have influenced a lack of engagement in the study (Babakus & Thompson, 2012; Bhatnager et al., 2021; Bopp et al., 2004). South Asian women may internalize cultural and gender norms that associate strength training with masculinity, and it may be seen as contradictory to traditional South Asian expectations for femininity that emphasize domesticity (Babakus & Thompson, 2012; Bopp et al., 2004; Thanawala et al., 2020). It is important for culturally-tailored fitness programs to

continue implementing strength training for South Asian women to address disparities in physical activity and encourage diverse forms of exercise.

Study drop-out. Despite poor adherence rates to the exercise program, drop-out from the study itself was relatively low. All seven participants completed both pre- and post-program questionnaires. It is important to note that, despite the exercise classes being in-person, questionnaires were completed online. Questionnaires were completed online at the convenience of participants, potentially maximizing willingness to complete them and removing time and competing priorities as a barrier. This also suggests that, although exercise class adherence was poor, participants remained engaged with the study itself. The use of online questionnaires could be one strategy to keep participants in the study.

Intervention fidelity. The results show that the program was implemented consistently with plans for the number and length of classes offered, format, instructions, and culturally-tailored aspects delivered as intended. Protocols for training the instructor for teaching classes were adhered to; the instructor reviewed the exercise program provided to her, practiced it, instructed it to the research team, received feedback from the research team, and instructed it again to the research team before starting the program. While this took some preparation time, the instructor was able to deliver the intervention appropriately. The exercises instructed for the dance warm-up and strength training were consistent in each class per week, with progression of the program taken into consideration. A cue list was created and provided to the instructor prior to the study to assist with consistency when instructing. The cues provided to the instructor were consistent per class and were consistent with the checklist for cues. One deviation from these checklists was that the instructor frequently used additional cues (relevant to exercise form and motivation, but not refereeing appearance or weight) that were not pre-planned which were

recorded on the checklist. In the future, a more robust list of cues may be beneficial. It may also be beneficial to include the instructor in the development of the cues.

Regarding the program relocation, participants verbally shared that the new location was “intimate” and “comfortable” while maintaining convenience for access. Previous exercise interventions for South Asian women have been located at mosques and South Asian community centers, which are culturally relevant facilities that can empower South Asian women to participate in physical activity (Banerjee et al., 2017; Beune et al., 2022; Natesan et al., 2015). Future studies should carefully consider location to ensure participants feel welcome, whether it is in a culturally-tailored facility or a private studio.

Acceptability. Acceptability refers to how well the intervention (program) is received by participants (Weiner et al., 2017). Although attendance was poor, quantitative and qualitative data show that participants received the program well overall.

Several items assessed participants’ perceptions of specific aspects of the strength training intervention. The perceptions of program difficulty varied greatly, ranging from “too easy” to “hard”, with a relatively even distribution across the choices. Three participants who had engaged in strength training in the past year (as reported in the pre-program questionnaires) found the program “too easy” or “easy”. By contrast, the four participants who had not engaged in strength training within the past year found the program to be “satisfactory” or “hard”. Given the program was designed for those who were beginners to strength training, these ratings indicate the intensity was acceptable for a beginner strength training program. Further, the program was progressed to be appropriate for beginner strength trainers. The first two weeks of the intervention included only one round of each of the circuits being completed due to more detailed instructions and demonstrations to ensure proper form and safety; recommendations for

weights during these first weeks ranged from 1- to 10-pound dumbbells (depending on the exercise). In Week 3, intensity began to gradually increase, with two rounds of each circuit completed. At Week 4 of the program, heavier weights were provided in response to participants verbally expressing a desire for greater intensity. During Weeks 5 and 6, exercises progressed in complexity or difficulty. This finding highlights the challenge in developing a program suitable for a diverse range of strength training experiences. Future studies may benefit from limiting their samples to homogeneous experience levels, such as participants with little to no prior strength training experience or those who regularly strength train.

Several culturally-tailored elements of the intervention contributed to the perceived acceptability from participants. Participants indicated that the most influential reasons for signing up for, and adhering to, the program were the culturally-tailored components, specifically the exclusivity to South Asian women, the South Asian dance warm-up, and the South Asian music playlist. These components are evident in previous culturally-tailored exercise interventions for South Asian women as well (Beune et al., 2022; Kandula et al., 2016; Natesan et al., 2015; Vahabi & Damba, 2015). A previous Bollywood dance fitness program with similar culturally-tailored components (e.g., exclusive to South Asian women, with the classes taught by a South Asian female instructor and playing South Asian music) was also found to be well-received by participants (Beune et al., 2022). Culturally-tailored components should be retained for future studies examining exercise programs for this population.

