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Examining the Influence of Crossfit Participation and the Crossfit Environment on Body Image, Self-Esteem, and Eating Behaviours Among Women Using a Mixed Methods Approach

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EXAMINING THE INFLUENCE OF CROSSFIT PARTICIPATION AND THE CROSSFIT ENVIRONMENT ON BODY IMAGE, SELF-ESTEEM, AND EATING BEHAVIOURS AMONG WOMEN USING A MIXED METHODS APPROACH

By

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ABSTRACT

The purpose of this thesis was to use a mixed methods approach to investigate the associations between CrossFit participation and women's body image, self-esteem, and eating behaviours. Women from five CrossFit affiliates (*N* = 149) completed a survey composed of both open and close-ended questions. In addition, ethnographic observations were conducted at all five affiliates. Four multiple linear regressions revealed that CrossFit participation was positively associated with body image, negatively associated with disordered eating, and not associated with trait self-esteem (Study 1). Thematic analysis revealed that women chose to CrossFit for its community, sense of inclusion, its programming (i.e., structured), and because it was challenging. Five one-way analysis of covariances (ANOVAs) revealed no differences between CrossFit affiliates and their women members' body image, self-esteem, or eating behaviours (Study 2). Conversely, thematic analysis of open-ended survey questions and ethnographic observations revealed potential positive (e.g., community, performance over appearance, food as fuel) and negative (e.g., self-comparison, exercising to eat) influences on all three variables, with most themes reoccurring across all affiliates. However, some differing experiences were reported within and between affiliates (Study 2). Thus, this study provides initial evidence of positive associations between CrossFit participation and women's body image and eating behaviours, with all five CrossFit affiliates creating similar environments. Although no associations with global self-esteem were reported, future research should investigate whether or not state and/or specific domains of self-esteem are associated with participation.

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LIST OF ABBREVIATIONS/SYMBOLS

MBSRQ-BASS	Multidimensional Body-Self Relations Questionnaire (MBSRQ): Body Areas Satisfaction Scale (MBSRQ-BASS).
BIQ	Body Image Ideals Questionnaire
RSES	Rosenberg Self-Esteem Scale
EAT-26	Eating Attitudes Test
MVPA	Minutes spent performing other types of moderate-vigorous physical activity variables

STUDY 1

EXAMINING THE INFLUENCE OF CROSSFIT PARTICIPATION ON BODY IMAGE, SELF-ESTEEM, AND EATING BEHAVIOURS AMONG WOMEN USING A MIXED METHODS APPROACH

Introduction

According to Cash and Pruzinsky (1990), body image is a multidimensional construct that relates to the attitudes an individual has towards their physical self (i.e., their body) that includes cognitive, behavioural, and evaluative components and can be both positive or negative. Although many people experience dissatisfaction with their body's appearance, the literature suggests that women tend to experience higher levels of body dissatisfaction compared to men (Furnham & Greaves, 1994; Lowery et al., 2005). Silberstein, Striegel-Moore, Timko, and Rodin (1988) propose that body dissatisfaction tends to occur as a result of women identifying a discrepancy between their self-perceived body (i.e., body image) and that which they perceive to be ideal. Moreover, this ideal is often heavily influenced by the traits that society deems to be desirable (Silberstein et al., 1988). For example, in Western society, there is considerable pressure on women to achieve a certain weight and shape (i.e., thin but toned, youthful, and sexy body without being too suggestive; Bozsik, Whisenhunt, Hudson, Bennett, & Lundgren, 2018; Carrotte, Prichard & Lim, 2017; Gendron & Lydecker, 2016; Hurd, 2000; Singh & Young, 1995; Turner, 1997). Yet, these numerous, and often contradictory, expectations, make it almost impossible for woman to achieve the ideal body, thus often leading to low levels of body satisfaction (Cohen & Blaszczynski, 2015; Heider, Spruyt, & De Houwer, 2015).

The literature also suggests that body image is highly correlated with self-esteem (Furnham, Badmin, & Sneade, 2002; Mellor, Fuller-Tyszkiewicz, McCabe, & Ricciardelli, 2010), which can be defined as the attitudes an individual has toward themselves (Rosenberg, 1965). The attitudes or feelings about one's overall value can be both positive or negative and may develop or change over time (Orth & Robins, 2014). In addition, although body image dissatisfaction and low self-esteem are highly correlated to each other, they are also both highly negatively correlated with overall quality of life (Kermode & MacLean, 2001; Medeiros de Morais et al., 2017; Nayir et al., 2016).

Moreover, how an individual thinks and feel about themselves (i.e., body image and self-esteem) may ultimately influence other health practices, such as their eating behaviours (Braun, Park, & Gorin, 2016; Daniali, Azadbakht, & Mostafavi, 2013). In a study by Neumark-Sztainer, Wall, Larson, Eisenberg and Loth (2011) of over 2,000 individuals, more than half of adult women reported dieting to lose weight within the last year and engaging in at least one unhealthy weight control behaviour (e.g., calorie restriction). Thus, LaCaille (2013) argued that not only is what we eat important, but that eating behaviours and the environmental context of eating also need to be considered to better understand why individuals consume the foods they do.

Although the distinction of unhealthy eating behaviours is of great debate, researchers tend to agree that they may consist of, but are not limited to, binge eating (National Eating Disorder Information Centre (\[NEDIC], 2014a), calorie counting (NEDIC, 2014b), restrictive eating (Academy of Nutrition and Dietetics, 2015), weight altering 'diets' (NEDIC, 2014b), meal skipping or compulsive eating (National Eating

Disorders Collaboration, 2018; NEDIC 2014b), and using food as a reward (or punishment; Academy of Nutrition and Dietetics, 2018). Furthermore, behaviours such as undereating/over exercising, excessively overeating to gain weight, using diet pills and/or diuretics, consuming 'zero calorie' products, using food substitutes, and smoking cigarettes to curb appetite have also been identified by Neumark-Sztainer et al. (2011), as forms of unhealthy eating behaviours.

In addition to the previously mentioned reciprocal relationships that exists between the above-mentioned variables (i.e., body image, self-esteem, and eating behaviours), previous research also suggests a mostly positive relationships between all three variables and exercise (Hausenblas & Fallon, 2006; Mond, Hay, Rodgers, Owen, & Beumont, 2004; Zamani Sani et al., 2016). Yet, despite the known positive effects exercise may have on body image, self-esteem, and eating behaviours, only 17% of Canadian adults currently meet the physical activity recommendations (i.e., 150 minutes of moderate-to-vigorous physical activity per week), with women being significantly less active than men (Statistics Canada, 2019). As such, many researchers have begun to investigate the underlying reasons as to why women may choose to (or not to) engage in exercise, with an emphasis on the (physical and social) impact specific exercise environments may have on body image, self-esteem, eating behaviours, as well as continued participation (Clark, 2017; Devi, Devi, & Bilagi, 2015; Mahlo & Tiggerman, 2016; Prichard & Tiggemann, 2008).

Two of the most frequently studied exercise environments are those of traditional fitness centres and yoga studios. Although fitness centres are a great place for individuals to engage in improving their health, numerous studies have reported that they can also be

an intimidating environment for some individuals, especially women (Clark, 2017; Fisher, Berbary, & Misener, 2017; Prichard & Tiggemann, 2008). Fitness centres often create an environment that promotes body perfection (Dworkin, 2003), and the comparison of individuals, especially women, to each other (Clarke, 2017), thus negatively impacting both body image and self-esteem (Clark, 2017; Prichard & Tiggemann, 2008). Moreover, fitness centres have been reported to elicit feelings of anxiety and increased body image awareness, due to the presence of mirrors within typical fitness centres (Clarke, 2017), as well as create uncomfortable physical and social spaces (Prichard & Tiggemann, 2008). Thus, it is not entirely surprising that time spent exercising in such facilities is associated with decreased body satisfaction, lower levels of self-esteem, and increased levels of unhealthy eating behaviours for women, compared to time spent exercising in other environments (Prichard & Tiggemann, 2008).

Conversely, Pritchard and Tiggeman (2008) suggested that yoga studios create environments that emphasize overall health and well-being rather than appearance. In comparison to fitness centres, yoga studios (and the practice of yoga itself) have been reported to create environments that foster higher levels of body satisfaction (Mahlo & Tiggerman, 2016; Neumark-Sztainer, MacLehose, Watts, Pacanowski, & Eisenberg, 2018), self-esteem (Deshpande, Nagendra, & Nagarathna, 2009; Devi et al., 2015; Elavsky, & McAuley, 2007; Narasimhan, Nagarathna, & Nagendra, 2011), and healthier eating behaviours (Bryan, Parasher, Cahil, & Zipp, 2013; Watts, Rydell, Eisenberg, Laska, & Neumark-Sztainer, 2018). Also, yoga encourages the connection between the mind and the body, and as a result, individuals attending yoga studios have been reported to engage in more mindful eating practices (e.g., listening to hunger signals; Bryan et al.,

2013; Watts et al., 2018). Nevertheless, Frayeh and Lewis (2018) suggested that, like most fitness centres, the presence of mirrors in yoga studios tends increase state social physique anxiety and appearance comparisons (Frayeh & Lewis, 2018).

Other exercise environments that have been investigated in relation to psychosocial health outcomes such as body image, self-esteem, and eating behaviours include: dance studios (Ehrenberg, 2010), aerobic classes (D'Abundo, 2009), women-only gyms (Öztürk & Koca, 2017), and university gyms (Rapport et al., 2018), with a variety of positive, negative, and neutral results being reported. More recently, CrossFit gyms (known as 'affiliates') have also begun to be examined in relation to the aforementioned variables (Podmore & Ogle, 2018; Simpson, Prewitt-White, Feito, Giusti, & Ryan Shuda., 2017).

In less than two decades, CrossFit's popularity has dramatically increased, with more 13,000 affiliates and counting today (CrossFit, 2018a). Developed by Greg Glassman in 2000, CrossFit is a group-based exercise regimen that consists of "constantly varied, high intensity, functional movements" (Glassman, 2007, p.1). CrossFit workouts, known as 'WODs' (i.e., workout of the day), combine aspects of aerobic training, gymnastics, weightlifting, powerlifting, strongman training, mobility exercises, and calisthenics (CrossFit, 2018b; Glassman, 2002, 2007). Although the use of group-based exercises classes is not a novel exercise method, they are considered to be a fundamental component of CrossFit (Glassman, 2007) as they are thought, according to CrossFit (2018b), to encourage comradery between members, friendly competition (although it may not always be perceived this way), fun, and intensity that is normally only achieved through team sport.

As with any new fitness or exercise regimens/programs, CrossFit has garnered more than its share of criticism and controversy, with its safety (or perceived lack thereof; Diamond, 2015; Ross, 2018) and *cult-like* tendencies (Beck, 2017; Stoddard, 2011), among other critiques, the center of much debate. Although its critics still exist, what was once an exercise regimen almost solely the subject of critique is now an exercise regimen beginning to receive praise as well (Blennerhassett, 2019; Hardick, 2018; Health Fitness Revolution, 2015).Yet, CrossFit research is still in its infancy, with a large portion of the literature focusing on the safety concerns and risk of injury associated with participation in CrossFit (Friedman, Stensby, Hillen, Demertzis & Keener, 2015; Hak, Hodzovic, & Hickey, 2013; Meyer, Sundaram, & Schafhalter-Zoppoth, 2018; Montalvo et al., 2017) or the physiological outcomes related to CrossFit participation (Barfield & Anderson, 2014; Baştuğ, Özcan, Gültekin, & Günay, 2016; Bellar, Hatchett, Judge, Breaux, & Marcus, 2015).

In addition, a small number of studies have begun to explore the unique atmosphere that exists within CrossFit affiliates (Crockett & Butryn, 2018; Pickett, Goldsmith, Damon, & Walker, 2016; Simpson, Prewitt-White, Feito, Giusti, & Shuda, 2017; Whiteman-Sandland, Hawkins, & Clayton, 2016). A spatial ethnography by Crockett and Butryn (2018) revealed that CrossFit affiliates tend to be more simplistic in design (e.g., large multipurpose spaces with moveable equipment) than traditional fitness centres. Other studies have focused on trying to understand the social capital and sense of community and belongingness that members obtain from attending CrossFit (Pickett et al., 2016; Whiteman-Sandland et al., 2016), and other potential motives for participating (Feito, Brown, Box, Heinrich & Petruzzello, 2018; Köteles, Kollsete, & Kollsete, 2016).

A small number of studies have examined the relationship between CrossFit and body image, self-esteem, and/or eating behaviours (Baştuğ et al., 2016; Edmonds, 2019; Kerry, 2017; Knapp, 2015; Köteles et al., 2016; Podmore & Ogle, 2018; Simpson et al., 2017). Baştuğ et al. (2016) reported positive improvements in body satisfaction of specific body parts for women who engaged in 12-week exercise intervention that included CrossFit. Moreover, using ethnographic methods, Knapp (2015) reported that although some aspects of the CrossFit environment reinforced traditional gender norms, there were also instances where gender norms were resisted (e.g., a greater acceptance of muscularity among women). Podmore and Ogle (2018) also reported women had different and sometimes contradictory experiences relating to body image, self-esteem, and eating behaviours with CrossFit participation. For example, whereas some women expressed that CrossFit affiliates were inclusive environments where physical appearance was not emphasized, others reported feeling pressured to look a certain way.

Yet, many of these studies focused solely on a single psychosocial variable (e.g., only body image; Baştuğ et al., 2016), even though the aforementioned psychosocial variables influence each other, or utilized only one method of investigation (e.g., only qualitative methods; Edmonds, 2019). In addition, although women and men may experience fitness/exercise environments differently, some studies chose to focus on both men and women (Edmonds, 2019; Kerry, 2017; Köteles et al., 2016; Simpson et al., 2017), whereas others chose to investigate only women (Baştuğ et al., 2016; Podmore & Ogle, 2018).

As such, the purpose of this mixed-methods study was to expand the current state of knowledge to better understand the potential associations between CrossFit

participation and women's body image, self-esteem, and eating behaviours. A convergent parallel design was used in which quantitative and qualitative data were simultaneously collected, analyzed separately, and then merged together. Quantitative data, collected by means of close-ended survey questions, were used to examine associations between specific CrossFit participation variables and women's body image, self-esteem, and eating behaviours. Qualitative data, collected by means of open-ended survey questions, were used to examine participants motivations for engaging in CrossFit and identify unique aspects of the CrossFit environment. Qualitative data were then compared and contrasted with quantitative results to answer the following research questions: (a) whether motivations identified were related to body image, self-esteem, and/or eating behaviours, and (b) discover if the unique aspects of CrossFit environment, acknowledged by the women, related to any of the above-mentioned variables.

Research Design

Theoretical Approach

The primary researcher of this study assumes a critical realist approach. Critical realists distinguish between three realities: the empirical (what is observed or experienced), the actual (events and non-events not observed or experienced), and the real (the mechanisms and structures that produce events; Bhaskar, 1975, 1978, 1989). As such, the researcher acknowledges that although a single reality exists, each individuals' interpretation of that reality is influenced by their perceptions, creating unique realities. Guided by previous research regarding the CrossFit environment and her own experiences with CrossFit (i.e., 2 years of CrossFit participation), the primary researcher sought to utilize a critical realist perspective to better uncover a deeper understanding of impact of the CrossFit environment on women. Although the primary researchers own

involvement and exposure to CrossFit can be considered an asset, reflexive journaling was maintained throughout all steps of the research process in order to constantly challenge the researcher's inherent biases (Finlay & Gough, 2003).

Mixed Methods Design

Creswell (2003) suggested that the use of a mixed-methods design is justified if a better understanding of the subject matter can be obtained utilizing more than one approach. In addition, Palinkas (2014) also supports the use of a mixed-methods design when the existence of previous research in the area is limited. Lastly, the researchers' critical realist beliefs also support the simultaneous use of qualitative and qualitive methods to identify possible associations that exist between women's CrossFit participation and their body image, self-esteem, and eating behaviours, while also unearthing a deeper understanding of these potential associations (Zachariadis, Scott, & Barrett, 2013). Thus, due to the recent increase in popularity of CrossFit, and the limited research surrounding it, especially in regards to its potential impacts on women's body image, self-esteem, and eating behaviours, the use of a mixed-method design was deemed appropriate based on the need for completeness and complementarity (Caruth, 2013; Risjord et al. 2002; Robson, 2011; Zachariadis et al., 2013).

Although the use of closed-ended survey questions as quantitative methods, and open-ended survey questions as qualitative methods together is not used as frequently as other quantitative-qualitative pairings (e.g., closed-ended survey and interviews) it has been employed in other health-related studies (Bull, Riggs & Nchogu, 2012; Tazghini & Siedlecki, 2013; Topp et al., 2015), justifying its use in the current study.

Methods

Participants and Recruitment

A convenience sample of adult women (aged 18 or older) was collected from CrossFit affiliates in Southwestern Ontario, Canada. Upon receiving University of Windsor Ethics Board clearance, a total of five CrossFit affiliates were recruited via email to participate in the study. All five CrossFit affiliates agreed to participate in the study and each respective owner sent out a mass-email that provided information regarding the study, as well as the survey link, to all members. Owners were also encouraged, but not required to post in respective social media groups (e.g., Facebook). Moreover, owners were also encouraged to send out four weekly reminder emails (and social media posts) to members.