In addition to the culturally-tailored aspects, the group fitness setting (i.e., a structured exercise class led by an instructor, where participants engaged in exercise together) was perceived as an influential component for participants signing up for, and adhering to, the intervention. This finding is consistent with previous research reporting that group fitness is the

most popular form of physical activity chosen by women because of the opportunity to develop friendships, a support network, and for enjoyment (Brown et al., 2017; Mroczek & Chawałek, 2020). Most of the participants liked the in-person classes, but one participant shared that they wanted virtual access to a pre-recorded program that can be attended at home. Asynchronous exercise is beneficial for increasing convenience and overcoming time-related barriers to accessing in-person fitness programs (Costa et al., 2023), but it removes the social aspect of group-fitness which most participants liked. In fact, in support of the in-person classes, one participant indicated a desire for larger class sizes, possibly due to the social and motivational benefits of group fitness among women (Mroczek & Chawałek, 2020). Class sizes were small (i.e., between one and three attendees each class), which may not have been large enough for the benefits of group fitness (Evans et al., 2019).

The participants shared verbally and in the open-ended responses that the instructor was humorous and friendly, which helped keep the participants engaged and comfortable. Thorough verbal and visual cues and modifications were provided for each exercise as well as words of encouragement, which were occasionally expressed in South Asian languages such as Hindi and Punjabi. The participants found the instruction to be clear, encouraging, and easy to understand, which helped with making them feel comfortable during the classes. This feedback suggests that the instructional approach was effective and highlights the importance of the instructor in creating an environment in which participants feel comfortable, which impacts adherence (Engeln et al., 2018; Ntoumanis et al., 2017).

Participants found the 6-week length of the program and the length of the individual classes to be satisfactory overall. Considering that the sample was predominately comprised of students, the program length may have been suitable because it didn't require a long

commitment. The program length is consistent with a previous culturally-tailored exercise program for South Asian women (Vahabi & Damba, 2014). For university students in particular who are generally on campus for a semester, 6 weeks would allow them to begin and complete the intervention within this time frame. Similarly, offering additional classes each week (i.e., three classes offered, but attending two classes per week) allowed for flexibility in varying and busy student schedules. Based on a systematic review by Santa Barbara et al. (2017), the program length and class duration are both consistent with previous strength training interventions and at a frequency in which strength gains can be achieved. The frequency of classes that participants were asked to attend (twice per week) also meets recommendations for strength training according to the Canadian 24-Hour Movement Guidelines (CSEP, 2021). Future culturally-tailored strength training programs should continue to design their program length and class frequencies based on previous research and recommendations for fitness benefits.

Research Question 2: Body Image Changes Post-Program

Body appreciation. Body appreciation, the primary indicator of positive body image in this study, showed a non-significant trend to increase post-program, with a medium effect size. Apart from one participant, the sample had low body appreciation scores at baseline, which allowed more opportunity for an increase post-program. There is currently no research specifically examining the effects of strength training on body appreciation in this population. However, a previous systematic review found that engaging in strength training improved body satisfaction (Santa Barbara et al., 2017). Although body appreciation and body satisfaction are distinct constructs, they are positively correlated across all age groups (Tiggemann & McCourt, 2013; Tobin et al., 2019). Therefore, strength training may have contributed to the improvement in body appreciation scores.

Functionality appreciation. Functionality appreciation did not change following the program. There is yet to be a study focused on a strength training program for functionality appreciation. However, a lack of change in functionality appreciation has been observed in a previous study examining the effects of a yoga program on positive body image outcomes, which similarly found no significant changes for functionality appreciation in a young female sample (Alleva et al., 2020). Functionality appreciation scores were relatively high pre-program (mean was 3.98 out of 5), with some participants scoring very high at the start of the study. Thus, ceiling effects may have prevented improvements for some participants. Further, given that the age group was relatively young, functionality may be less of a priority for them and changes in functional aspects of the body may not be as appreciated as compared to older adults (Alleva & Tylka, 2021; Tiggemann & McCourt, 2013).

Embodiment. Embodiment did not statistically increase post-program; however, there was a trend for increase, with a small effect size. The small effect size may be due to the scores being relatively high at baseline (mean was 4.08 out of 5), leaving little room for improvement. Strength training, as well as the context of the facility, also may not have been effective for improving embodiment to a greater extent. There were mirrors in both locations of the program, which may have led participants to focus on the external appearance of the body instead of the body's cues (Haelyon & Levy, 2012; Prichard & Tiggemann, 2005). In addition, activities like yoga inherently focus on body awareness and responsiveness, which contribute to feelings of embodiment (Menzel & Levine, 2011), and is likely less true for strength training. However, it may be possible that the cues used by the instructor fostered embodiment during strength training (e.g., focus on the feeling of the muscle contracting and getting stronger) which may have led to the improvement post-program. This suggestion would be consistent with Calogero et al.'s

(2019) attunement with exercise, which suggests contextual factors can contribute to embodiment.

Fitness-related authentic pride. Fitness-related authentic pride did not change post-program. The items on this measure do not assess strength or muscle mass specifically but are about fitness in general. It is possible, particularly in novice exercisers, that strength training is not as closely associated with fitness as activities like walking, running, or other aerobic activities. In fact, the Canadian 24-Hour Movement Guidelines (CSEP, 2021) focus primarily on moderate-vigorous aerobic activity, with strength training less emphasized. It may also be possible that South Asian cultural expectations that stigmatize strength training and muscle for women could prevent feelings of pride being associated with strength training in this population.

Overall, based on the preliminary body image findings, body appreciation and embodiment may be the most relevant body image measures for future research as they appear susceptible to change in this proof-of-concept study.

Strengths, Limitations and Implications

As with all studies, there are limitations. While the study aimed to recruit at least 25 participants, only seven women were recruited for this study. However, feasibility studies are not governed by the same sample size guidelines as full studies because statistical significance is not the goal. Regardless, a larger sample size may have allowed for more insights on the feasibility and acceptability of the program. Several factors could have contributed to this small sample size. In addition to the small sample size, the BAS-2, FAS, and BRS scales had low Cronbach's alpha values post-program, which indicate low reliability. This may be a result of the very small sample size.

The timing of the recruitment period may have limited the recruitment of an adequate sample size for a feasibility study. Given recruitment began around the midpoint of the winter term, and the intervention ran past the end of classes (into exams), it is likely this represented a very busy and stressful time for students, with final assignments and exams, and students moving home for the summer (Cyr et al., 2013). Particularly when recruiting from a student population, future studies should consider the time of the year and time of semester to recruit participants and run the exercise program. To recruit a larger sample, the recruitment period should be during early September or early January ideally (i.e., the start of semesters where there are fewer assignments and exams). The recruitment period should also remain relatively short to maintain participants' interest in the study.

Similarly, more targeted recruitment strategies, such as placing posters in settings where there are higher concentrations of South Asian women (e.g., South Asian community centers, religious institutions, at South Asian student organization events) and in-person contact (e.g., handing out flyers at South Asian student events or on campus) should be implemented. These strategies may be particularly effective given that the classes were held in-person; thus, potential participants will be recruited from the geographic region where the study will take place. However, social media is also important for recruitment, given the young adult age range of the sample. Establishing connections with South Asian student organizations prior to requesting that they share the poster may help with recruitment, as most of the student organizations did not respond to sharing the poster within the recruitment period. Social media accounts targeting South Asian women (e.g., South Asian student organization accounts, local South Asian women empowerment accounts) for recruitment should be utilized as well.

In addition, the culturally tailored components of the program were well-received by participants based on both quantitative and qualitative program evaluation measures. Future research should examine how to increase recruitment for culturally-tailored exercise programs for South Asian women. Future recruitment strategies should place a stronger emphasis on the South Asian components of the program in the poster (e.g., promote the South Asian dance warm-up and music). To assist with improving attendance, the program can be further culturally tailored by changing the circuit-style strength training class into a South Asian “strength dance” class by incorporating strength training moves into the choreography. In addition to using previous research for designing a culturally-tailored program, South Asian women within the community should be included in the planning stage of the study by examining their motivators and barriers to strength training to better tailor the program.

Moreover, inclusion criteria should be considered in future randomized control trials. Researchers should consider excluding individuals who have high levels of positive body image to prevent ceiling effects. Although this was our initial intention, given the small number of women expressing interest in the study, we expanded our inclusion criteria during recruitment to not restrict participation based on body appreciation. This can be done by including screening measures that exclude individuals who have a relatively high body image. Similarly, screening measures should also exclude those who are experienced and actively engaging in strength training. Not only will this minimize the chance that individuals have already gained body image benefits from strength training, but it also helps to create a level of difficulty in the exercise program that is more appropriate for the sample. Additionally, targeting recruitment towards individuals who lack experience in strength training and do not regularly engage in it may

encourage novices, especially those anxious about trying it in a group setting, to participate in the study.