Participation was both voluntary and anonymous. The surveys were completed electronically via Qualtrics (an online survey tool) at the participants' convenience and took approximately 30 minutes to complete. Participants first answered basic demographic questions, followed by all open-ended questions, and then all close ended questions. Informed consent was obtained at the onset of the survey. Finally, upon survey completion, participants were directed to a separate survey where they could enter their name and an email address for a chance to win a prize package (i.e., $25 grocery gift card and a t-shirt).

Quantitative Measures

Body image.

Multidimensional Body-Self Relations Questionnaire: Body Areas Satisfaction Scale (MBSRQ-BASS). The MBSRQ-BASS, one of the most widely used measures of body image, is a 9-item subscale of the 69-item self-report inventory, that assesses the

evaluative, cognitive, and behavioural components of body image (Cash, 2015). The MBSRQ-BASS is assessed on a 5-point Likert scale that ranges from 1 (*very dissatisfied*) to 5 (*very satisfied*) and scored based on the mean of its corresponding items. High scores indicate greater content with most areas of their body, whereas low scores represent higher levels of dissatisfaction with the appearance and/or size of several areas of their body. The MBSRQ is both reliable, with Cronbach's alpha internal consistency average value of .73 for women, and valid, with countless studies reporting the validity of the MBSRQ-BASS subscale (Cash, 2018). In the current study, Cronbach's alpha coefficient was .79.

Body Image Ideals Questionnaire (BIQ). The BIQ utilizes the self-discrepancy theory to measure evaluative body image (Cash, 2000). The BIQ measures the degree of discrepancy between self-perceived and ideal physical attributes (Part A). In addition, it also takes into consideration how important each of the physical attributes is to the individual (Part B). Eleven physical attributes are included in the questionnaire (e.g., height, skin complexion, muscle tone and definition). Responses to each item are on a 4-point Likert scale that range from 0 (*exactly as I am*) to 3 (*very unlike me*) for Part A, and from 0 (*not important*) to 3 (*very important*) for Part B. Discrepancy scores (Part A) were recoded from 0 to -1. Then, a mean of item-by-item cross-products (i.e., discrepancy multiplied by importance) is calculated. Scores may range from -3 to +9, with higher scores representing a higher discrepancy between the actual and ideal self, as well as a strong sense of importance placed on these physical ideals. Lower scores indicate both a greater congruence between the actual and ideal self and less importance towards these physical ideals. The BIQ has been reported to be both reliable (internal consistency of

.76) and valid (as it correlates significantly other well-validated measures of body image such as the Appearance Schemas Inventory-Revised, .58; Cash, 2000). A Cronbach's alpha coefficient of .80 was obtained in the current study.

Self-esteem.

Rosenberg Self-Esteem Scale (RSES). The RSES is a 10-item self-report measure that assesses trait self-esteem (Rosenberg, 1965). Items are scored on a 4-point Likert scale ranging from '*strongly agree*' to '*strongly disagree*', with reverse-coding where appropriate. The sum of all 10 items are calculated. Scores may range from 10-40, with higher numbers indicating higher self-esteem. The RSES is both reliable (internal consistency scores ranging from .77 to .88 and test-retest reliability ranging from .82 to .85) and valid (criterion validity = .55 and construct validity correlated with anxiety [r = - .64], depression [r - .54), and anomie [r = - .43]; Rosenberg, 1965). The internal consistency of the RSES for the current study was .89.

Eating behaviours.

Eating Attitudes Test (EAT-26). The EAT-26 is one of the most commonly used standardized self-report measures that examines concern characteristics and symptoms of abnormal, disturbed, or exaggerated eating behaviours (Garner, Olmsted, Bohr, & Garfinkel, 1982). The EAT-26 can be used in both clinical and nonclinical settings and is intended for both adolescents and adults. Items are scored on a 6-point Likert scale ranging from 0 (*never, rarely, sometimes*) to 3 (*always*), with item 26 being reverse-coded. All 26 items are added together to obtain a possible score out of 78, with higher scores indicating higher levels of concern about body weight, dieting, and/or problematic eating behaviours. The EAT-26 is highly correlated with the EAT-40 (i.e., the original,

longer form of the questionnaire), which showed high concurrent validity (r = .87) in young adult women (Garner et al., 1982) and has been utilized by other researchers with middle-aged women (Gargari, Khadem-Haghighian, Taklifi, Hamed-Behzad, & Shahraki, 2010; Midlarsky & Nitzburg, 2008), as well as adult women athletes (Doninger, Enders & Burnett, 2005). A Cronbach's alpha value of .83 was obtained for the current study.

Independent variables.

CrossFit length. Participants were asked to indicate how long they have been engaging in CrossFit. A continuous variable was created based on the number of months each participant has engaged in CrossFit

CrossFit attendance. Participants were asked to indicate how often (average number of days/week) they attend CrossFit. A continuous variable was created, with scores ranging from 0-7.

CrossFit skill level. Participants were asked to self-indicate their CrossFit skill level. Four skill level categories were created: beginner, intermediate, advanced, and competitive. Beginners were those who have recently joined CrossFit and/or are still learning the fundamental movements of CrossFit. Intermediate individuals were those who attend CrossFit for general health reasons, who do not necessarily care about 'getting better at CrossFit' but simply want to stay active and/or who may still be learning the fundamentals. Advanced individuals were those who are able to perform all the fundamental CrossFit movements (as well as some of the more challenging CrossFit movements; e.g., kipping pullups, handstand push-ups), and who are constantly trying to get better at CrossFit. Individuals' who perform most, if not all workouts as prescribed were considered competitive.

Covariates.

Age. A continuous variable was created based on participants' age at time of survey completion.

Other moderate-to-vigorous physical activity (MVPA). A continuous variable was created based on the number of minutes participants spent performing other types of moderate-vigorous physical activity.

Qualitative Measures

In addition to the aforementioned components of the survey, participants were asked to answer the following two open-ended questions: "What are your motivations for participating in CrossFit?" and "How is the atmosphere of your CrossFit affiliate different than other environments you have/do exercise in (e.g., a typical fitness centre, yoga studio, bootcamp, etc.)? Please explain."

Data Analysis

Quantitative analysis. Data analysis was completed using SPSS version 25 for MAC (IBM Corp, 2017). Prior to analysis, data were checked for entry accuracy as well as internal consistency (see above Cronbach's alpha values), where applicable. A forced-response approach was utilized for the survey (excluding the open-ended questions) to ensure no missing values occurred.

A correlation analysis was conducted to determine if either pre-established covariate (e.g., age and other MVPA) was associated with any of the dependent variables in each respective multiple linear regression. Age showed a significant deviation from normal distribution. As such, correlation analyses were carried out using a non-parametric analysis (Spearman's correlation). Age showed no significant correlation with

any of the dependent variables and was thus not included in the regressions. In addition, due to the inconsistent nature of reported other MVPA (i.e., multiple participants mentioned that their other MVPA varied based on the season or provide large ranges of minutes), it was not included in the multiple linear regression analyses.

Four separate multiple linear regressions, using the "Enter" method, were performed. Each dependent variable (MBSRQ-BASS, BIQ, RSES, and EAT-26) was regressed against all independent variables (CrossFit length, attendance, and skill level). To correct for multiple comparisons, an alpha level of .0125 per test (.05/4) was utilized to determine statistical significance (Bonferonni, 1935). Descriptive analyses were performed on all variables. Assumptions regarding of independence of observations, linearity, homoscedasticity, multicollinearity, outliers, and leverage/influential points were all satisfied. Residual normality was present for all dependent variables, excluding the Eat-26, which showed a positive skew. No data transformations were made as a positive skew was expected because the prevalence of eating disorders in Canada is only approximately 2-3% (National Initiative for Eating Disorders, 2017).

Qualitative analysis. Open-ended questions (i.e., motivation and the CrossFit affiliate environment) were examined using Braun and Clarke's (2006) thematic analysis to identify patterns and themes. The following six phase framework was utilized: (1) become familiar with the data, (2) generate initial codes, (3) search for themes, (4) review themes, (5) define themes, and (6) report themes (Braun & Clarke, 2006). In addition, similar to Köteles et al. (2016), the prevalence of themes was identified based on the number of times each them was mentioned by different participants.

Trustworthiness. To ensure trustworthiness of the data, half of the open-ended survey answers coded by the primary researcher were also coded by a second researcher and compared. The two researchers then engaged in discussion surrounding any inconsistencies. Barbour (2001) suggested that at least 20% of answers should be coded by more than one researcher to ensure adequate response variations. Thus, the current studies use of two researchers to code 50% of the answers is considered to be acceptable. A percentage agreement of 90% was obtained between both researchers, which is above percent agreement of 85% classified as adequate by MacQueen, McLellan-Lemal, Bartholow, and Milstein (2008).

Results

Quantitative

A total of 200 surveys were received, with 51 surveys being removed (nine individuals belonging to a CrossFit affiliate other than the five for which ethics approval was obtained and 42 for partially complete surveys. Thus, a final sample of 149 individuals (mean age: 34.96 ±9.16 years) was used for statistical analysis. Response rates based on the number of women registered at each affiliate varied between 31-39%. Participant demographic variables and descriptive statistics of assessed variables can be found in Tables 1 and 2, respectively. Adequate power was obtained based on a 10:1 ratio (VanVoorhis & Morgan, 2007) of participants to predictors (4 multiple linear regressions x 3 predictor variables each x 10 participants = 120 participants, 1 short of the 149 surveys obtained).

A multiple linear regression analysis was conducted to evaluate if the CrossFit-related independent variables were predictors of participants' body satisfaction (MBSRQ-

BASS). A significant regression equation was reported, $F(3, 145) = 8.269$, $p < .001$. Based on the model, predictor variables accounted for 13% (adjusted $R^2 = .128$). A breakdown of each predictor's contribution to the model is provided in Table 3. Results suggest that only CrossFit skill ($t = 3.901$, $p < .001$) contributed significantly and positively to the model.

A second multiple linear regression analysis was conducted to evaluate if the CrossFit-related independent variables were predictors of participants' body image ideals (BIQ). A significant regression equation was found, $F(3, 145) = 8.487$, $p < .001$. Based on the model, predictor variables accounted for 13% (adjusted $R^2 = .132$). A breakdown of each predictor's contribution to the model is provided in Table 3. Results suggest that only CrossFit skill ($t = -2.765$, $p = .006$) contributed significantly to the model.

A multiple linear regression analysis was conducted to evaluate if the CrossFit-related independent variables were predictors of participants' self-esteem (RSES). No significant regression equation was reported, $F(3, 145) = 2.562$, $p < .057$.

Lastly, a multiple linear regression analysis was conducted to evaluate if the CrossFit-related independent variables were predictors of disordered eating behaviours (EAT-26). A significant regression equation was found, $F(3, 145) = 3.530$, $p = .017$. Based on the model, predictor variables accounted for 7% (adjusted $R^2 = .068$). A breakdown of each predictor's contribution to the model is reported in Table 3. Results suggest that only CrossFit length ($t = -2.600$, $p = .010$) contributed significantly to the model.

Qualitative

All major themes that emerged from the analysis of the participants' answers to both open-ended questions regarding their motivation for attending CrossFit and the differences they identified between CrossFit and other environments they have exercised in are presented in Tables 4 and 5, respectively. Similar to Koteles et al. (2016) and Muir, Munroe-Chandler, and Loughead (2018) frequency counts, as well as percentages, are provided to identify the number of participants whose answers referred to each theme. If a participant's motives encompassed more than one theme, frequency counts were attributed to all themes present. A brief breakdown of all themes for each open-ended question is presented below.

Motivation themes.

Physical abilities. The most commonly mentioned motivation for engaging in CrossFit was related to participants physical health and/or abilities, with more than three-quarters (81%) citing reasons such as getting stronger, building muscle, becoming more fit, increasing their conditioning, and/or improving their overall physical health and/or abilities, among others. For example, one woman reported that, "To get stronger. I really enjoy lifting heavy weight and having fun and CrossFit really fulfills what I look for in a workout/fitness."

Challenging. Another theme discovered was that participants reported being motivated by the challenge of learning new skills or movements and challenging the limits of their bodies. Slightly more than one-third (34%) of participants provided examples such as "challenging myself mentally and physically," "push a little harder and move a little faster," and "challenge of learning new skills and progressions."

Community. Almost one-third of participants mentioned the community created within CrossFit affiliates as a motivator for their continued participation. Many references specifically highlighted that working out in a CrossFit affiliate provided them with opportunities to socialize, meet new people, build friendships, and be part of a supportive and positive community. Moreover, one woman even went as far as to say that her CrossFit affiliate was "like a family."

Mental health. A number of participants referenced benefits to their mental health as a motivation for doing CrossFit. Many members reported that participating in CrossFit made them feel good/great, provided stress-relief, and had a positive effect on their mood. In addition, a few participants also mentioned specific improvements in body image and self-esteem. For example, one woman's reasons for engaging in CrossFit were "better self-esteem, body image."

Aesthetics and weight management. Several participants, approximately 15%, stated aesthetics- and weight-related motivations for participating in CrossFit. Examples of aesthetic-related motivations range from general desires to "look good" to specific goals of "want[ing] a 6 pack." In addition, examples of weight-related motivations include: "to lose weight," "to get skinny," and "to maintain weight."

Programming. Some participants expressed engaging in CrossFit due to its use of structured programming delivered by a trained coach. For example, one woman mentioned that she enjoyed having a coach present "to ensure [she's] doing things correctly," whereas another participant emphasized "workouts are prescribed, laid out, I just show up."

Role model for family. The last motivation-related theme discovered was the desire to be a role model for family. Although not mentioned as frequently as other themes, several women were inclined to engage in CrossFit for reasons such as: "to lead by example by having a healthy life" and "to be a good example for [their] children."

CrossFit environment themes.

Community. The most frequently referenced difference was the sense of community believed to exist within CrossFit affiliates compared to the perceived lack thereof in other exercise environments, with almost 80% of respondents mentioning community related factors. For example, one woman stated that she felt the biggest difference is "[…] the community atmosphere. Everyone is encouraging everyone else to be their best. Everyone is at different points in their fitness journey and we encourage everyone to be better. I get to see people regularly and talk during workouts." Despite an overwhelming positive appraisal of the sense of community within their CrossFit affiliates, one women did mention that she sometimes feels nervous or even uncomfortable in the group atmosphere when others are encouraging her or cheering her on.

Inclusion. Another distinction identified by one-third of the women was the difference in inclusion at CrossFit affiliates compared to other exercise environments. Many women stated that they felt less judgement from other members or coaches, were not as concerned about their appearance, weight, or abilities, and described their CrossFit affiliate as more "welcoming," "accepting," and "comfortable," compared to traditional gyms, and Pilates studios, among others. Yet, one woman did highlight that although she

felt included in her affiliate's community, small cliques within this community still existed.

Programmed. Several women also identified that CrossFit is different than many exercise environments due to its combined use of group-based classes led by knowledgeable coaches and constantly varied, structured programming. For example, one woman said she preferred CrossFit to a regular gym because "a coach is present to lead you through each activity, monitor your progress, and help fix anything you might be doing wrong," whereas another women explained that "the coaches genuinely care and are aware of your capabilities and progress."

Challenging. The last theme identified differentiating CrossFit from other exercise environments related to pushing limits and challenging physical and mental abilities. Many women expressed that they felt CrossFit was "more challenging" and encouraged them to "push each other, and suffer through workouts together […]."

Discussion

Using a mixed-methods approach, the aim of this study was to contribute to the limited existing literature surrounding women's CrossFit participation and their body image, self-esteem, and eating behaviours. Quantitative analysis was used to investigate associations between CrossFit participation and body image, self-esteem, and eating behaviours directly. Conversely, qualitative analysis was used to expand upon quantitative results by uncovering thematic motivations for participating in CrossFit and identifying possible thematic differences compared to other exercise environments.

Quantitative results revealed that CrossFit participation positively predicted women's body image. Specifically, higher CrossFit skill was associated with higher

levels of satisfaction for most areas of the body, as well as greater self-ideal congruence with strongly held physical ideals. Although the MBSRQ-BASS and the BIQ measure slightly different aspects of the physical body, current results support previous research by Cash and Szymanski (1995), which demonstrated good convergence between scores on both scales. The current results are also consistent with previous meta-analyses (Campbell & Hausenblas, 2009; Hausenblas & Fallon, 2006) that reported positive associations between physical activity and body image, as well as a quantitative-based CrossFit specific study by Baştuğ et al. (2016) that reported the same trend.

In addition, the results of the current study also provide further evidence that self-perceived physical skill and/or fitness is positively associated with body image (Greenleaf, Boyer, & Petrie, 2009; Zamani Sani et al., 2016). These findings are similar to those of Zamani Sani et al. (2016) who posited that, consistent with the theory of self-concept (Lindwall, Asci, & Hagger, 2011), not only does the act of participating in physical activity itself contribute to increases in body image, but that the increases may also partially be attributed to opportunity physical activity/exercise provides to increase one's physical fitness and physical skills. Moreover, CrossFit's use of strength training may be particularly effective in increasing body image, as previous literature suggests that strength training and improvements in strength-related fitness and skill have a greater effect than aerobic-based exercise (Ginis, Enj, Arbour, Hartman, & Phillips, 2005; Ginis, Strong, Arent, Bray, & Bassett-Gunter, 2014).