Despite the challenges with recruitment overall, one strength of this study was the acceptability of the intervention for those who adhered and attended, which suggests that the intervention itself may be repeated in future pilot studies. The in-person group fitness component was well-received by most participants and should be implemented in future studies. In-person group fitness programs offer social support, immediate and personalized feedback from instructors, and a better environment for focus and motivation (Howie et al., 2021). The instructor's humorous and friendly personality and detailed cues on form while teaching the classes allowed for the participants to feel more comfortable during exercise. Given challenges with attendance, providing options for asynchronous fitness classes, in addition to in-person classes, may increase convenience for those who are not able to attend the available time slots while maintaining adherence. Attendance may also be improved by offering classes more frequently during the week to add more flexibility in scheduling. The program length, class length, frequency, and difficulty level were all well-received by study participants. Changes to body appreciation (medium effect size) indicate that even a relatively moderate volume of strength training may be effective at increasing body appreciation. However, a larger study will be needed to determine if the volume of exercise is sufficient to change positive body image. Progression of exercise difficulty was effective in maintaining a challenging program for participants and potentially for building strength.

The high intervention fidelity was a strength of the study as well. The approach to instructor training allowed the instructor to teach the classes effectively and consistently. Based on this approach, a training manual for other instructors who are instructing in strength training

interventions should be created. Future studies that have a larger sample size may require more than one instructor, so providing a consistent manual to train multiple instructors would be beneficial. Many additional appropriate cues were used by the present study's instructor, indicating a need for a more fulsome list of pre-planned cues as well.

It is also important to consider the location of culturally-tailored exercise programs. The second location of the program in the private studio was perceived as intimate and comfortable by participants and open only to women in the study. Future programs should continue to facilitate classes in welcoming, inclusive facilities for the target demographic based on previous research (i.e., private spaces, South Asian community centers or religious institutions for South Asians).

Additional measures of positive body image should be considered for future studies to record a broader range of experiences and attitudes. As a multidimensional construct, it is important to holistically assess positive body image. As evidenced in this study where body appreciation changed but other positive body image measures did not, it cannot be assumed that changes in all dimensions will occur. The BAS-2 has been used with South Asian women in previous studies and should be continued to be used in future research (Swami et al., 2015). The low Cronbach's alpha values that were found in some of the body image measures should be interpreted with some caution, and future research should continue to assess reliability and validity of these measures with young South Asian women. However, they were considered adequate for the exploratory nature of the study. Other measures of positive body image should be validated in this population as well. Body image measures that focus more specifically on muscle strength, or those that tap into body image concerns specifically for South Asian women

(e.g., skin tone satisfaction) could be more applicable to a strength training program or for this population for observing improvements.

In general, there is a lack of research on the barriers to strength training and physical activity for young South Asian women particularly. Future research should focus on exploring reasons for low participation rates.

Conclusion

In conclusion, the present study aimed to assess the feasibility and acceptability of a culturally-tailored strength training program and how it may affect positive body image for young South Asian women. In general, the acceptability findings showed that the program was well-received by participants who completed the program, although the poor attendance indicates otherwise. Intervention fidelity indicated it is practical to implement for future randomized control trials as well. Based on the recruitment and attendance, however, the intervention is not feasible at this time and adapting and re-testing of recruitment strategies is necessary before conducting a larger scale study. This is not unexpected as steps in the process of behavioural trials may be repeated and revised rather than being linear. It is recommended that in cases where feasibility is not supported, parts of the methods should be revised and re-evaluated before moving on to larger scale studies (Czajkowski et al., 2015). Despite recruitment challenges, the program was implemented as intended (i.e., fidelity). The most favoured aspects of the program included the South Asian dance warm-up and cultural music, the exclusivity to South Asian women, and the group fitness setting, which are components that are consistently seen in previous culturally-tailored exercise programs for this population (Beune et al., 2022; Vahabi & Damba, 2015). In terms of preliminary efficacy, there were no statistically significant changes in body image outcomes; however, body appreciation and embodiment increased (with a medium effect size and small effect size, respectively) post-program. The lack of change in body image measures may be due to the inclusion of women who scored relatively high on positive body image scores and who had prior strength training experience, which could have led to ceiling effects. There is a need for further feasibility assessment, but with an adequate sample size, which may be achieved through a better-timed recruitment period, more targeted recruitment

strategies, and establishing relationships with South Asian organizations. This will ensure future randomized control trials are appropriately designed and implemented to truly assess the efficacy of the program for changing positive body image. Future studies should continue to explore culturally-tailored programs for promoting various forms of exercise, such as strength training, and how they affect positive body image in South Asian women. This can contribute to making the positive body image literature more equitable, moving beyond primarily White women, improving body image, exercise levels, and overall well-being in South Asian women.

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Appendices

Appendix A: Questionnaires

Pre-Screening Questions

For the purpose of the study, participants must be novice in strength training to be eligible. For the past 12 months, have you engaged in strength training more than one time a week, for multiple weeks in a row?