The current study's thematic analysis of qualitative data also supports its quantitative findings regarding body image. The fourth most common thematic motivation discovered in the current study was mental health. Although many women did

not clarify their motivations beyond stating "mental health," others referenced, more specifically, improvements in body image, supporting the quantitative results. Moreover, although almost 15% of women referenced appearance or weight,
the most frequently mentioned motivation for participating in CrossFit was that of physical health and abilities. Examples of such abilities included endurance, flexibility, strength, and more specific examples such as pull-ups and "double unders" (i.e., an advanced form of skipping). Thus, improvements in physical skills were a much stronger motivator for women than actual physical appearance and provides further evidence that improvements in perceived physical fitness and skills contributes to positive increases in body image satisfaction. This is not to say that women participating in CrossFit are not concerned about their appearance. However, perhaps CrossFit's inclusive (theme) environment provides a non-judgmental, community-based atmosphere (theme) where women are encouraged to value improvements in skill and abilities over aesthetics, which may positively impact body image as women may be less critical of their appearance. In addition, many women perceived that, unlike many exercise environments, the lack of mirrors in CrossFit affiliates allowed them to focus on what their body was doing, and not its appearance. One woman further explained that "it takes the vanity out of the typical fitness routine," which supports previous research by Prichard and Tiggemann (2008) and Martin Ginis, Jung, and Gauvin, (2003) who both reported that the presence of mirrors created a heightened awareness and concern for appearance among women.

The current findings are similar to those of previous qualitative studies that have reported that the CrossFit environment deemphasizes appearance and celebrates performance (Podmore & Ogle, 2018; Knapp, 2015; Edmonds, 2019). In addition, the

everyday challenge of CrossFit was another theme discovered in both open-ended questions. Similar to Partridge, Knapp, and Massengale (2014), many women discussed the "challenge of learning new skills" and the concept of pushing the body "out of [its] comfort zone" as aspects unique to the CrossFit environment. Many women also expressed feeling a sense of accomplishment after mastering a new skill or finishing a hard workout. As such, the challenge and desire to learn and master new skills may indirectly or directly contribute to the quantitative associations between CrossFit skill and body image. Yet, as was reported by Köteles et al. (2016), the length or frequency of CrossFit attendance was not a predictor of body image. The current findings may suggest that simply attending CrossFit classes is not enough, but that women participating in CrossFit must show improvements in skill in order to reap body image-related benefits.

The second psychosocial variable examined in the current study was self-esteem. Although much scientific literature provides evidence of a positive association between exercise or physical activity and self-esteem (Biddle, Fox, & Boutcher, 2003; Lox, Martin Ginis, & Petruzello, 2010; Scully, Kremer, Meade, Graham, & Dudgeon, 1998), the current study's quantitative findings suggest no link between CrossFit participation and self-esteem. Conversely, other quantitative studies that specifically examined the relationship between CrossFit participation and self-esteem also reported no associations between the two variables (Eather, Morgan, & Lubans, 2016; Köteles et al., 2016). Yet, when Eather et al. (2016) examined only those individuals 'at risk' for psychological problems, a significant positive association between CrossFit participation and self-esteem was reported. As such, perhaps CrossFit participation only has a statistically significantly beneficial influence on self-esteem if the individual's self-esteem was low

before beginning CrossFit. In addition, the current study only utilized a measure of trait self-esteem. As such, perhaps significant associations between CrossFit participation and state self-esteem do exist, but do not translate into trait self-esteem. Conversely, due to the relatively high cost of CrossFit, women attending CrossFit affiliates may be of higher socioeconomic status then the average individuals. Moreover, numerous studies, have reported positive associations between socioeconomic status and self-esteem. (von Soest, Wagner, Hansen & Gerstorf, 2018; Twenge & Campbell, 2002). Thus, perhaps no significant changes in self-esteem were observed in the current studies as these women were likely of high socioeconomic status, and thus potentially relatively high self-esteem to begin with.

Furthermore, the qualitative results of this study somewhat contradict its quantitative findings. As previously mentioned, "mental health" was a common motivational theme. Although "mental health" is quite vague and women could be referencing several different aspects of their mental health other than self-esteem, many women did provide specific examples of self-esteem-related motivations. For instance, one woman wrote that "CrossFit makes me feel great about myself, I feel happier and healthier," whereas another women said "I feel proud of myself for accomplishing things there and I carry that outside of the gym," implying the benefits to her self-esteem extend beyond the walls of her affiliate. In addition, the lack of a statistically significant association between CrossFit participation and self-esteem was incongruent with qualitative analysis as the majority of women felt CrossFit created an inclusive community that deemphasized appearance, characteristics that have previously been related to fostering positive self-esteem (Cohen, 2004; Lee & Robbins, 1998; Williams &

Galliher, 2006) as well as continued exercise participation (Anderson, Boyard, Wang, Beebe, & Murad, 2016; Farrance, Tsofliou, & Clarke, 2016).

One potential explanation for the nonexistent quantitative association between CrossFit and self-esteem may be due to the specific self-esteem assessment tool used. In a quantitative review, Spence, McGannon, and Poon (2005) wrote that although exercise may have a positive effect on self-esteem, this association may be small at the global level. Thus, the lack of a significant association in the current study may be due to the multidimensional nature of self-esteem (Sonstroem & Morgan, 1989). Specifically, although exercise participation may have an influence on specific domains of self-esteem, such as physical competence and/or physical appearance self-esteem, it may not have a considerable influence on other domains of self-esteem (Donnellan, Trzesniewski, Conger, & Conger, 2007; Sonstroem & Morgan, 1989). As such, the impact of exercise participation on global self-esteem, as measured in the current study, may be minimal (Donnellan et al., 2007). Moreover, in a study by Wichstrøm von Soest (2016), it was reported that the relationship between body image and self-esteem peaks in adolescents but tapers significantly with age, lending another potential explanation for significant associations between women's CrossFit participation and body image, but not self-esteem.

The last outcome examined in relation to CrossFit participation was eating behaviours. To the author's knowledge, this study is the first of its kind to quantitively examine the eating behaviours of women participating in CrossFit. Specifically, this study sought to investigate whether or not women's CrossFit participation (skill, length, attendance) could predict disordered eating behaviours. The multiple linear regression

revealed that length of time since beginning CrossFit was a significant predictor of women's eating behaviours, with longer attendance predicting lower disordered eating scores. The frequency at which women attended CrossFit classes and individual skill levels were not able to statistically predict eating behaviours.

Although a lack of quantitative research exists, a few studies have begun to qualitatively examine the eating patterns of individuals participating in CrossFit (Edmonds, 2019; Podmore & Ogle, 2018; Simpson et al., 2017). Podmore and Ogle (2018) reported differing experiences among women who participate in CrossFit, with some women feeling as though they were pressured to adhere to a specific diet (often Paleo or 'clean' eating), and others suggesting they felt they had adopted a more relaxed approach to eating. However, in contrast to the current study's quantitative results, the majority of participants in Podmore and Ogle (2018) reported that the CrossFit environment (coaches and other members) promoted restrictive certain foods in order to see "results." However, interviews by Simpson et al. (2017) revealed that participants self-reported eating healthier since joining CrossFit, yet some still followed a specific diet. Thus, similar to the current study, perceptions of healthy eating are relative. Although some individuals may feel they have adopted healthier eating habits, not all of these changes (e.g., counting calories or restricting specific types of food) are necessarily healthy eating habits according to published guidelines (Health Canada, 2019; LaCaille, 2013).

The current study's qualitative results do not lend much direct support (or contradiction) to its quantitative findings. Only two individuals mentioned eating behaviours in response to the motivation-based open-ended question, and no women

discussed eating behaviours in response to the second open-ended question. This was not entirely unexpected as neither question specifically addressed eating behaviours. Of the two women that did mention eating behaviours, both mentioned that their CrossFit participation motivated them to adopt a healthier diet and better eating habits, lending limited support to quantitative results.

Yet, the discovery of other qualitative themes may provide some insight into the statistical results. For example, more women were motivated to improve their physical health and abilities through CrossFit, than to improve their aesthetics or manage their weight. This deemphasis on appearance, reinforced by the inclusive community, may potentially be allowing women to feel less restrictive in their eating behaviours as they are not as concerned with achieving the 'ideal' body. Yet, it is important to note that some women may have other reasons for engaging in less restrictive eating behaviours, such as having family and not wanting to cook different meals for themselves and their children or spouse. In addition, many women expressed changes in their motivation with continued participation, which may help further decipher the quantitative results. Some women from the current study expressed that they originally participated in CrossFit as a means to manage their weight or get skinny, but that they have since changed their focus to getting stronger or accomplishing a new skill, again potentially lending to less disordered eating behaviours.

Limitations and Future Research

Despite this study's novel use of a mixed methods approach to investigating associations between CrossFit and psychosocial health, it is without its limitations. First, only five CrossFit affiliates were included in this study. As such, the results of this study

may not be generalizable to the entire CrossFit population. Second, due to feasibility reasons, open-ended survey questions were used to obtain qualitative data. Although an acceptable practice (Bull, Riggs & Nchogu, 2012; Tazghini & Siedlecki, 2013; Topp et al., 2015), the use of semi-structured interviews would have provided richer data. In addition, the study was limited by its use of a global self-esteem. Future studies may benefit from using a more domain-specific measure of self-esteem. Although this study was the first to quantify an association between women's CrossFit participation and their eating behaviours, only limited qualitative research was provided. As such, future research should continue to quantitatively investigate this potential link, while also providing more qualitative support. Lastly, quantitative analysis was not conducted to determine if differences in psychosocial outcomes varied based on affiliate attended. Thus, future research examining the potential differences between affiliates, such as the socioeconomic status of women, is warranted.

Conclusion

Notwithstanding the aforementioned limitations, this study expands upon the limited current research regarding the potential impact of CrossFit participation on women's BI, SE, and EBs. The use of a mixed-method approach provides valuable insight into the nuances among the associations between variables. The results of this study revealed that CrossFit participation may statistically and positively influence women's BI and EBs, but not global SE. Qualitative analysis provide support and provide possible insight into these quantitative findings, while simultaneously exposing other nuances that may have gone overlooked using only a quantitative approach. In summary,

this study sheds light on both the positive, negative and neutral impacts of CrossFit participation on women's psychosocial health.

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Table 1. Participant Demographic Variables

	Minimum	Maximum	Mean (*SD*)
Age (years)	19	61	34.94 (9.16)
Other MVPA (minutes/week)	0	2000	137.03 (219.15)
CrossFit Skill Level (score, 1 to 5)	1	4	2.62 (0.84)
CrossFit Length (months)	1	104	31.33 (23.34)
CrossFit Frequency (days/week)	1	7	4.23 (1.28)

Table 2. Body Image, Self-Esteem, and Disordered Eating Scores of Participants

	Minimum	Maximum	Mean (*SD*)
Multidimensional Body-Self Relations Questionnaire - Body Areas Satisfaction Scale (score, 1 to 5)*	2	5	3.52 (.59)
Body-Image Ideals Questionnaire (score, -3 to 9)**	-2.18	5.27	1.46 (1.43)
Rosenberg Self-Esteem Scale (score, 10 to 40)*	18	40	31.62 (5.16)
Eating Attitudes Test- 26 (score, 0 to 78)**	0	42	9.93 (8.41)

*higher scores indicate better outcomes
**lower scores indicate better outcomes

Table 3. Multiple Linear Regression Analyses

	Unstandardized Coefficients		Standardized Coefficients	*t*	*p* value	*B* - 95% CI	
	B	SE *B*	Ɓ			Lower	Upper
MBSRQ-BASS[a]							
Intercept	2.942	0.178		16.508	<0.001*	2.59	3.295
CrossFit Skill Level	0.269	0.069	0.383	3.901	<0.001*	0.133	0.405
CrossFit Length	0.001	0.002	0.045	0.498	0.619	-0.003	0.006
CrossFit Frequency	-0.036	0.039	-0.078	-0.918	0.360	-0.113	0.041
BIQ[b]							
Intercept	3.207	0.429		7.48	<0.001*	2.36	4.055
CrossFit Skill Level	-0.458	0.166	-0.271	-2.765	0.006*	-0.786	-0.131
CrossFit Length	-0.008	0.006	-0.129	-1.422	0.157	-0.019	0.003
CrossFit Frequency	-0.071	0.094	-0.064	-0.752	0.453	-0.257	0.115
RSES[c]							
Intercept	28.879	1.641		17.603	<0.001*	25.636	32.122
CrossFit Skill Level	0.182	0.634	0.03	0.287	0.775	-1.072	1.436
CrossFit Length	0.041	0.021	0.185	1.941	0.054	-0.001	0.083
CrossFit Frequency	0.233	0.361	0.058	0.645	0.520	-0.48	0.945
EAT-26[d]							
Intercept	11.851	2.647		4.478	<0.001*	6.62	17.082
CrossFit Skill Level	-0.402	1.024	-0.04	-0.393	0.695	-2.425	1.621
CrossFit Length	-0.089	0.034	-0.246	-2.6	0.010*	-0.156	-0.021
CrossFit Frequency	0.451	0.582	0.069	0.775	0.440	-0.699	1.601

*indicates significant at .0125.

[a]Multidimensional Body-Self Relations Questionnaire: Body Areas Satisfaction Scale

[b]Body Image Ideals Questionnaire

[c]Rosenberg Self-Esteem Scale

[d]Eating Attitudes Test

Table 4. Motivation Themes

Theme	Frequency (%)
Physical health and abilities	121 (81.21%)
Challenge	52 (34.90%)
Community	45 (30.20%)
Mental Health	29 (19.46%)
Aesthetics and weight management	22 (14.77%)
Programming	15 (10.07%)
Role model for family	8 (5.37%)

Note. 1 participant did not answer

Table 5. CrossFit Environment Themes

Theme	Frequency (%)
Community	117 (78.52%)
Inclusive	47 (31.54%)
Programmed	38 (25.50%)
Challenging	30 (20.13%)

Note. 2 participants did not answer

STUDY 2

EXAMINING THE IMPACT OF THE CROSSFIT ENVIRONNMENT ON BODY IMAGE, SELF-ESTEEM, AND EATING BEHAVIOURS AMONG WOMEN USING A MIXED METHODS APPROACH

Introduction

Every day, humans interact with their environment. Although such a statement may read as common knowledge to most, it is upon this tenet that Bronfenbrenner (1974) developed the socio-ecological model. The socio-ecological model suggests that the relationship between humans and the environment is reciprocal in nature and that environment is composed of five levels (Bronfenbrenner, 1994; Robinson, 2008; Townsend & Foster, 2013) including the individual (e.g., knowledge, attitudes, beliefs, gender, and age), interpersonal (e.g., friends, family), organizational, community, and public policy levels. The first two levels consist of characteristics of the individual (e.g., knowledge, attitudes, beliefs, gender, and age), whereas the second level is composed on the individual's social relationships with others, such as friends or family. The later three levels make up the physical environment and can include all organizations and social institutions (e.g., workplace or school), frequented by the individual; the social networks and norms, or standards, among individuals, groups, and organizations; as well as the laws and policies that regulate or support the actions and behaviours of all individuals (e.g., smoking bylaws). Although each level may influence an individual on its own, each level also overlaps with the other levels to influence individual behaviour and development simultaneously (Bronfenbrenner, 2005). Moreover, the closer the level is to the individual (i.e., the intrapersonal level), the greater the influence that level has on the individual's development and behaviour.

Thus, the socio-ecological model can be applied to help understand all aspects of human development (Bronfenbrenner; 1974). For example, the socio-ecological model suggests that an individual's physical health may be influenced by their age (individual), the health behaviours of their friends and family (interpersonal), the conditions of their workplace (organizational), societal norms regarding the consumption of fast food (community), and their access to health care (public policy), among countless other factors.