- No. I am novice to strength training.
- Yes. I am experienced in strength training and/or currently engage in it multiple times a week.

Are you of South Asian descent (descending from South Asian countries including Afghanistan, Bangladesh, Bhutan, India, Nepal, Maldives, Pakistan and Sri Lanka)?

- Yes. I am of South Asian descent.
- No. I am not of South Asian descent.

Are you a cisgendered woman (i.e., assigned female at birth)?

- Yes. I am a cisgendered woman.
- No. I am not a cisgendered woman.






Are you between the ages of 18-29 years?

- Yes. I am between the ages of 18-29 years.
- No. I am not between the ages of 18-29 years.

Physical activity improves your physical and mental health. Even small amounts of physical activity are good, and more is better.

For almost everyone, the benefits of physical activity far outweigh any risks. For some individuals, specific advice from a Qualified Exercise Professional (QEP – has post-secondary education in exercise sciences and an advanced certification in the area – see csep.ca/certifications) or health care provider is advisable. This questionnaire is intended for all ages – to help move you along the path to becoming more physically active.

- I am completing this questionnaire for myself.
- I am completing this questionnaire for my child/dependent as parent/guardian.

 YES 	 NO 	<h2>PREPARE TO BECOME MORE ACTIVE</h2>
●	●	<p>The following questions will help to ensure that you have a safe physical activity experience. Please answer YES or NO to each question <u>before</u> you become more physically active. If you are unsure about any question, answer YES.</p>
●	●	<p>1 Have you experienced ANY of the following (A to F) within the past six months?</p>
●	●	<p>A A diagnosis of/treatment for heart disease or stroke, or pain/discomfort/pressure in your chest during activities of daily living or during physical activity?</p>
●	●	<p>B A diagnosis of/treatment for high blood pressure (BP), or a resting BP of 160/90 mmHg or higher?</p>
●	●	<p>C Dizziness or lightheadedness during physical activity?</p>
●	●	<p>D Shortness of breath at rest?</p>
●	●	<p>E Loss of consciousness/fainting for any reason?</p>
●	●	<p>F Concussion?</p>
●	●	<p>2 Do you currently have pain or swelling in any part of your body (such as from an injury, acute flare-up of arthritis, or back pain) that affects your ability to be physically active?</p>
●	●	<p>3 Has a health care provider told you that you should avoid or modify certain types of physical activity?</p>
●	●	<p>4 Do you have any other medical or physical condition (such as diabetes, cancer, osteoporosis, asthma, spinal cord injury) that may affect your ability to be physically active?</p>
..... 	<p>.....> NO to all questions: go to Page 2 – ASSESS YOUR CURRENT PHYSICAL ACTIVITY</p>	
<p>YES to any question: go to Reference Document – ADVICE ON WHAT TO DO IF YOU HAVE A YES RESPONSE ...>>></p>		

ASSESS YOUR CURRENT PHYSICAL ACTIVITY

Answer the following questions to assess how active you are now.

- 1 During a typical week, on how many days do you do moderate- to vigorous-intensity aerobic physical activity (such as brisk walking, cycling or jogging)? DAYS/
WEEK
- 2 On days that you do at least moderate-intensity aerobic physical activity (e.g., brisk walking), for how many minutes do you do this activity? MINUTES/
DAY
- For adults, please multiply your average number of days/week by the average number of minutes/day: MINUTES/
WEEK

Canadian 24-Hour Movement Guidelines recommend that adults accumulate at least 150 minutes of moderate- to vigorous-intensity physical activity per week. For children and youth, at least 60 minutes daily is recommended. Strengthening muscles and bones at least two times per week for adults, and three times per week for children and youth, is also recommended (see csep.ca/guidelines).

GENERAL ADVICE FOR BECOMING MORE ACTIVE

Increase your physical activity gradually so that you have a positive experience. Build physical activities that you enjoy into your day (e.g., take a walk with a friend, ride your bike to school or work) and reduce your sedentary behaviour (e.g., prolonged sitting).

If you want to do **vigorous-intensity physical activity** (i.e., physical activity at an intensity that makes it hard to carry on a conversation), and you do not meet minimum physical activity recommendations noted above, consult a Qualified Exercise Professional (QEP) beforehand. This can help ensure that your physical activity is safe and suitable for your circumstances.

Physical activity is also an important part of a healthy pregnancy.

Delay becoming more active if you are not feeling well because of a temporary illness.

DECLARATION

To the best of my knowledge, all of the information I have supplied on this questionnaire is correct.
If my health changes, I will complete this questionnaire again.