Additionally, the same five levels of environmental influence may also impact an individual's psychosocial health, including their body image, self-esteem, and eating behaviours, among others. Body image is a multidimensional construct encompassing an individual's perceptual, social, cognitive, behavioural, and affective attitudes and feelings towards their body (Schilder, 2013; Cash & Pruzinsky, 2002). Thus, body image is not only compromised of how the individual perceives and evaluates their body, but also how important their appearance is to them, what they view as an ideal, their acceptance of their body, as well as the extent to which they invest in their appearance (Cash & Pruzinsky, 2002). Yet, one of the most commonly measured aspects of body image is its evaluative dimension. Evaluations of these attitudes and feelings are often measured on scales ranging from dissatisfaction to satisfaction, with women often reporting greater body dissatisfaction than men (Algars, 2009; Tiggermann & Pennington, 1990). Silberstein, Striegel-Moore, Timko, and Rodin (1988) suggested that women are more likely to identify a larger discrepancy between their ideal self and the self they perceive compared to men, resulting in this decreased body satisfaction. The literature also suggests that body image and self-esteem, an individual's evaluation of themselves

(Rosenberg, 1965), are positively and reciprocally related (Gillen, 2015; Lowery et al., 2005; Wichstrøm von Soest, 2016). Adolescent girls and women who are more satisfied with their bodies are likely to report higher levels of self-esteem and vice versa (Gillen, 2015; Lowery et al., 2005; Wichstrøm von Soest, 2016), which is widely reported to be a central aspect of an individual's psychological health and overall well-being (Bos, Huijding, Muris, Vogel, & Biesheuvel, 2010; Orth, Robins, & Widaman, 2012). Moreover, an individual's perception of their body and their sense of self-worth have been reported as potential factors that can influence eating behaviours (Braun, Park, & Gorin, 2016). Specifically, several researchers have reported associations between body dissatisfaction and an increase in disordered eating behaviours (Braun, Park, & Gorin, 2016; Lewis-Smith, Diedrichs, Rumsey & Harcourt, 2016; Perez & Joiner, 2003; Zeigler-Hill & Noser, 2015). Yet, Kashubeck-West and Saunders (2001) caution that not all individuals that are dissatisfied with their body and/or suffer from low self-esteem will have disordered eating behaviours.

In addition to aforementioned dynamic interactions that exists between an individual's body image, self-esteem, and their eating behaviours, the socio-ecological model suggests that each of these constructs is also influenced by the social and physical environment (Bronfenbrenner; 1974). Specifically, although exercise participation in general, may have positive effects on an individual's psychosocial health (Hausenblas & Fallon, 2006; Martin, Prichard, Hutchinson, & Wilson, 2013; Zamani Sani et al., 2016), several studies highlighted the need to consider the social and physical environmental contexts in which the exercising is taking place, as not all exercise environments are equally capable of producing a positive influence on an individual's body image, self-

esteem, and eating behaviours, especially among women (Clark, 2017; Prichard & Tiggemann, 2008). For example, studies investigating fitness centres suggested that women often find these environments to not only be intimidating (Clark, 2017; Fisher, Berbary, & Misener, 2017; Prichard & Tiggemann, 2008), but may also elicit anxiety and an increased awareness of their physical appearance (Clark, 2017). Conversely, yoga studies are postulated to encourage women to value their health and well-being more than their appearance (Prichard. & Tiggemann, 2008), and encourage mindful eating (Bryan et al., 2013; Watts et al., 2018), resulting in potentially positive effects on body image, self-esteem, and eating behaviours (Bryan et al., 2013; Prichard. & Tiggemann, 2008; Watts et al., 2018).

Although a significant body of literature exists evaluating the social and physical environments of fitness centres and yoga studios and their associations with body image, self-esteem, and eating behaviours, limited research exists in other exercise environments, especially CrossFit gyms (known as 'affiliates'). Developed by Greg Glassman in 2000, CrossFit is a relatively new, group-based exercise program that incorporates aspects of aerobic training, weight lifting, calisthenics, powerlifting, mobility, and gymnastics (CrossFit, 2018b; Glassman, 2002, 2007). Individuals partake in high intensity workouts composed of a variety of functional movements (Glassman, 2007). Moreover, CrossFit prides itself on creating social and physical environments that encourage interaction between members, enjoyment, and intensity that cannot typically be achieved in most exercise settings (CrossFit, 2018b). Despite garnering significant public criticism for its 'lack of safety' and 'cult-like tendencies' (Beck, 2017; Ross,

2018), more than 13,000 CrossFit affiliates exist today, with its number of practitioners continuing to rise (CrossFit, 2018a).

Only a small number of studies investigating the potential impact of CrossFit participation on women's body image, self-esteem, and/or eating behaviours have been conducted, with mixed results (Baştuğ et al., 2016; Edmonds, 2019; Kerry, 2017; Knapp, 2015; Köteles et al., 2016; Podmore & Ogle, 2018; Simpson et al., 2017). In a study of 186 Norwegian participants, including both men and women, Köteles et al. (2016) reported no relationship between CrossFit participation and body image or self-esteem. Conversely, Baştuğ et al. (2016) observed positive effects on body satisfaction for women participating in an exercise intervention that included CrossFit. In addition, although no change in body image or self-esteem was reported in the larger group of adolescents who underwent a CrossFit intervention, those categorized at risk of psychological distress did experience significant improvements in aspects of both body image and self-esteem (Eather, Morgan, & Lubans, 2016; Köteles et al., 2016). Lastly, only a few studies have examined the eating habits of individuals participating in CrossFit, with both healthy (e.g., moderation, intuitive eating, seeing food as fuel) and unhealthy (e.g., restrictive dieting, exercising as punishment for 'poor' food choices) eating behaviours reported (Edmonds, 2019; Podmore & Ogle, 2018; Simpson et al., 2017).

Yet, gaps in the literature still exist. First, although the literature suggests that body image, self-esteem, and eating behaviours are positively and reciprocally related, many studies only investigated the associations between CrossFit and one of the three variables (e.g., only body image; Baştuğ et al., 2016). Moreover, even though men and

women experience body image, self-esteem, and eating behaviours differently (Bleidorn et al., 2016; Leblanc, Bégin, Corneau, Dodin, & Lemieux, 2015; Silberstein et al., 1988), several studies conducted mixed-gendered investigations (Edmonds, 2019; Kerry, 2017; Köteles et al., 2016; Simpson et al., 2017). Given that CrossFit research is relatively limited, a lack of mixed-method studies is evident, with most studies conducting single-method approaches (Edmonds, 2019; Knapp, 2015). Lastly, whilst several studies have obtained participants from more than one CrossFit affiliate (Köteles et al., 2016; Simpson et al., 2017), no study has yet to examine the potential impact of individual CrossFit affiliates, all of which are individually owned and operated, on individual body image, self-esteem, and/or eating behaviours scores.

Thus, the purpose of the mixed-methods study was to examine whether the body image, self-esteem, and eating behaviours of women participating in CrossFit was significantly different based on the CrossFit affiliate attended. A convergent parallel design was used in which quantitative and qualitative data were simultaneously collected, analyzed separately, and then merged together. Quantitative data were collected by means of close-ended survey questions and used to examine the following research question: whether women's levels of body image, self-esteem, and eating behaviours differed significantly based on which CrossFit affiliate they attended. Qualitative data, collected by means of a focused ethnography, including participation observation and open-ended survey questions, were used evaluate the social and physical environments of each affiliate. Quantitative and qualitative data were then compared and contrasted to obtain a better understanding of the ways in which the physical and social environments

of each CrossFit affiliate impacted its women members body image, self-esteem, and eating behaviours.

Research Design

Theoretical Approach

The lead investigator of the study embodied a critical realist approach. The primary author acknowledges that ontology (i.e., what is real) is not necessarily reducible epistemology (i.e., what can be observed). Thus, although the author believes that an intransitive reality exists independent of human perception, this reality cannot be objectively viewed, as an individual's views of this reality are shaped by their perceptions (Bhaskar, 1975, 1978, 1989; Fletcher, 2017). Regarding the current study, the lead investigator, who actively engages in CrossFit and has had mostly positive experiences with CrossFit, acknowledges that their perceptions of the true reality are shaped by their investigative interests, theoretical underpinnings, as well their past and current experiences with CrossFit, lending to their own, unique view of the actual reality (McEvoy & Richards, 2006). Moreover, although the primary researcher was guided by the socio-ecological model and previously conducted CrossFit research, the author recognizes that these theories and past studies may not necessarily reflect the most accurate picture of reality (Fletcher, 2017). Thus, the use of the socio-ecological model and previous literature will be used to facilitate a deeper analysis of the CrossFit environment that can support, expand upon, or even contradict the socio-ecological model and/or previous research in order to construct a better understanding of reality (Fletcher, 2017).

Although some may view the author's biased views as a weakness, the author's personal engagement with CrossFit (as well as some of the study's participants) and awareness of previous CrossFit research provides valuable insight, producing more meaningful research (Damasio, 1994; Greene, 2014; Kisfalvi, 2006). In addition, the author partook in reflexive journaling throughout all stages of the research process in order to manage inherent biases, re-evaluate impressions and challenge pre-existing assumptions and hypotheses (Finlay & Gough, 2003; Sparks & Smith, 2014).

Mixed Methods Design

Creswell (2003) suggests that mixed method research is appropriate if a more complex understanding of what is being studied could not be possible utilizing only one approach. Methodological triangulation (i.e., utilizing more than one method/source of data) is justified by the need of completeness (i.e., to obtain the widest possible range of perspectives and a greater level of detail that could not be obtained using only one data source; Caruth, 2013; Risjord et al., 2002; Robson, 2011). Palinkas (2014) also reported that qualitative methods are especially useful in conjunction with quantitative methods when limited previous research exists, such is the case with the present study. As such, the current study utilized a convergent parallel mixed-methods design, where quantitative and qualitative data were concurrently collected, individually analyzed, and then consolidated, to obtain a more comprehensive view of the ways in which different CrossFit affiliates may influence the body image, self-esteem, and eating behaviours of women members.

Methods

Participants, Recruitment, and Procedures

After receiving University of Winsor Ethics Boards approval, five CrossFit affiliates located in Southwestern Ontario, Canada were contacted via email to participate. Owners from all five affiliates provided permission to conduct research in their respective CrossFit affiliates. All members at each of the five affiliates were notified via mass-email (sent by the owner) about the study and its components: (a) a survey, containing both close (quantitative) and open-ended (qualitative questions) and (b) focused ethnographies of each CrossFit affiliate (including participant observation, field notes, location sketches and pictures). Owners were also asked to share the same information on any of their social media groups (e.g., Facebook). Reminder emails regarding all study components were sent out on a weekly basis. Participation in any/all components of the study was completely voluntary.

Quantitative and qualitative (Part A). Surveys were anonymously completed online via Qualtrics (2019) and took approximately 30 minutes to complete, with informed consent being obtained at the onset of the survey. Participants first answered basic demographic questions, followed by all open-ended questions, and then all close ended questions. After the survey was completed, participants were allowed to fill out a secondary, separate survey for a chance to win a prize pack (i.e., $25 grocery gift card and a t-shirt).

Qualitative (Part B). A focused ethnography consisting of three visits to each affiliate occurred during the winter of 2019. All affiliate members were notified of the times and dates of these scheduled visits well in advance. Thus, if members did not wish

to be present during these visits, they could arrange an alternate time to attend on those days. In addition, on the days the researcher visited each affiliate, signs were posted on all entrances reminding members that the study was taking place and that the researcher would be making observations, ensuring passive consent was obtained. Each visit lasted approximately two hours.

Data Collection

Quantitative.

Body image.

Multidimensional Body-Self Relations Questionnaire (MBSRQ): Body Areas Satisfaction Scale (MBSRQ-BASS). Developed by Cash (2015), the MBSRQ is 69-item self-report inventory consisting of 10 subscales that assesses individuals' attitudes regarding their physical appearance. The MBSRQ-BASS is a 9-item subscale of the larger inventory that evaluates individuals' satisfaction with specific body parts and attributes (Cash, 2015). A 5-point Likert scale ranging from 1 (*very dissatisfied*) to 5 (*very satisfied*) is utilized, with scores calculated based on the mean of the 9 items (Cash, 2015). Higher scores indicate greater satisfaction with most areas and attributes of the body, whereas lower scores indicate greater unhappiness with several areas and attributes of the body. The validity of the MBSRQ-BASS has been reported by numerous studies, with an average Cronbach alpha value of .73 (Cash, 2018). The current study had a Cronbach alpha coefficient of .79.

Body Image Ideals Questionnaire (BIQ). The BIQ was developed to measure evaluative body image (Cash, 2000). The questionnaire has two parts. Part A determines the degree of discrepancy between an individual's self-perceived and ideal physical

attributes. Part B considers how important each of these physical attributes is to the individual. The physical attributes assessed are: height, skin complexion, hair texture and thickness, facial features, muscle tone and definition, body proportions, weight, chest size, physical strength, physical coordination, and overall physical appearance. Items are scored on a 4-point Likert scale ranging from 0 (*exactly as I am*) to 3 (*very unlike me*) for Part A and from 0 (*not important*) to 3 (*very important*) for Part B. Scores of 0 on Part A are recoded to -1. A final score is calculated by taking the mean of each item-by-item cross-product (Part A by Part B), with scores ranging from -3 to +9. Higher scores are more indicative of a greater discrepancy between the self-perceived and ideal self, as well as a high level of importance placed of these physical attributes. Conversely, lower scores demonstrate greater consistency between the actual and ideal self, as well as minimal importance placed on these physical ideals. According to Cash (2000), the BIQ has good reliability (internal consistency of .76) and validity (significantly correlates with other measures of body image such as the Appearance Schemas Inventory-Revised, .58). The internal consistency for the current study was .80.

Self-esteem.

Rosenberg Self-Esteem Scale (RSES). The RSES is a self-report measure used to asses global self-esteem. The 10-item questionnaire utilizes a 4-point Likert scale that ranges from 1 (*strongly disagree*) to 4 (*strongly agree*), with items 2, 5, 6, and 8 reverse-scored. All 10 items are summed to produce a final score ranging from 10 to 40, with higher numbers indicating greater self-esteem. The RSES is reported to be both valid (criterion validity = .55 and construct validity correlated with anxiety [r = - .64], depression [r - .54), and anomie [r = - .43]) and reliable (internal consistency scores

ranging from .77 to .88 and test-retest reliability ranging from 0.82 to 0.85; Rosenberg, 1965). In the current study, Cronbach's alpha coefficient was .89.

Eating behaviours.

Eating Attitudes Test (EAT-26). The EAT-26 is a standardized self-report measure developed by Garner, Olmsted, Bohr, and Garfinkel (1982) to assess characteristics and symptoms of abnormal, disturbed, and exaggerated eating behaviours. Its use is intended for adolescents and adults alike, and can also be used in both clinical and nonclinical settings. Items 1-25 are scored on a 6-point Likert scale of 0 (*never, rarely, sometimes*) to 3 (*always*), with item 26 being reverse-coded. A possible score out of 78 is calculated by taking the sum of all 26 items. Higher scores indicate greater symptoms of abnormal, disturbed, and exaggerated eating behaviours, whereas lower scores indicate the opposite. The EAT-26 displays high concurrent validity (r = .87) with the original, 40-item version of the survey in young adult women (Garner et al., 1982) and has been administered to middle-aged women for many previous studies (Gargari, Khadem-Haghighian, Taklifi, Hamed-Behzad, & Shahraki, 2010; Midlarsky & Nitzburg, 2008). In the present study, the EAT-26 was deemed to be reliable as evidenced by a Cronbach's alpha value of .83.

CrossFit affiliate.

CrossFit affiliate. Participants were asked to indicate which CrossFit affiliate they attended. For anonymity purposes, all five CrossFit affiliates were renamed as CrossFit affiliates 1 through 5 for reporting purposes.

Qualitative (part A). Similar to previous studies, open-ended questions were added to the survey to obtain ethnographic data (Arnon & Reichel, 2009; Bull, Riggs, & Nchogu, 2012; Deschenes, 2014; Tazghini & Siedlecki, 2013; Topp et al., 2015).

Participants were asked the following three open-ended questions: “Do you think the physical (e.g., how the affiliate is set up, what equipment is available, where things are, etc.) and/or social environments (e.g., how people do/don't interact with each other) at your CrossFit affiliate have influenced your [body image, self-esteem, or eating behaviours]? If so, please provide specific examples.”

Qualitative (part B). A focused ethnography was deemed appropriate for current study. First, its use is also justified due to the specific nature of the researcher’s interests (i.e., investigating the impact of different CrossFit affiliates on the body image, self-esteem, and eating behaviours of its women members; Wall, 2014). In addition, the primary investigator was already familiar with the CrossFit environment, as she has been participating in CrossFit for more than two years, which is considered to be an important component of focused ethnographies (Knoblauch, 2005). Thus, the author’s knowledge about class procedures, CrossFit terminology, and the general CrossFit culture allowed the primary researcher to gain entry (to the affiliates) and acceptance (by members) more easily than someone unfamiliar with CrossFit (Hall, 1977).

Each focused ethnography was conducted using Spradley’s twelve step developmental research sequence (1980). Each focused ethnography consisted of participant observations, field notes, a sketched layout, and pictures of each affiliate. More specifically, and according to Spradley (1980), five CrossFit affiliates were selected for observation (Step 1). Observations were made using a passive participant approach (Step 2). Steps 3 through 10 consisted of documenting observations (Step 3 and 4), classifying these observations into categories (Step 5), conducting more focused observations and breaking down each category into smaller categories (Steps 6-9), and

identifying patterns and themes among the observations (Step 10). Themes were then organized (Step 11) and reported (Step 12).