I answered **NO** to all questions on Page 1

I answered **YES** to any question on Page 1

Sign and date the Declaration below

Check the box below that applies to you:

- I have consulted a health care provider or Qualified Exercise Professional (QEP) who has recommended that I become more physically active.
- I am comfortable with becoming more physically active on my own without consulting a health care provider or QEP.

<input type="text"/>	<input type="text"/>	<input type="text"/>
Name (+ Name of Parent/Guardian if applicable) (Please print)	Signature (or Signature of Parent/Guardian if applicable)	Date of Birth
<input type="text"/>	<input type="text"/>	<input type="text"/>
Date	Email (optional)	Telephone (optional)

With planning and support you can enjoy the benefits of becoming more physically active. A QEP can help.

- Check this box if you would like to consult a QEP about becoming more physically active.
(This completed questionnaire will help the QEP get to know you and understand your needs.)

Demographic Information

ID #: (you can find this in your email):

Age: _____

How do you describe your background? *Please check all that apply.*

- | | Yes |
|-----------------------------------|--------------------------|
| a) Afghani | <input type="checkbox"/> |
| b) Bengali | <input type="checkbox"/> |
| c) Bhutanese | <input type="checkbox"/> |
| d) Indian | <input type="checkbox"/> |
| e) Nepali | <input type="checkbox"/> |
| f) Maldivian | <input type="checkbox"/> |
| g) Sri Lankan | <input type="checkbox"/> |
| h) Other – Please describe: _____ | <input type="checkbox"/> |

What is your occupation status? *Please check all that apply.*

- Unemployed
- Student
- Part-time
- Full-time
- Retired

What is the highest level of education you have completed? *Please check one box.*

- No formal education
- Less than grade 9
- Some high school/secondary school
- Completed high school (received secondary school diploma)
- Some trade or technical training
- Completed trade or technical training (received certification / diploma)
- Some college
- Completed college (received degree or diploma)
- Some university
- Completed university (received degree)

Post-graduate education

If you are currently in post-secondary education, which program are you in?

If you are currently in post-secondary education, which year of study are you in?

What is your marital status? *Please check one box.*

- Single
- Engaged
- Married
- Common law
- Separated
- Divorced
- Widowed

Do you have children?

- Yes
- No

If you have children, how many do you have?

Body Appreciation Scale-2 (BAS-2)

For the following items, please consider how true each statement is on the following scale:

- 1 = Never
- 2 = Seldom
- 3 = Sometimes
- 4 = Often
- 5 = Always

	Never				Always
1. I respect my body.	1	2	3	4	5
2. I feel good about my body.	1	2	3	4	5
3. I feel that my body has at least some good qualities.	1	2	3	4	5
4. I take a positive attitude towards my body.	1	2	3	4	5
5. I am attentive to my body's needs.	1	2	3	4	5
6. I feel love for my body.	1	2	3	4	5
7. I appreciate the different and unique characteristics of my body.	1	2	3	4	5
8. My behaviour reveals my positive attitude towards my body; for example, I hold my head high and smile.	1	2	3	4	5
9. I am comfortable in my body.	1	2	3	4	5
10. I feel like I am beautiful even if I am different from media images of attractive people (e.g., models, actresses/ actors).	1	2	3	4	5

Functional Appreciation Scale (FAS)

For the following items, please consider how true each statement is on the following scale:

1 = Strongly disagree

2 = Disagree

3 = neither agree nor disagree

4 = Agree

5 = Strongly agree

	Strongly Disagree				Strongly Agree
1. I appreciate my body for what it is capable of doing.	1	2	3	4	5
2. I am grateful for the health of my body, even if it isn't always as healthy as I would like it to be.	1	2	3	4	5
3. I appreciate that my body allows me to communicate and interact with others.	1	2	3	4	5
4. I acknowledge and appreciate when my body feels good and/or relaxed.	1	2	3	4	5
5. I am grateful that my body enable me to engage in activities that I enjoy or find important.	1	2	3	4	5
6. I feel that my body does so much for me.	1	2	3	4	5
7. I respect my body for the functions that it performs.	1	2	3	4	5

Body Self-Conscious Emotions – Fitness-Related Authentic Pride Subscale

Read each of the following statements carefully. Indicate which value is most appropriate based on how you GENERALLY feel, using the following scale:

- 1 = never
- 2 = rarely
- 3 = occasionally
- 4 = frequently
- 5 = always

Generally, I have felt ...