Data analysis

Quantitative. SPSS version 25 for MAC (IBM Corp, 2017) was utilized for all data analysis of close-ended survey questions. All data were reviewed prior to analysis for entry accuracy and internal consistency (Cronbach's alpha values). No missing values occurred as all survey questions, excluding the open-ended questions, were forced-response. A one-way analysis of variances (ANOVAs) was performed for each dependent variable (MBSRQ-BASS, BIQ, RSES, and EAT-26) to determine if it was significantly different for participants attending different CrossFit affiliates. Participants were classified into five groups (i.e., affiliate 1, affiliate 2, affiliate 3, affiliate 4, or affiliate 5). To account for multiple comparisons, a Bonferroni adjustment was used for all one-way ANOVAs (.05/4 = .0125; Bonferroni, 1935). Descriptive analyses were performed on all variables.

Assumptions relating to outliers, normal distribution of the dependent variable for each independent variable, and homogeneity of variances were all verified prior to completing each one-way ANOVA. Scores on the MBSRQ-BASS for affiliate 2 were not normally distributed, but no transformations or non-parametric tests were chosen as one-way ANOVAs are fairly robust to deviations from normality (Maxwell & Delaney, 2004). Scores on the EAT-26 were not normally distributed (slightly negatively skewed) for affiliates 1, 2, and 4. This is not unexpected, as the EAT-26 assess symptoms of disordered eating (with high scores representing more disordered eating) and the prevalence of eating disorders in Canada is only 2-3% (National Initiative for Eating

Disorders, 2017). As one-way ANOVAs are robust to skewness and the skewness was expected, no transformations were carried out. In addition, two extreme outliers scores on the EAT-26 were identified. Both values (41 and 42, respectively) where winsorized to 31 (the next highest value) and the subsequent one-way ANOVA was carried out with the winsorized values (Ghosh & Vogt, 2012).

Qualitative (part A). Open-ended survey questions were coded using thematic analysis (Braun & Clarke, 2006). Braun and Clarke's (2006) six-step framework was used to identify patterns and themes that resulted from participants answers to each question.

Trustworthiness. According to Barbour (2001), a minimum of 20% of answers should be coded by more than one researcher to account for adequate response variations. Thus, although the use of two coders for all survey answers is ideal, for reasons of feasibility, a second researcher coded a third (33%) of the survey, satisfying Barbour's (2001) 20% minimum. A percentage agreement of 90% was obtained between researchers, above MacQueen, McLellan-Lemal, Bartholow, and Milstein's (2008) acceptable level of 85%,

Qualitative (part B). Ethnographic data were analyzed using Spradley's (1980) twelve step developmental research sequence (i.e., steps for conducting participant observations).

Results

Quantitative

Exactly 200 surveys were received. After removing incomplete surveys ($n = 42$) and those completed by individuals not belonging to one of the five affiliates in the

current study (n = 9), a total of 149 completed surveys from participants (mean age: 34.96 ±9.16 years) from five CrossFit affiliates were utilized for data analysis, yielding a response rates between 31-39% based on the number of women registered at each affiliate. According to VanVoorhis and Morgan (2007), adequate power was obtained, based on a minimum number of at least 7 participants in each group (i.e., CrossFit affiliate), with an average of 30 participants per CrossFit affiliate (largest = 46 participants, smallest = 16 participants), indicating a reasonable sample size was achieved. Descriptive statistics are presented in Table 1.

A one-way ANOVA was conducted to evaluate if body satisfaction (MBSRQ-BASS) was different depending on which CrossFit affiliate participants attended. Body satisfaction was not statistically significantly different between CrossFit affiliates, $F(4, 144) = .682$, $p = .605$. Each CrossFit affiliate's MBSRQ-BASS scores (means and standard deviations) can be seen Table 2.

A one-way ANOVA was conducted to evaluate if participants' body image ideals (BIQ) were different depending on which CrossFit affiliate participants attended. Body image ideals did not statistically significantly differ between CrossFit affiliates, $F(4, 144) = .557$, $p = .696$. Differences (although not statistically significant) between CrossFit affiliates' BIQ scores are reported in Table 2.

A one-way ANOVA was conducted to evaluate if self-esteem (RSES) was significantly different depending on which CrossFit affiliate participants attended. Participants' self-esteem did not significantly differ between CrossFit affiliates, $F(4, 144) = 1.278$, $p = .281$. Each CrossFit affiliates' RSES scores (means and standard deviations) are reported Table 2.

Lastly, a one-way ANOVA was conducted to evaluate if participants' eating behaviours (EAT-26) were different based on CrossFit affiliate attended. Using an adjusted alpha of 0.0125, participant's eating behaviours did not statistically differ between CrossFit affiliates, $F(4, 144) = 2.666$, $p = .035$. However, prior to correcting the alpha (i.e., $\alpha = .05$), participants eating behaviours were statistically different between CrossFit affiliates ($\omega^2 = .0003$), with affiliate 5 reporting significantly higher disordered eating scores than affiliate 1 and 4, respectively, based on a Tukey post hoc analysis. Differences between CrossFit affiliates' EAT-26 scores are reported in Table 2. Although no statistically significant differences after correcting for multiple comparisons can be reported, differences prior to alpha corrections are evidence in Table 2 using subscripts.

Qualitative (Part A)

Body image and self-esteem. All body image and self-esteem themes based on participants' answers to each open-ended question, stratified by affiliate, are presented in Table 3. A breakdown of each theme is presented below.

Community. The majority of members from all five CrossFit affiliates expressed that the community atmosphere of their affiliate positively affected their body image and self-esteem. Aspects of this community include members (and coaches) complimenting and encouraging each other (mostly, but not always, performance based, e.g., "your pull-ups look great"), a sense of comradery and friendship, all of which were said to decrease concerns over their body's appearance and provide them increased confidence in themselves. For example, one woman from affiliate 1 described how that "you always feel so good after a workout because of the encouragement from your affiliate," whereas another woman from affiliate 2 stated "walking into my affiliate to a chorus of hellos and

high fives and completing a workout alongside positive people helps you feel better about yourself and boost confidence levels."

Performance over appearance. Many women from all five affiliates emphasized that both the physical and social environments of their affiliates placed greater importance on performance and improving one's abilities than on physical appearance. A woman from affiliate 3 noted that "the fact that there are no mirrors helps people to be less concerned about how they look and more concerned about how their body feels when moving." Additionally, a member from affiliate five described that "I am encouraged to lift heavy weights, which has increased my self-esteem, and that strong is a good look. You don't have to be skinny, strong is a good look also."

Self-comparison. Although many women across all CrossFit affiliates expressed valuing improvements in performance over their appearance, some women from all affiliates, excluding affiliate 3, mentioned engaging in some sort of self-comparison to other women at the affiliate. Although a few women expressed envy towards more skilled or strong women, many more of these comparisons were appearance-based, potentially negatively affecting body image and self-esteem. One woman from affiliate 4 expressed that she tends to compare her body to the younger woman, even though she described these comparisons as "unattainable and unrealistic." Moreover, she went on to say that "Still, I do it and it negatively impacts my self-esteem."

Unconventional ideal body. Although the majority of women from all five affiliates described adopting a performance-based (rather than appearance-based) focus, many still described appearance-related characteristics. Yet, unlike the traditional ideal body typically desired by most women (i.e., thin, lean, and toned), many women

expressed a desire for muscularity. Additionally, others expressed wanting "thick thighs" or to "bulk up." It is important to note that a few women, from all affiliates, still expressed a desire to adhere to the traditional body ideal, but these aspirations were far less prevalent across all affiliates.

Inclusion. A recurrent theme among women at all affiliates was the inclusive environment created within each affiliate. A woman from affiliate 3 explained that "regardless of how in or out of shape a person is, they're just as welcomed and supported as the next, so I feel less self-conscious." In addition, many women also expressed that this inclusion extended to all individuals regardless of age or ability as well, lending to positive contributions to both body image and self-esteem. Yet, a small number of women from affiliates 1, 3, and 4 mentioned that some divisions within their affiliate still existed, based on skill level. All three women mentioned that the more skilled individuals were not as approachable and inclusive to the less-skilled members or that they felt specific areas (such as the weightlifting platforms) were informally reserved for these individuals.

Journey of the body. Another reoccurring theme among all affiliates was the journey of the body. Several women emphasized that the ways in which they viewed their bodies, and the self-esteem they have regarding their bodies, in both appearance and ability, has changed with CrossFit participation. For example, a woman from affiliate 1 expressed that although she entered CrossFit with a desire to be "conventionally attractive," she is now 15 pounds heavier, accepting of this weight gain, and "doesn't really think about" what she weighs and no longer compared herself to other people,

whereas a woman from affiliate 4 expressed having a more relaxed and positive relationship with her body since switching from body building to CrossFit.

Sense of accomplishment. Common among all affiliates was the notion of a sense of accomplishment. Aspects of this sense of accomplishment included feeling good about mastering a new skill, tracking one's progress and seeing improvements, and coaches placing an emphasis on celebrating success not failures. For example, one woman from affiliate 5 explained that "if you think you can't, you do the workout with everyone and prove to yourself that you can while people encourage you" and expressed that such feelings increased her self-esteem and body confidence.

Nonthreatening physical space. Women from all five affiliates described the physical setup of their affiliate to positively influence their body image and self-esteem. All five affiliates were described as open and inviting, with minimal equipment. Moreover, many women cited the lack of mirrors as beneficial to their body satisfaction, whereas other women appreciated that the "rigs" were situated towards the of the room as it was less intimidating. Women also felt more self-confident picking up free weights and dumbbells as there is a variety of them (very light to very heavy). Lastly, many women also expressed the lack of "typical gym machines" as creating a more welcoming environment.

No influence. Although many women expressed ways in which the social and physical environments within their CrossFit affiliates influenced their body image and/or self-esteem, a smaller number of women suggested that time spent at their affiliate had no influence. For example, one woman from affiliate 4 felt that self-esteem did not come from the environment but "comes from within and is intrinsic."

Eating behaviours. All eating behaviour related themes, derived from participants' answers to each open-ended question, and stratified by affiliate, are presented in Table 4. A description of each theme is presented below.

Sharing ideas. A common eating behaviour theme, across all affiliates, was the sharing of ideas. Many women also noted that recipes and "meal prep" ideas are often shared before and after class or on each affiliate's respective closed social media group. One woman from affiliate 1 also explained that "hearing what works and what doesn't" from other members has been both helpful and inspirational.

Food as fuel. Fueling the body for performance was a theme mentioned by women at every affiliate. The importance of eating to feel better during workouts, recover faster, replenish the body after a hard workout was common. Several women also expressed increasing their overall food consumption and/or increasing their protein intakes to support their bodies' needs.

Moderation. Excluding affiliate 3, many women revealed that their CrossFit affiliate had contributed to a more balanced approach to food. For example, a woman from affiliate 4 expressed that "We eat healthy, we eat donuts." Additionally, a woman from affiliate 2 expressed that she enjoys indulging in pizza or a slice of cake occasionally but in moderation.

Restriction/dieting. Although many healthier eating behaviours were mentioned, several individuals reported engaging in restrictive eating or dieting. Whereas some said they avoided added sugar, processed foods, dairy, and/or wheat, others expressed limiting their carbohydrate intake or adopting a specific diet such as a paleo or ketogenic diet. Lastly, others reported engaging in macronutrient counting and/or calorie tracking.

Exercise to eat. Another common theme was the notion of allowing themselves to eat whatever they want because they exercise. A woman from affiliate 3 explained that "I like to eat what I want, when I want. And that has a lot to do with why I like CrossFit, it lets me eat somewhat unhealthy ways and not gain weight or feel bad about my eating habits."

Journey of eating habits. Several women from affiliates 1 and 2 reported that their eating behaviours had gone through several different phases since joining CrossFit. Many expressed initially trying to be very strict with their eating behaviours (e.g., tracking macronutrients and calories) and then switching to more intuitive eating and embracing everything in moderation. The notion of seeing food as fuel, but also taking time to enjoy food was also mentioned.

No influence. Similar to the body image and self-esteem questions, a smaller number of women from each affiliate expressed that CrossFit environment had no influence on their eating behaviours. Although one woman from affiliate 3 said that she was "already a very strict eater," another woman from affiliate 5 said "Not really. I do that outside of the gym and with my family."

Qualitative (Part B)

Using Spradley's (1980), twelve-step DRS, the following themes were noted throughout all five CrossFit affiliates. A description of each them is presented below.

Community. Evident among all affiliates was a sense of community. Coaches from each affiliate knew every member by name. Members interacted with each other before, during, and after working out. Words of encouragement were shared between members and from coaches, with the last person to finish the workout receiving the

loudest cheers. Moreover, every affiliate sold some sort of affiliate specific apparel, which was proudly worn by several men and women during each class. In addition, several mentions of "Where is (name)?" or "I wonder why (name) isn't here today" were expressed by individuals at affiliates 1 and 5. This provides further evidence of the sense of community created within these affiliates as members were missed by other members should they not be able to attend their regular class time. In addition, several affiliate message boards had scheduled gatherings both at (e.g., a partner competition) and outside the affiliate (e.g., a group laser tag night).

Inclusion. At every affiliate, individuals attending classes varied not only in gender (all classes were mixed), but in age, ability, and body size as well. For example, in one class observed at affiliate 3, the class had an equal number of both men and women. Moreover, there was a woman who appeared to be in her early 20s, whereas other women appeared to be middle aged, all with varying CrossFit skill levels. Similarly, although some men appeared to be in their late 20s or early 30s, one gentleman appeared to be quite older. In addition, although some individuals were quite muscular and lean, others were not. Thus, despite visible differences, all members took part in class together and engaged with each other. In regards to differing abilities, coaches from every affiliate provided several scaling options so that all members could work within their abilities but still maintain the same stimulus. For example, although some individuals at affiliate 4 performed deficit push-ups, others performed regular push-ups, push-ups on a box/bar, or push up negatives, based on their abilities. Yet, it is important to mention that within each affiliate (especially affiliates 1, 3, and 4), several cliques of individuals were observed

chatting before and after class or even during class, with individuals of similar age and/or abilities often partnering up to share a squat rack or a barbell.

Celebration of accomplishments. Similar among all affiliates was the celebration of accomplishments. Although affiliate 1 has a "personal record bell" for members to ring any time they hit a new personal record or learn a new movement, affiliate 3 has a whiteboard where monthly PRs are recorded, and affiliate 2 has a goal board (i.e., a whiteboard with the title "2019 Goals") where members record their yearly goals and cross them off as they accomplish them. In addition, coaches at every affiliate congratulate each member with a high five or "good job" after every class. Furthermore, accomplishments are also celebrated between members. For example, at affiliate 5, one woman was observed attempting two kipping (i.e., using the bodies momentum) pull ups in a row. After successfully doing so, she looked at another woman member who immediately congratulated her and told her how much she had improved since the last time she attempted them.

Performance over appearance. Throughout visits to all five affiliates, no appearance related comments from a coach to a member or between members were noted. Conversely, coaches often provided praise to members for their performance, as evident by the above theme. In addition, women seemed to be less concerned about their appearance. Many women entered the affiliate having not done their hair or applied make up. Moreover, women of all shapes and sizes adorned spandex pants or shorts and tight-fitting athletics shirts or sports bras. In addition, women did not appear to be afraid to sweat, with many seeming indifferent about the sweat marks on their shirts. Although, one woman from affiliate 5 was concerned about how she looked in a picture taken by the

coach while working out, and a few women from affiliate 1 and 4 were observed to be constantly checking to ensure their shirt was not riding up.

Form over load. One of the most common themes throughout all affiliates was the emphasis on form and function over moving heavy loads. Large portions of each class at every affiliate were spent going over movement techniques. Members often first performed the movements with a PVC pipe, before moving on to an empty barbell. Only after several demonstrations and technical cues by the coaches, were members allowed to begin adding weight. In addition, coaches were always walking around and providing tips and advice to members throughout the workout. Moreover, as was observed in affiliates 1 and 2, coaches encouraged members to refrain from adding more weight or suggested taking weight off should the coach not feel their technique was maintained.

Unconventional ideal body. Although members typically seemed more concerned about their performance than their appearance, a large number of women exhibited defined muscularity. In addition, unlike the traditional ideal body (e.g., lean), many women, including every woman coach, displayed thick thighs, large biceps, and defined backs. Moreover, the primary researcher overheard many women discussing wanting to be more muscular or feeling as though it was okay to be bulky. A woman from affiliate 1 even came up to the researcher and noted that CrossFit got her away from "that barbie doll mentality" and felt empowered to defy traditional beauty standards.

Nutrition. Aspects of nutrition were present among all affiliates. Several men and women at all affiliates were observed to be consuming a variety of supplements, including energy and/or protein shakes. In addition, many conversations surrounding food occurred before and after workouts. For example, one woman from affiliate 5

described to another member how she ate a panzerotti the night before for the first time in over a year and was "paying for it" today. Conversely, a group of women members at affiliate 1 were discussing recent recipes they had seen on social media. In addition, each affiliate had protein powders and other supplements (e.g., protein bars, greens) on display for members to purchase. Affiliate 3 even had a nutrition bar where members could purchase smoothies, cold brew coffee, with the associated macronutrients and calories displayed on the menu.