1. Proud of the effort I place on my fitness
2. Proud of my fitness efforts
3. Proud of my effort to improve my fitness
4. Proud of my fitness accomplishments

Body Responsiveness Scale (BRS)

For the following items, please consider how true each statement is of you and your body on a scale:

1 = Not at all true of me
to
7 = Always true of me

	Not at all true of me						Always true of me
1. I am confident that my body will let me know what is good for me.	1	2	3	4	5	6	7
2. My bodily desires lead me to do things that I end up regretting.	1	2	3	4	5	6	7
3. My mind and body often want to do two different things.	1	2	3	4	5	6	7
4. I suppress my bodily feelings and sensations.	1	2	3	4	5	6	7
5. I 'listen' to my body to advise me about what to do.	1	2	3	4	5	6	7
6. It is important for me to know how my body is feeling throughout the day.	1	2	3	4	5	6	7
7. I enjoy becoming aware of how my body feels.	1	2	3	4	5	6	7

Reasons for Engaging in the Culturally-Tailored Strength Training Program

1. What aspects of the study encouraged you to sign up? Please select all that apply.

- Exclusivity to South Asians
- Exclusivity to women
- Group fitness setting
- Strength training for the selected form of exercise
- A class frequency of twice a week
- The 6-week duration of the program
- Length of classes (45 minutes)
- No cost
- Other:

2. What aspects of the program made you want to continue attending the sessions? Please check all that apply.

- Exclusivity to South Asians
- Exclusivity to women
- South Asian language communication availability
- South Asian dance warm-up
- South Asian music playlist
- The instructor's modest attire
- Strength training for the selected form of exercise
- Modifications offered for exercises
- Variety of exercises
- Level of difficulty of exercises
- Quality of instruction
- Group fitness setting
- A class frequency of twice a week
- Length of classes (45-minutes)
- The 6-week duration of the program
- No cost
- Other:

3. What did you think of the length of each strength training class?

Too Short Short Satisfactory Long Too Long

4. What did you think of the length of the strength training program?

Too Short Short Satisfactory Long Too Long

5. What did you think of the difficulty of the classes?

Too Easy Easy Satisfactory Hard Too Hard

6. Please comment on the quality of instruction.

7. What aspects of the strength training program did you like best?

8. What aspects of the strength training program did you not like?

9. What suggestions do you have for improving this program?

AIM

	Acceptability of Intervention Measure (AIM)				
	Completely disagree	Disagree	Neither agree nor disagree	Agree	Completely agree
This strength training program meets my approval	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
This strength training program is appealing to me	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I like this strength training program	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I welcome this strength training program	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

FIM

Feasibility of Intervention Measure (FIM)

	Completely disagree	Disagree	Neither agree nor disagree	Agree	Completely Agree
This strength training program seems implementable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
This strength training program seems possible	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
This strength training program seems doable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
This strength training program seems easy to do	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Appendix B: Brock University Research Ethics Board Clearance Form



Brock University
Office of Research Ethics
Tel: 905-688-5550 ext. 3035
Email: reb@brocku.ca

Health Science Research Ethics Board

Certificate of Ethics Clearance for Human Participant Research

DATE: 2/28/2024
PRINCIPAL INVESTIGATOR: GAMMAGE, Kimberley - Kinesiology
FILE: 23-212 - GAMMAGE
TYPE: Masters Thesis/Project STUDENT: Zaraa Zaman
SUPERVISOR: Kimberley Gammage
TITLE: Investigating the Effects of a Strength Training Intervention on Well-Being Among a Sample of South Asian Young Adult Women

ETHICS CLEARANCE GRANTED

Type of Clearance: NEW

Expiry Date: 2/1/2025

The Brock University Health Science Research Ethics Board has reviewed the above named research proposal and considers the procedures, as described by the applicant, to conform to the University's ethical standards and the Tri-Council Policy Statement. Clearance granted from **2/28/2024** to **2/1/2025**.

The Tri-Council Policy Statement requires that ongoing research be monitored by, at a minimum, an annual report. Should your project extend beyond the expiry date, you are required to submit a Renewal form before 2/1/2025. Continued clearance is contingent on timely submission of reports.

To comply with the Tri-Council Policy Statement, you must also submit a final report upon completion of your project. All report forms can be found on the Office of Research Ethics web page at <https://brocku.ca/research-at-brock/office-of-research-services/research-ethics-office/#application-forms>

In addition, throughout your research, you must report promptly to the REB:

- a) Changes increasing the risk to the participant(s) and/or affecting significantly the conduct of the study;
- b) All adverse and/or unanticipated experiences or events that may have real or potential unfavourable implications for participants;
- c) New information that may adversely affect the safety of the participants or the conduct of the study;
- d) Any changes in your source of funding or new funding to a previously unfunded project.

We wish you success with your research.