Physical space. Although the layout of each affiliate differed slightly, they all had several aspects in common. All consisted of large, open spaces, with minimal exercise machines. Instead, exercise equipment (such as barbells, rowers, bikes, and dumbbells) where situated on the peripheries of the main open space. In addition, besides one small mirror in affiliate 4, no mirrors were present at any of the affiliates. All affiliates had rigs (i.e., large structure consisting of squat racks and pull up bars of varying heights) situated at the back or side of their rooms, as well as informal seating (e.g., affiliates or mats to sit on) areas near the entrance of the affiliate. The primary researcher also noticed the open setup of all five affiliates seemed to inherently foster communication and interaction between members, as equipment was constantly moved around and shared among participants. Moreover, each affiliate had either a white board or screen with the day's workout displayed on it. Lastly, unique to affiliate 1 and 4 was the presence of "affiliate rules" displayed on a wall. For example, common to both affiliates were rules such "checking" one's ego at the door, introducing yourself to new members, as well as rules about putting equipment away, showing up on time, and being respectful towards other members.

Discussion

Using a convergent parallel design, the aim of this study was to investigate whether women's body image, self-esteem, and eating behaviours differed significantly based on the CrossFit affiliate attended. Quantitative data were employed to statistically determine the body image, self-esteem, and eating behaviours of women members from each of the five affiliates. Conversely, qualitative data were used to compliment the quantitative data to obtain women members' opinions regarding the influences their CrossFit affiliate may have had on their body image, self-esteem, and/or eating behaviours (Part A), as well as investigate the physical and social environments create within each affiliate by means of ethnography (Part B). To the authors' knowledge, this is the first study to investigate the influence of different CrossFit affiliates on its women members' psychosocial health. In addition, it is also one of the first studies to investigate such health outcomes using a mixed methods approach.

The first variable examined was body image. Quantitative results revealed no significant differences between women's body satisfaction scores from each of the five affiliates. The current studies qualitative data also provides evidence of similarities between all five affiliates, as six out of the eight body image related themes were discovered in all five affiliates. However, minor differences existed between affiliates in regards to self-comparison, with no mention of it by women from affiliate 3. Participant observations also revealed several similar themes, with community, inclusion, celebrating accomplishments, valuing performance over appearance, an unconventional ideal body, and open physical layout all being noted. Such findings are similar to previous studies by

Podmore and Ogle, (2018), Knapp (2015), and Edmonds (2019) who reported observing themes such as community, a deemphasis on appearance, and a sense of accomplishment.

Moreover, in comparison to adult women body satisfaction norms determined by Cash (2000, 2018), women from all five affiliates scored better, on average, on both the MBSRQ-BASS and the BIQ, respectively. Yet, as was evident in the current studies qualitative findings, as well as a previous study by Podmore and Ogle (2018), not every woman at every affiliate experienced a positive impact on their body image as a result of attending their CrossFit affiliate. Although a small number of women said that attending their affiliate had no influence on their body image, a few women from every affiliate also reported negative ways in which they thought attending their affiliate had impacted their body image.

In addition to body image, this study also sought to investigate the self-esteem of women at each affiliate. Results from quantitative analysis revealed no differences between the self-esteem of women at any of the affiliates. Supporting evidence can be provided from the study's qualitative results. Women from all five affiliates generally perceived their CrossFit affiliates to influence their self-esteem in similar ways. The majority of women at each affiliate perceived that their affiliate provided a supportive and inclusive community that valued performance over appearance, all of which was perceived to positively impact self-esteem. In addition, several women from each affiliate highlighted feeling a sense of accomplishment every time they entered their affiliate. Again, similar themes were discovered based on participant observation and ethnographic inquiry, with a lack of mirrors, the presence of "personal record bells" or goal boards, and encouragement from coaches and between members being noted. Participant

observations, field notes, and members answers also revealed that the large open spaces, variety of simple equipment (with a variety of weights), and organization of the space (e.g., rig at the back), created an environment that was both welcoming, comfortable and self-esteem boosting, and inherently forced interaction and communication among members. These results are congruent with previous research by Crockett and Butryn (2018), who conducted a spatial ethnography of two CrossFit affiliates and observed congruence between spatial layouts, with open, undivided spaces being noted to foster communication.

Yet, similar to body image, although mostly positive influences on self-esteem were reported, a small number of women at each affiliate reported negative influences on self-esteem as a result of attending their affiliate. Of the women who reported no influence, many reported that self-esteem could not be developed externally (by an exercise environment) but was intrinsic in nature, whereas others reported that other aspects of their life had a greater influence on their self-esteem, as a substantial portion of their day was spent outside the affiliate. Such results may provide insight as to potential reasons previous quantitative studies reported no associations between CrossFit participation and changes in self-esteem (Eather, Morgan, & Lubans, 2016; Köteles et al., 2016). Of those that reported a negative influence, some reported feeling discouraged by how much better other women were in comparison to themselves, whereas others reported feeling more self-conscious about their bodies and their abilities while working out in a group setting as they felt as though they were being watched and judged by other members. Thus, although women's self-esteem levels were not significantly different

between affiliates, qualitative findings support previous research by Podmore and Ogle (2018), who observed varying lived experiences between members at the same affiliate.

Lastly, affiliate's physical and social environments influence on women's eating behaviours were examined. After performing a Bonferroni adjustment to correct for multiple comparisons, no quantitative differences in eating behaviours were reported between affiliates (Bonferonni, 1935). All affiliates (mean values) scored below 20 on the EAT-26 (threshold for disordered eating behaviours), suggesting a low level of concern regarding dieting, body weight, or problematic eating behaviours. Conversely, participant observation and field observations at all five affiliates somewhat contradicted quantitative results. Various physical displays of nutritional promotion were present in all affiliates, with some promoting healthier eating behaviours than others. Excluding affiliate 2, all affiliates had displays of supplements (e.g., protein powders, protein bars, greens, creatine) available for purchase. Although initial evidence exists that sports supplements such as creatine, caffeine (e.g., sport gels, energy drinks, preworkout), and protein (e.g., whey) can assist with exercise performance, the Dietitians of Canada (2014) reports that the consumption of a well-balanced diet, good training, and rest is likely to provide far more support for performance than any supplement. Additionally, participants at all five affiliates engaged in informal discussions surrounding food, recipes, or diets, or eating behaviours (e.g., moderation, fueling the body, restricting specific food groups, and counting calories) being observed at all five affiliates.

Furthermore, despite affiliate 1 having the second lowest mean score on the EAT-26, observations indicated a much higher presence of nutritional recommendations in affiliate 1 compared to all other affiliates. Moreover, evidence of discrepancies within

nutritional recommendations at affiliate 1 was also noted. For example, part of affiliate 1's "rules", displayed in large writing on one of the main walls within the workout space, included "eat well." Yet, underneath, in smaller writing, it was specified that individuals should limit their starch consumption and avoid sugar altogether, thus encouraging restriction. Conversely, in the warm up area, another poster stressed the importance of eating well, drinking lots of water, prioritizing sleep, but also consuming treats when desired but in moderation, thus encouraging a more intuitive, healthy approach to eating. Similarly, unlike the alpha-adjusted quantitative results, survey answers also revealed a large discrepancy between affiliates regarding eating behaviours. Although several women at all affiliates mentioned engaging in restrictive eating, a much larger portion of women at affiliate 5 reported the adoption restrictive diets, such as the Renaissance Periodization diet, which involves not only counting calories and macronutrients, but also limiting and/or avoiding the consumption of several food. Conversely, unlike every other affiliate, the theme of exercising to eat (i.e., feeling the need to exercise to counteract what is being eaten), an unhealthy eating behaviour, was not reported by any women at affiliate 1. In addition, although women from affiliates 1, 3, and 5 mentioned that their affiliate provided nutritional guidance (e.g., macronutrient counting) or had nutrition challenges (e.g., a ketogenic diet challenge), both of which contained unhealthy eating behaviour recommendations, women from affiliates 2 and 4 mentioned no such support or challenges. Thus, although no significant quantitative differences were reported using an adjusted alpha, qualitative variance in eating behaviours was evident.

Moreover, based on both open-ended survey answers and participant observations, differences between members at each respective affiliate were apparent.

Despite some women adopting healthier eating behaviours (such as moderation and intuitive eating) as a result of the environment at their CrossFit affiliate, others reported becoming more restrictive. Similarly, participant observations revealed that although some women chose to drink water during class, several others consumed supplements (e.g., protein shakes) while exercising. Based on these observations, it appears as though a greater number of women attending CrossFit affiliates are consuming supplements than women exercising at typical fitness centres, as Sanchez Oliver, Miranda León, and Guerra Hernández (2011) reported that less than five percent of women from a traditional fitness centre reported consuming any kind of protein supplement. This could potentially be explained by the current study's qualitative findings, as several women at all five affiliates reported a desire to become stronger, with a smaller number of women expressing a desire to become more muscular and even bulkier.

In addition, although a lack of quantitative studies examining the eating behaviours of women engaging in CrossFit exist, a few qualitative studies have recently surfaced (Edmonds, 2019; Podmore & Ogle, 2018; Simpson et al., 2017). The results of such studies suggest that a variety of eating behaviours exist among women who participate in CrossFit (Edmonds, 2019; Podmore & Ogle, 2018; Simpson et al., 2017), supporting the qualitative findings of the current study. For example, one study reported that some participants expressed engaging in healthier eating behaviours as a result of joining CrossFit, whereas other individuals at the same affiliate have adopted a specific diet, such as a paleo diet (Simpson et al., 2017).

Although each affiliate in the current study is individually owned and operated, the results of this study suggest an abundance of similarities between all five affiliates.

As such, with so many similarities observed (in both the physical and social construction of each affiliate's environment), it is not surprising that scores on body image, self-esteem, and eating behaviours were statistically indistinguishable. A potential explanation for this could be that although each affiliate is individually owned and operated, several standards are in place in an attempt to maintain consistency across affiliates (e.g., CrossFit affiliates are licensed through CrossFit Inc., and individuals must obtain CrossFit specific certifications to be able to coach; CrossFit, 2019). Thus, perhaps while attending these training courses, qualities such as community, form over function, among others, are instilled in each coach, which subsequently trickle down to members at each affiliate. Therefore, although small differences between affiliates could be accounted for by each owner's unique tendencies in how they choose to run their affiliate, a greater number of similarities exist as all are part of the larger CrossFit community of who have all undergone similar training. Additionally, similarities among participants may also be attributed, in part, to the fact that all five affiliates were situated within the same geographic region, even though they are all independently owned and operated (i.e., owners of all affiliates apply to CrossFit Inc. for licensing but are allowed to operate their affiliate as they see fit).

Limitations and Future Research

Even though this is the first study to investigate whether or not differences exist between how various CrossFit affiliates potentially influence their women members' body image, self-esteem, and eating behaviour, it is not without limitations. The five CrossFit affiliates were chosen for reasons of feasibility. All five affiliates were located within two middle class cities, less than 100 kilometers apart, with populations of

approximately 100,000 and 230,000 respectively. As such, future research investigating differences between CrossFit affiliates located in different communities are needed. In addition, although the use of semi-structured interviews would have been preferred, time constraints did not permit such interviews to take place. Unfortunately, some survey answers were not entirely clear and would have benefitted from clarification, which could have been obtained using semi-structured interviews, a common ethnographic technique. Additionally, to maintain anonymity, survey answers (both open and close-ended) were kept anonymous. As such, there was no way to connect participant observations with survey answers. Thus, future studies would benefit from first conducting participant observations and collecting field notes, and then conducting interviews, allowing better quantitative and qualitative data matching.

Conclusion

Despite the above-mentioned limitations, the current study is the first of its kind to investigate the ways in which various CrossFit affiliates are associated with women's body image, self-esteem, and eating behaviours. Moreover, the study is also unique in its use of a mixed-method approach as it provides a better understanding of overt and underlying differences and similarities between affiliates. The results of this study revealed that statistically significant differences in women's body image, self-esteem, and eating behaviours, between CrossFit affiliates did not exist. Qualitative results provided support for quantitative findings to some extent, while also highlighting potential contradictory findings between and within affiliates that would not have been possible using only a quantitative approach. Thus, this study provides initial evidence that although CrossFit affiliates are all unique, many similarities still exist between them,

while also highlighting ways in which the CrossFit exercise environment may mostly positive, but also negatively associated with women's body image, self-esteem, and/or eating behaviours.

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Table 1. Number of Participants, Response Rates, and Age of Participants Stratified by Affiliate

	Participants *N* (%total)	Response rate* %	Age Mean (*SD*)
Affiliate 1	46 (30.9%)	31%	35.87 (9.95)
Affiliate 2	37 (24.8%)	39%	36.32 (8.86)
Affiliate 3	22 (14.8%)	35%	34.73 (10.33)
Affiliate 4	28 (18.8%)	32%	31.93 (8.34)
Affiliate 5	16 (10.8%)	32%	34.69 (6.64)
Total	149 (100%)	33.80%	34.95 (9.16)

*based on the total number of women members at each affiliate

Table 2. Body Image, Self-Esteem, and Eating Behaviours Scores Stratified by Affiliate

	MBSRQ-BASS[1] Mean (*SD*)	BIQ[2] Mean (*SD*)	RSES[3] Mean (*SD*)	EAT-26[4] Mean (*SD*)
Affiliate 1	3.58 (0.67)	1.24 (1.33)	31.76 (5.25)	8.30 (6.74)[a]
Affiliate 2	3.42 (0.63)	1.65 (1.52)	30.05 (4.70)	10.08 (8.86)
Affiliate 3	3.66 (0.53)	1.65 (1.34)	32.36 (5.77)	10.55 (8.57)
Affiliate 4	3.54 (0.51)	1.49 (1.46)	32.35 (5.27)	8.18 (6.71)[b]
Affiliate 5	3.47 (0.47)	1.34 (1.60)	32.75 (4.68)	15.13 (8.50)[ab]
Total	3.53 (0.59)	1.46 (1.43)	31.62 (5.16)	9.73 (7.95)

*Shared subscripts represent statistically significant differences prior to adjusting for multiple comparisons: $a = .024$, $b = .040$

[1]Multidimensional Body-Self Relations Questionnaire: Body Areas Satisfaction Scale

[2]Body Image Ideals Questionnaire

[3]Rosenberg Self-Esteem Scale

[4]Eating Attitudes Test

Table 3. Body Image and Self-Esteem Themes

Themes	Affiliate 1 (*n* = 46)	Affiliate 2 (*n* = 37)	Affiliate 3 (*n* = 22)	Affiliate 4 (*n* = 38)	Affiliate 5 (*n* = 16)
Community	Yes	Yes	Yes	Yes	Yes
Performance over appearance	Yes	Yes	Yes	Yes	Yes
Self-comparison	Yes	Yes	▪	Yes	Yes
Unconventional ideal body	Yes	Yes	Yes	Yes	Yes
Inclusion	Yes	Yes	Yes	Yes	Yes
Journey of the body	Yes	Yes	▪	Yes	Yes
Sense of accomplishment	Yes	Yes	Yes	Yes	Yes
Non-threatening physical space	Yes	Yes	Yes	Yes	Yes
No influence	Yes	Yes	Yes	Yes	Yes

Table 4. Eating Behaviour Themes

Themes	Affiliate 1 (n = 46)	Affiliate 2 (n = 37)	Affiliate 3 (n = 22)	Affiliate 4 (n = 28)	Affiliate 5 (n = 16)
Sharing ideas	Yes	Yes	Yes	Yes	Yes
Food as fuel	Yes	Yes	Yes	Yes	Yes
Moderation	Yes	Yes	▪	Yes	Yes
Restriction/dieting	Yes	Yes	Yes	Yes	Yes
Exercise to eat	▪	Yes	Yes	Yes	Yes
Journey of eating habits	Yes	Yes	▪	▪	▪
Nutrition Programs	Yes	▪	Yes	▪	Yes
No influence	Yes	Yes	Yes	Yes	Yes

REVIEW OF LITERATURE

Socio-Ecological Model

The socio-ecological model, originally introduced in the 1970s by Bronfenbrenner (1974), is a theoretical framework used to explain the dynamic interactions that occur between humans and the environment in order to better understand human development. Although Bronfenbrenner continued to modify the model until his death in 2005, he suggests two propositions to define the properties of the model (Bronfenbrenner, 1994). First, as humans get older and continue to develop, the interactions that occur between them and their environment becoming increasingly more complex and reciprocal (Bronfenbrenner, 1994). Bronfenbrenner (1994) argues that these interactions must occur on a seemingly regular basis and over extended time periods in order to have an effect on either the human or the environment. These types of interactions (i.e., between humans and objects or persons in their environment) are referred to as 'proximal processes.' Examples of such processes can include the interaction between two family members (i.e., interaction by one human with their social environment) or the interaction between someone and their workplace (i.e., interaction with their physical environment). The second defining proposition of the socio-ecological model is that the type, strength, content, and direction of these proximal processes that effect human development vary based on the characteristics of the human, as well as the characteristics of the environment (Bronfenbrenner, 1994). For example, the relationship between a mother and a child might be affected by the individual characteristics of both the mother and the child (e.g., health of the child), as well as the environment in which they live (e.g., their income level).

Application. Although the socio-ecological model was originally used to explain interactions between humans and their environment (Bronfenbrenner, 1994), it is now being used across multiple disciplines in order to improve the relationships between humans and environments, to increase human development in a given environment, as well as to help improve the environments themselves to better develop the humans that exist within them. Furthermore, the use of the socio-ecological model is not limited to a specific field of study but is applicable across almost all fields from government politics (Simplican, Leader, Kosciulek, & Leahy, 2015) to economics (Kotzee & Reyers, 2016), and has a substantial application to the fields of public health (Glanz & Bishop, 2010; Smith et al., 2005) and personal health (Taylor & Distilberg, 2016; Tehrani, Majlessi, Shojaeizadeh, Sadeghi, & Kabootarkhani, 2016). The socio-ecological model is so often utilized in the fields of both public health (e.g., public health policies, public health interventions and initiatives) and personal health (e.g., an individual or small group of individuals' levels of physical activity) due to the complex nature of health problems and the numerous potential factors that influence both public and personal health outcomes (Robinson, 2008). As such, multi-level layers of the interactions between the human(s) and the environment are needed to sufficiently understand both public and personal health problems.

Levels of influence. Many different variations of the socio-ecological model exist, with researchers often tailoring the model to their specific areas of research (Center for Disease Control and Prevention [CDC], 2018; Gubbels, Van Kann, De Vries, Thijs, & Kremers, 2014). Originally, Bronfenbrenner (2005) created the model to have five levels (i.e., microsystem, mesosystem, ecosystem, macrosystem, and chronosystem), but over

time, others have simplified (i.e., combined levels together) or expanded upon (i.e., subdivided subsequent levels further) the existing levels or even renamed certain levels in order to tailor the original model so it more accurately explain the interactions that occur in specific fields of study (CDC, 2018; Gubbels et al.,, 2014; Office of Disease Prevention and Health Promotion, 2015). For example, the Centers for Disease Control and Prevention (2018) utilizes a simplified, four level (i.e., individual, relationship, community, and societal) variation of the model with regards to their violence prevention strategies and interventions. Sallis, Owen, and Fisher (2015) argue that tailoring the socio-ecological model to the specific research is needed, especially when studying health behaviours, as the environmental influences that affect health behaviours can range quite drastically. As such, the current manuscript will utilize the following five-level version of the model as it is easy to understand and has been thoroughly referenced in previous similar literature (McLeroy, Bibeau, Steckler, & Glanz, 1988; Robinson, 2008; Townsend & Foster, 2013; United Children's Fund, 2014; United States Department of Health and Human Services, 2005).

Intrapersonal. Intrapersonal factors include individual characteristics that influence behaviour including, but not limited to, knowledge, attitudes, beliefs, values, goals, expectations, gender, race, age, religious identity, sexual orientation, economic status, financial resources, and/or developmental history (Robinson, 2008; United Children's Fund, 2014). For example, an individual knowledge about the benefits of physical activity may have an effect on whether or not they choose to participate in such physical activity.

Interpersonal. Interpersonal factors are social networks and support systems that influence the individual's behaviour. This includes, but is not limited to, family, friends, peers, and/or co-workers (United Children's Fund, 2014). The social networks are thought to provide social identity, support, and role definition (Robinson, 2008). For example, if an individual's close friends all join a soccer team, the individual may be more inclined to do so as well.

Organizational. Organizational-level factors include organizations and social institutions with rules, regulations, policies, and informal structures, that can constrain or promote certain behaviours (Robinson, 2008; United Children's Fund, 2014). For example, an individual's physical place of employment may constrain the behaviour of smoking by not allowing employees to engage in such behaviour on workplace property.

Community. Community-level factors include social networks and norms, or standards, which exist as formal or informal among individuals, groups, and organizations (Robinson, 2008; United Children's Fund, 2014). For example, a common social norm that exists in today's society is the notion that a salad (regardless of its actual contents or where it is from) is considered 'healthy', even though this is not necessarily always the case.

Public policy. Public policy-level variables include local, provincial, national, and global laws and policies that regulate or support the actions and behaviours of all individuals. Laws and policies influence what, how, when, and where individuals interact with each other and the environment (Robinson, 2008; United Children's Fund, 2014). For example, human resources policies regarding work hours (i.e., limiting the number of

hours an individual may work in a week) are in place to protect the health of all individuals (Centers for Disease Control and Prevention, 2015).

Interaction between levels. A key construct of the socio-ecological model is the idea that each level of influence is not static (Bronfenbrenner, 2005). However, each level may influence an individual on its own, each level also overlaps with all the other levels to influence individual behaviour and development simultaneously (Bronfenbrenner, 2005). As such, although researchers maybe successful in investigating the effects of a single level of the model on an individual's development or behaviour, it is important to keep in mind that all the other levels within the model are also impacting the individual concurrently. Yet, it is nearly impossible for researchers to develop studies that account for all the model's levels, and thus must limit the scope of their research to one or two levels. Studies, and especially interventions, that incorporate more than one level are more likely to be successful; however, the presence of research examining the impact of one level on an individual's behaviour and development is still both useful and needed (Bronfenbrenner, 2005).

Body Image

Definition. First defined by Schilder in 1935, body image is "the picture of our own body which we form in our mind" (Schilder, 2013, p11)[1]. Conversely, Cash, Ancis, and Strachan (1997) suggested that body image is a "multidimensional self-attitude toward one's body, particularly its size, shape, and aesthetics" (p. 433) and that body image is not a static concept but one that changes throughout a lifetime as a result of

[1]Schilder's book was first published in 1935 but subsequent editions have been published on his behalf post-mortem, including an edition published in 2013.

"sensory and behavioral experience, physical appearance, somatic changes, societal norms, and the reactions of other people" (p. 68).

Moreover, Schilder (2013) suggested that humans are not 'perceptive apparatuses' in the sense that humans do not simply look in the mirror and build a perception of the image in front on them but that they almost always attach emotional attitudes towards the image (of their body) that they see. As such, body image is a thought to be a complex construct encompassing many aspects of the body including perceptual, social (Schilder, 2013), cognitive (Schilder, 2013), behavioural (Cash & Pruzinsky, 2002), and affective aspects (Cash & Pruzinsky, 2002).

Women: The ideal body. Although body image is a complex construct, Western society has put considerable pressure on women to achieve a certain weight and shape that is deemed desirable (Turner, 1997). Where characteristics such as eye colour, and foot size are generally accepted as characteristics that cannot be changed, weight and shape are predominantly viewed as controllable variables (Tiggemann, 2015; Voelker, Reel, & Greenleaf, 2015). Thus, Western society deems it socially acceptable to hold individuals accountable for these variables.

Even though some cultures and nations, for example South Africans, are reported to attach less importance to body weight and shape and to view larger bodies as potentially more attractive (Ali, Rizzo, & Heiland, 2013; Buss et al., 1990), Western culture emphasizes the desire for women to be thin (Bozsik, Whisenhunt, Hudson, Bennett, & Lundgren, 2018), appear youthful (Gendron & Lydecker, 2016; Hurd, 2000), and even more recently, encourages a 'thigh gap' (Lupton, 2017). In addition to being thin, women are now also pressured to appear muscular and toned (Bozsik et al., 2018),

thus creating an even more unrealistic body ideal for women to try to attain. In addition, if trying to be both muscular and thin, and also remain youthful was not enough, women are also expected to display a degree of sex appeal, without appearing too suggestive (Carrotte, Prichard & Lim, 2017; Singh & Young, 1995). In order to achieve this, idealized women are expected to have both a thin and toned midsection, as well as lean but muscular arms and legs, but have larger breasts and buttocks (Carrotte et al., 2017). As such, the plethora of contradictory expectations makes it almost impossible for any women to achieve the ideal body, thus causing women to have increased body image dissatisfaction (Cohen & Blaszczynski, 2015; Heider, Spruyt, & De Houwer, 2015).

Furthermore, women with poor body image/low body satisfaction have been reported to suffer from various negative health outcomes including disordered eating (Marshal, Lengyel, & Utioh, 2012; Ricciardelli, Tate, & Williams, 1997; Stice & Shaw, 2002), weight preoccupation (Marshal et al., 2012), depression (Jackson et al., 2014), social withdrawal (Marshal et al., 2012), decreased self-esteem (Marshal et al., 2012), and decreased sexual satisfaction (Pujols, Meston, & Seal, 2009). In regards to eating patterns, body dissatisfaction has been associated with bulimic behaviour, food restriction, and binging behaviour (Marshal et al., 2012; Ricciardelli et al., 1997; Stice & Shaw, 2002). Moreover, women who perceived themselves as unattractive or who had low body satisfaction were reported to be at higher risk of depressive symptoms (Jackson et al., 2014). Lastly, Pujols et al. (2009) suggest that there is a positive relationship between poor body image and sexual satisfaction, as well sexual functioning.

Social comparison theory. According to Festinger's (1954) social comparison theory, individuals are driven to self-evaluate themselves against others in order to define

the self. In order to determine where an individual stands', be it in their opinions, their potential, or even in their physical appearance, they often measure themselves in relation to those around them (Suls & Wheeler, 2012). In addition, Festinger (1954) also suggested that individuals are also more likely to create more self-pressure towards uniformity with a group of individuals if they deem this group to be more important. Yet, it is also proposed that the impact that others may have on a given individual is mediated by how close those individuals are (Festinger, 1954). As such, the impact of, for example, the physical appearance of family, friends, and acquaintances, may be greater on the individual than the desire to achieve a similar physical appearance to that of a given celebrity.

Downward and upward social comparisons. Although Festinger's (1954) social comparison theory provides a great basis for how and why an individual might compare their body to that of others, Wills (1981) introduced the concept of upward and downward social comparisons. As such, regardless of how close to you these other individuals are, different types of comparisons can be made. The first social comparison that can be made is a downward social comparison. This occurs when an individual compares themselves to another individual who they believe to be less than them on a given characteristic (Wills, 1981). This may result in the individual feeling better about themselves on that given characteristic (Wills, 1981). For example, if an individual sees someone who they believe to have a less ideal body (in physical appearance) than them, this may act as an ego boost as the individual will feel better about their own body being closer to the ideal body than the other individual. The other, more destructive, type of social comparison that exists is an upward social comparison. This occurs when an

individual compares themselves to another individual who they believe is better than them on that given characteristic (Collins, 1996). This may result in the individual to have negative feelings about themselves (Collins, 1996). For example, if an individual has a close friend that they consider to be more attractive to them (in physical appearance), they may feel discouraged about their body as they feel their body is farther from the ideal body than that of their friend.

Social comparison theory and body image. Seeing as though the thin, but muscular, body is constantly being promoted by Western society (Turner, 1997), it is not surprising that individuals may begin to internalize this ideal body and begin make unrealistic upward social comparisons to it (Rodgers, McLean, & Paxton, 2015). As such, if an individual does begin to internalize the ideal body and analyze how close/far they are to that ideal body in comparison to others, negative consequences, such as decreased self-esteem (Rodgers et al., 2015) and changes to eating behaviours (Dakanalis et al., 2015) may result.

Commonly researched influences on body image.

Family. With the socio-ecological model (Bronfenbrenner, 1974) and the social comparison theory (Festinger, 1954) in mind, it is not surprising that past research suggests that family members, specifically parents, may have an impact on an individual's body image (McCabe & Ricciardelli, 2005; Tatangelo, McCabe, Mellor, & Mealey, 2016). Based on the socio-ecological model, parents are part of the 'interpersonal' (i.e., second layer of the model) level of the model, which means that they have substantial impact on their child's body image (Bronfenbrenner, 1974). Moreover, the social comparison theory stresses that individuals often want to compare themselves

with those they deem important, and few bonds are stronger than that between a child and their parent(s) (Festinger, 1954). For example, a parent may impact their child's body image through verbal messages (e.g., negative comments about their child's weight may lead the child to have low body satisfaction; Webb et al., 2017) or even through their own appearance related beliefs and behaviours (e.g., if a mother is constantly obsessing over and talking negatively about her own weight, her child may start to mimic this; Webb et al., 2017).

Friends. Similar to the influence a family member may have on an individual's body image, friends also exist within the interpersonal level of the socio-ecological model (Bronfenbrenner, 1974) and are thought to be impactful persons in an individual's life (Festinger, 1954). As such, it is not surprising that past researchers such as Dohnt and Tiggemann's (2006), reported that a girl's perceptions of peers' body image dissatisfaction had a significant influence on her own level of body dissatisfaction. Moreover, upward comparisons to friends' bodies has also reported to increase body dissatisfaction (Carey, Donaghue, & Broderick, 2014).

Media. Although other factors such as the influence of parents (Tatangelo et al., 2016) and friends (Dohnt & Tiggemann, 2006) may impact the way an individual looks at and feels about their body, exposure to mainstream media has been reported to reinforce the ideal body (Dakanalis et al., 2015, Rogers et al., 2015). From the time a young girl begins watching television or seeing the cover of magazines in grocery stores, she is constantly being exposed to images of celebrities with these unrealistic bodies (Dakanalis et al., 2015). Not surprisingly, constant exposure to these types of images overtime may lead young girls to internalize the unrealistic bodies as the desirable bodies

they should strive for and may often lead to the development of a negative body image (Rogers et al., 2015).

Social media. In the past, women only had mainstream forms of media to which to compare themselves. However, the creation of and rapid rise in popularity of social media has created an almost infinite amount of comparisons for women to make between themselves and others. The impact social media has on a women's body satisfaction has been reported to be higher than that of mainstream media (Cohen & Blaszczynski, 2015). Not only are women able to compare themselves to unrealistic bodies of the celebrities they see in mass media, they are also able to compare themselves to the celebrities, social media 'influencers' (i.e., persons made famous through social media but not mainstream media), and their peers/acquaintances using social media as well (Holland & Tiggemann, 2016; Jones, 2001). For example, a small study of university-aged students revealed negative associations between social media use and body image and self-esteem outcomes (Santarossa & Woodruff, 2017).

Specific environmental influences on body image. When considering factors that impact an individual's body satisfaction, the most commonly researched influences are those of family (Tatangelo et al., 2016), friends (Dohnt & Tiggemann, 2006), and media (Dakanalis et al., 2015).Yet, for those who choose to exercise, both the physical and social spaces created in these environments can have large implications for an individual's body image (Dittmann & Freedman, 2009; Prichard & Tiggemann, 2005).

Fitness centres. Often referred to as a 'gym', fitness centres can be defined, for the purpose of this manuscript, as "a place, typically a private club, providing a range of facilities designed to improve and maintain physical fitness" (Oxford Dictionaries,

2018a). Examples of such fitness centres include Goodlife Fitness and World Gym. Although fitness centres can be a great place for individuals to engage in bettering their health, they can also be an intimidating environment for some individuals, especially women (Clark, 2017; Fisher, Berbary, & Misener, 2017; Prichard & Tiggemann, 2008). For many women, going to a fitness centre can invoke anxiety and negative thoughts as they perceive fitness centres to be an environment that promotes body perfection (Dworkin, 2003). A study by Prichard and Tiggemann (2008) suggested that, in comparison to their time spent exercising outside of fitness centres, time spent exercising within fitness centres had a stronger relationship with body image, suggesting that the environment of fitness centres itself (both physical and social) can negatively impact a women's body image. In addition, women who utilise primarily cardiovascular machines as their main form of workout (which is the case for many women) have also been reported to have higher levels of self-objectification and body dissatisfaction (Prichard & Tiggemann, 2008). Moreover, Clark (2017) reported that upon entering a fitness centre, women tend to immediately begin comparing themselves to other women, making both downward and upward comparisons. Furthermore, some women also said that it was intimidating when they first started at the gym because they were jealous of other women's abilities and bodies, thus impacting their own body satisfaction (Clark, 2017). Lastly, the overwhelming presence of mirrors within typical fitness centres has been revealed to make women more conscious and anxious regarding their bodies (Clark, 2017).

Yoga studios. For the purpose of this manuscript, yoga can be defined as a "Hindu spiritual and ascetic discipline, a part of which, including breath control, simple

meditation, and the adoption of specific bodily postures, is widely practised for health and relaxation" (Oxford Dictionaries, 2018b). As such, yoga studios are simply formal places (i.e., with formal classes and teachers) where such activities take place. Whereas fitness centres tend to create an environment where women are extremely aware and critical of the physical appearance of their bodies (Clark, 2017; Dworkin, 2003; Fisher et al., 2017; Prichard & Tiggemann, 2008), yoga studios have conversely been reported to create environments where engaging in physical activity is associated with health and well-being, rather than appearance (Prichard & Tiggerman, 2008). Thus, women attending yoga studios have been reported to have higher levels of body satisfaction than individuals not engaging in yoga (Mahlo & Tiggerman, 2016; Neumark-Sztainer, MacLehose, Watts, Pacanowski, & Eisenberg, 2018) and those engaging in fitness classes at fitness centres (Daubenmier, 2005; Prichard & Tiggerman, 2008). Nevertheless, like most fitness centres, yoga studios with mirrors tend to increase state social physique anxiety and appearance comparisons with other members in the class, which could potentially impact body satisfaction long term (Frayeh & Lewis, 2018).