Approved:

Stephen Cheung, Chair
Health Science Research Ethics Board

Note: Brock University is accountable for the research carried out in its own jurisdiction or under its auspices and may refuse certain research even though the REB has found it ethically acceptable.

If research participants are in the care of a health facility, at a school, or other institution or community organization, it is the responsibility of the Principal Investigator to ensure that the ethical guidelines and clearance of those facilities or institutions are obtained and filed with the REB prior to the initiation of research at that site.

Appendix C: Class Consistency Checklist

Class #: _____

Date: _____

Warm Up: Bollywood and South Asian Dance-Fit Choreography

Exercise	Cue 1	Cue 2	Cue 3	Wrong Cue
Bollywood dance move #1				
Bollywood dance move #2				
Bollywood dance move #3				
Bollywood dance move #4				
Bollywood dance move #5				
Bollywood dance move #6				
Bollywood dance move #7				

Water Break: Cue used

Strength Training: Round 1 (45 seconds each, 15 seconds rest)

Exercise	Cue 1	Cue 2	Cue 3	Wrong Cue
Rows				
Squats				
Bird-dogs				
Push-ups				
Romanian deadlifts				
Plank				
Shoulder abductions				
Reverse lunges				
Side plank (right)				
Bicep curls				
Hip thrusts				
Side plank (left)				
Triceps extensions				
Calf raises				
Dead bugs				

Water Break: Cue used

Strength Training: Round 2 (45 seconds each, 15 seconds rest)

Exercise	Cue 1	Cue 2	Cue 3	Wrong Cue
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Rows				
Squats				
Bird-dogs				
Push-ups				
Romanian deadlifts				
Plank				
Shoulder abductions				
Reverse lunges				
Side plank (right)				
Bicep curls				
Hip thrusts				
Side plank (left)				
Triceps extensions				
Calf raises				
Dead bugs				

Cool down: Cues used

Total Cues: _____ **Missed Cues:** _____

Appendix D: Exercise Class Design

Strength Training Class Outline

Warm-Up (~5 minutes)

Exercise/Dance	Time (seconds)
Bollywood dance move #1	30
Bollywood dance move #2	30
Bollywood dance move #3	30
Bollywood dance move #4	30
Bollywood dance move #5	30
Bollywood dance move #6	30
Bollywood dance move #7	30

Sample Strength Training Circuit (repeat 2 times, 1 minute rest in between; ~30 minutes)

Muscle Group & Exercise	Time (seconds)*	Rest/Transition (seconds)	Equipment **	Modification Suggestion
Upper Body Rows	30-45	15	Free weights	Lighter/no weight
Lower Body Squats	30-45	15	Free weights	Lighter/no weight; chair sit to stand
Core Bird-dogs	30-45	15	Mat	Wall for balance
Upper Body Push-ups	30-45	15	Mat	Knees/wall
Lower Body Romanian deadlifts	30-45	15	Free weights	Lighter/no weight
Core Plank	30-45	15	Mat	Knees/wall
Upper Body Shoulder abductions	30-45	15	Free weights	Lighter/no weight
Lower Body Reverse lunges	30-45	15	Free weights	Lighter/no weight; wall for balance
Core	30-45	15	Mat	

Side plank (right)				Wall for balance
Upper Body Bicep curls	30-45	15	Free weights	Lighter/no weight
Lower Body Hip thrusts	30-45	15	Mat, bench, free weights	Lighter/no weight
Core Side plank (left)	30-45	15	Mat	Knees/wall
Upper Body Triceps extensions	30-45	15	Free weights	Lighter/no weight
Lower Body Calf raises	30-45	15	Wall	Seated with free weights
Core Dead bugs	30-45	15	Mat	One limb at a time

***If participants cannot complete the suggested time, they are encouraged to do as long as they safely can**

****If participants cannot complete the exercises with free weights, modifications will be provided without free weights**

Cool-Down (~5 minutes)

Stretch	Targeted Muscles	Time (seconds)
Behind neck stretch	Triceps brachii, latissimus dorsi	30
Hands behind back	Anterior deltoids, pectoralis major	30
Shoulder stretch Left arm Right arm	Posterior deltoid, latissimus dorsi, rhomboids	30 (each side)
Toe touch	Hamstrings, erector spinae	30
Wall stretch Left leg Right leg	Gastrocnemius, soleus, achilles tendon	30 (each side)
Oblique side bend stretch Left side Right side	Obliques abdominus	30 (each side)
Quadriceps stretch Left leg Right leg	Rectus femoris, vastus lateralis, vastus intermedius, vastus medialis	30 (each side)

Neck flexion

Sternocleidomastoid,
suboccipitals, splenae

30