Self-Esteem

In addition to body image, the interaction between an individual and their environment can also greatly influence an individual's self-esteem. Often defined as the attitudes an individual has toward themselves (Rosenberg, 1965), self-esteem is a person's overall sense of their value or worth (Collins Dictionary, 2018). These attitudes or feelings about one's overall value can be either positive or negative and may develop or change over time (Orth & Robins, 2014).

Theories of self-esteem.

Maslow's hierarchy of needs. Abraham Maslow, in his essay titled "A theory of human motivation," described the concept of self-esteem as being one of five basic human needs and motivations (Maslow, 1943). Maslow's (1943) hierarchy of needs suggests that once individuals have satisfied some of their more fundamental needs (i.e., physiological and safety needs), they can begin to fulfill higher level needs such as those of love/belonging and self-esteem. Although feelings of love and belonging include the need for affectionate relationships to be made with friends and family, self-esteem relates to the need to have a high evaluation and respect for oneself and to have others evaluate the individual highly as well (Maslow, 1943). As such, two forms of self-esteem exist: the need for the individual to respect themselves and the need for others to respect them as well, with the need to respect oneself noted as being a higher-level need than that of receiving respect from others (Maslow, 1943). Examples of lower level self-esteem needs (respect from others) include the desire for "reputation or prestige" (Maslow, 1943, p. 382) as well as "recognition, attention, importance, or appreciation" (Maslow, 1943, p. 382). Conversely, examples of higher-level self-esteem needs include the ability to love and have confidence in oneself (Maslow, 1987). If an individual is able to satisfy their self-esteem needs, feelings of self-confidence, strength, worth, capability, and adequacy will follow (Maslow, 1943). If an individual is unable to fulfill these needs, feelings of weakness and inferiority will arise (Maslow, 1943).

Sociometer theory. Maslow's (1943) hierarchy of needs places emphasis on the need for individuals to feel both inner confidence in oneself and to feel as though others think highly of them as well. Although this theory is still relevant today, researchers have

built upon Maslow's (1943) work. Leary and Downs (1995) did so by introducing the idea that self-esteem is a sociometer. Based on this theory, a sociometer can be defined as a gauge or measure ('-meter') of an individual's social relationships ('socio-') with other individuals (Leary, 2005). Thus, changes in an individual's self-esteem can increase or decrease based on the extent to which the individual feels they are being accepted or rejected by others (Leary & Downs, 1995). Furthermore, the sociometer theory reinforces the socio-ecological model (Bronfenbrenner, 1974), by suggesting that the environment, including the people within it, can impact an individual, with the sociometer theory specifically explaining how it may impact that individual's self-esteem (Leary & Downs, 1995). Lastly, like the socio-ecological model (Bronfenbrenner, 1974), the sociometer theory suggests that an individual's perceived relational value with both macro-level groups (i.e., an individual's city, communities, etc.) and micro-level groups (i.e., family, friends, partners) can affect that individual's self-esteem (Menon, 2017).

Commonly researched influences on self-esteem.

Age and gender. Although both age and gender are fixed variables that an individual cannot change about themselves, research suggests that an individual's self-esteem is impacted by both variables (Bleidorn et al., 2016; Diseth, Meland, & Breidablik, 2014; Kling, Hyde, Showers, & Buswell, 1999; Orth, Maes, & Schmitt, 2015; Robins, & Trzesniewski, 2005; Twenge & Campbell, 2001; von Soest, Wichstrøm, & Kvalem, 2016). First, a general trend among research related to self-esteem and age has been identified with most researchers agreeing that that self-esteem increases through childhood, drops slightly during adolescences, increases throughout adulthood, and then declines significantly with old age (i.e., over the age of 60; Orth et al., 2015; Robins, &

Trzesniewski, 2005; Twenge & Campbell, 2001; von Soest et al., 2016). Second, in terms of gender, women tend to have lower levels of self-esteem compared to men at any given age (Bleidorn et al., 2016; Diseth et al., 2014; Kling et al., 1999). Moreover, differences in appearance-related self-esteem levels have also been reported, with women having greater dissatisfaction with their bodies and lower levels of appearance-related self-esteem than men, regardless of age (Baudson, Weber, & Freund, 2016; Keating, Stephens, Thomas, Castle, & Rossell, 2016)

Family. Maslow's (1943) hierarchy of needs, the sociometer theory (Leary & Downs, 1995), and the socio-ecological model (Bronfenbrenner, 1974) all demonstrate the importance family may have on an individual's self-esteem. Moreover, the family environment is reported to have a significant impact in early childhood, with effects still being significant, but smaller with age (Orth, 2018). Longitudinal studies suggest that children and adolescents who report feelings of parental warmth (Brummelman et al., 2015) and support (Amato & Fowler, 2002) predicted an increase in self-esteem, whereas the use of harsh punishment by parents was reported to lead to lower levels of self-esteem (Amato & Fowler, 2002). In addition, a mother's mental health status has also been examined in relation to a child's self-esteem, with children of mothers who experience depression having lower levels of self-esteem (Orth, Robins, Widaman, & Conger, 2014). Lastly, the family's socioeconomic status may also impact a child's self-esteem, with low socioeconomic status being significantly associated with lower levels of self-esteem (Orth et al., 2015; Twenge & Campbell, 2002).

Friends. Although parents have been reported to have a large impact on an individual's self-esteem, Maslow's (1943**)** hierarchy of needs, the sociometer theory

(Leary & Downs, 1995), and the socio-ecological model (Bronfenbrenner, 1974) all suggest that other individuals within a person's environment, such as friends, may also have a substantial impact on their self-esteem. Although parents may have a large impact on an individual's self-esteem during their childhood years, that influence tends to decrease as they get older, especially as they approach adolescence (Orth, 2018). During adolescence, friends tends to influence an individual's self-esteem more substantially than ever before (Birkeland, Breivik, & Wold, 2014; Shroff & Thompson, 2006). For girls specifically, individuals within the same friend group often report similar levels of self-esteem (Shroff & Thompson, 2006). Furthermore, a study by Jiang, Zhang, Ke, Hawk, and Qiu (2015) suggests that rejection leads to decreases in self-esteem. This directly supports Leary and Downs's (1995) sociometer theory, which suggests that self-esteem is greatly impacted by an individual's acceptance or rejection within their friend groups. Although the majority of research regarding the influence of friends on an individual's self-esteem occurs in adolescent populations (as this is the time when self-esteem appears to decrease drastically), a few studies have also reported that adult women with quality friendships tend to have higher levels of self-esteem than those who do not, implying that friends may still influence an individual's self-esteem during adulthood (Gatzke, Barry, Papadakis, & Grover, 2015; Zuffianò et al., 2016)

Media. As is the case with body image (Dakanalis et al., 2015; Rogers et al., 2015), media has been reported to significantly impact the self-esteem of both men and women (Fernandez & Prichard, 2012), but with the majority of literature focusing on the ways in which it negatively influences women's self-esteem specifically (Clay, Vignoles, & Dittmar, 2005; Dohnt & Tiggemann, 2006). By reinforcing the unrealistic ideal body,

the media creates an environment where women are constantly making upwards comparisons, thus resulting in decreased appearance-related self-esteem (Grabe, Ward, & Hyde, 2008). Furthermore, if an individual's self-esteem suffers in one domain (e.g., appearance), it may also begin to decrease overall (von Soest et al., 2016) and/or in other areas as well (Harris, Wetzel, Robins, Donnellan, & Trzesniewski, 2018). Yet, appearance self-esteem has been reported to be more strongly related to global self-esteem than any other domain-specific self-esteem (Harter, 2012).

Social media. Similar to mainstream media, exposure to social media has been revealed to have potentially negative impacts on an individual's self-esteem (Burrow & Rainone, 2017; Shin, Kim, Im, & Chong, 2017; Vogel, Rose, Roberts, & Eckles, 2014). In addition, the more often an individual uses social media, the more likely that individual is to have lower levels of self-esteem (Vogel et al., 2014). This may be a result of the individual having more time to make upwards social comparisons with those whose social media they are viewing (Vogel et al., 2014), or it may even be due to the feedback (or lack thereof), usually in the form of 'likes' or comments they are receiving on their own social media accounts (Burrow & Rainone, 2017).

Specific environmental influences on self-esteem. Although exercise has been cited by a few researchers as a means to increase an individual's self-esteem (Kahlin, Werner, Edman, Raustorp, & Alricsson, 2016; McAuley, Blissmer, Katula, Duncan, & Mihalko, 2000), the fitness environments in which these individuals exercise may also separately impact an individual's self-esteem. Whereas some exercise environments might positively influence a women's self-esteem by creating a welcoming and comforting environment, others may negatively influence a women's self-esteem by

creating intimidating and uncomfortable physical and social exercise spaces (Prichard & Tiggemann, 2008).

Fitness centres. Almost one-third of women who exercise do so at a fitness centre (Slater & Tiggemann, 2006). It is suggested that time spent exercising in such facilities leads to lower levels of self-esteem in comparison to those who engage in physical activity outside of such fitness centres (Prichard & Tiggemann, 2008). In addition, the most popular form of exercise that women engage in at fitness centres is the use of cardiovascular machines, which were associated with negative body esteem (i.e., a specific level of self-esteem; Prichard & Tiggemann, 2008). Furthermore, as was the case with body image, the mirrored environments popular in fitness centres have also been reported to be negatively associated with women's self-esteem (Martin Ginis, Jung, & Gauvin, 2003). Lastly, not only do the physical environments of fitness centres have the potential to negatively influence self-esteem, but the social environments created within them do as well (Fisher et al., 2017). Many women who attend fitness centres also feel subconscious about the clothing they are wearing and are constantly comparing themselves to the other women at the gym, which may ultimately lead to decreases in self-esteem (Fisher et al., 2017).

Yoga studios. In general, yoga studios are reported to create environments that emphasize overall health and well-being over appearance (Prichard & Tiggerman, 2008). As such, the literature suggests that individuals who engage in yoga (or take part in a yoga-based exercise intervention) are more likely to have high levels of self-esteem (Deshpande, Nagendra, & Nagarathna, 2009; Devi, Devi, & Bilagi, 2015; Elavsky, & McAuley, 2007; Narasimhan, Nagarathna, & Nagendra, 2011). A study by Deshpande et

al. (2009) suggests that, in comparison to a regular exercise group, both global and domain-specific (including social esteem and appearance-related) self-esteem were significantly higher in individuals who were part of the yoga group. This is not surprising as body image and self-esteem are closely related, with yoga studios also positively impacting body satisfaction (Mahlo & Tiggerman, 2016; Neumark-Sztainer et al., 2018). Conversely, a study by Junkin (2007) revealed that although middle-aged women who participated in a yoga intervention did see increases in yoga-specific self-esteem, no changes in overall self-esteem were reported.

Eating Behaviours

Along with body image, and self-esteem, an individual's eating behaviours are also greatly influenced by their environment (Bruening et al., 2014; Prichard & Tiggemann, 2005; Woodruff & Hanning, 2008). Healthy eating is very difficult to define due to the myriad of influences/behaviours that can affect what and how we eat. After more than a decade since its last release, Canada's Food Guide to Healthy eating was recently updated in 2019 (Health Canada, 2019). Although the older version of the food guide placed was inherently complicated and placed an emphasis on four food groups and the numbers of servings a day individuals should consume (Health Canada, 2007), the updated guide utilizes a new approach. Instead of food groups and servings, the updated Food Guide encourages individuals to "eat a variety of healthy foods each day" (p. 49), including lots of vegetables and fruits, as well as whole grain foods and protein (Health Canada, 2019). In addition, the Food Guide also suggests that Canadians choose plant-based protein sources more frequently, limit the consumption of highly processed foods, and drink plenty of water, not milk.

However, just as LaCaille (2013) argued, Canada's Food Guide now argues that not only is what we eat important, but we also need to consider eating behaviours and the environmental context to better understand why we consume the foods that we do (Health Canada, 2019). Health Canada (2019), along with others, have encouraged individuals to be mindful in their eating practices (i.e., how the foods consumed affect one's body, mind, and feelings; Van Dyke & Drinkwater, 2014), take time to eat and listen to hunger signals; Van Dyke & Drinkwater, 2014), cook more often (and do so with others), enjoy eating (and incorporating culture and food traditions; Vik et al., 2013), and eat with others (Health Canada, 2019). Moreover, food should not be labelled as 'good' and 'bad', but foods that are calorie, fat, sugar, and/or salt dense (such as cakes, chocolate, ice cream, pop, chips, etc.) should be consumed less often (Heart and Stroke Foundation of Canada, n.d.). In fact, it is healthy to consume these foods, in addition to alcoholic beverages, in moderation from time to time and enjoy doing so.

As previously mentioned, healthy eating behaviours also consist of listening to your body's hunger signals (Health Canada, 2019; Van Dyke & Drinkwater, 2014). If an individual is satiated, they need not continue to eat, yet if they are still hungry, they should continue to eat until they reach feelings of fullness (i.e., intuitive eating; Health Canada, 2019, Van Dyke & Drinkwater, 2014). Although counting calories is not recommended to maintain healthy eating patterns, individuals should instead try to engage in mindful eating (i.e., how the foods consumed affect one's body, mind, and feelings; Van Dyke & Drinkwater, 2014). Individuals should also take time to relax and enjoy the food they are eating and avoid the unconscious eating habits that can occur when one eats while doing things such as watching TV (Vik et al., 2013).

Furthermore, the National Eating Disorder Information Centre (NEDIC) and the Academy of Nutrition and Dietetics also stress that healthy eating includes avoiding behaviours such as binge eating (NEDIC, 2014a), calorie counting (NEDIC, 2014b), restrictive eating (i.e., only eating certain foods; Academy of Nutrition and Dietetics, 2015), using food for reward (or punishment; Academy of Nutrition and Dietetics, 2018), and avoiding engaging in weight altering 'diets' (NEDIC, 2014b). As such, healthy eating can be viewed as adopting a non-dieting healthy relationship with food that appropriately fuels your body, mind, and spirit (Health Canada, 2007).

Unhealthy eating behaviours. For the purposes of this manuscript, unhealthy eating behaviours will be all eating behaviours that do not align with the above-mentioned definition of healthy eating behaviours (Academy of Nutrition and Dietetics, 2015, 2018; Health Canada, 2007; Heart and Stroke Foundation of Canada, n.d.; NEDIC, 2014a, 2014b; Van Dyke & Drinkwater, 2014; Vik et al., 2013). As such, unhealthy eating behaviours may include, but are not limited to, high consumption of alcohol and/or foods that are calorie, fat, sugar, and/or salt dense (Health Canada, 2007), not listening to one's internal satiety signals (be it over or under eating; Van Dyke & Drinkwater, 2014), mindless eating (Vik et al., 2013), binge eating (NEDIC, 2014a), obsessive calorie counting (NEDIC, 2014b), or restrictive dieting (Academy of Nutrition and Dietetics, 2015), and using food as a reward or punishment (Academy of Nutrition and Dietetics, 2018).

Furthermore, eating behaviours such as meal skipping, restrictive dieting, and/or compulsive eating (National Eating Disorders Collaboration, 2018) will also be deemed unhealthy eating behaviours, as they are all forms of 'dieting' (previously mentioned as

unhealthy; NEDIC 2014b). Other forms of dieting may also include under eating/over exercising (Neumark-Sztainer, Wall, Larson, Eisenberg, & Loth, 2011), excessively overeating to gain weight, using diet pills and/or diuretics (Neumark-Sztainer et al., 2011), restricting a/multiple major food groups (National Eating Disorders Collaboration, 2018), consuming 'zero calorie' products (containing artificial sweeteners; National Eating Disorders Collaboration, 2018; Neumark-Sztainer et al., 2011), using food substitutes (e.g., protein power or special drinks; Neumark-Sztainer et al., 2011), smoking cigarettes to curb appetite (Neumark-Sztainer et al., 2011), using steroids (i.e., muscle-building substances; Irving, Wall, Neumark-Sztainer, & Story, 2002), and going for prolonged periods of time without eating (Neumark-Sztainer et al., 2011).

Social cognitive theory. In addition to the socio-ecological model (Bronfenbrenner, 1974), Bandura's (1986) social cognitive theory provides a means by which to explain individuals' behaviours, including their eating behaviours. The social cognitive theory suggests that there is triadic reciprocal determinism between three factors (Bandura, 1989) that all potentially influence an individual's behaviours. This means that all three factors interact bidirectionally (Bandura, 1989). The three factors are the following:

Cognitive: An individual's knowledge, expectations, and attitudes about a given behaviour. This is known as their self-efficacy, or their confidence in their ability to accomplish a given task or behaviour (Bandura, 1982), such as healthy eating.

Behavioral: An individual's skills, practice, and self-efficiency in performing a given task or behaviour (Bandura, 1982).

Environmental: Aspects of the environments that impact an individual's ability to perform a given task or behaviour. This includes the influence of others (e.g., family and friends), social norms, and the actual physical environment itself (Bandura, 1982).

Commonly researched influences on eating behaviours.

Family. As was the case with both body image and self-esteem, the family environment is one of the largest influences on an individual's eating behaviours (Benton, 2004; Farrow, Haycraft, & Blissett, 2015; Palfreyman, Haycraft, & Meyer, 2015, Woodruff & Hanning, 2008). As per both the socio-ecological model (Bronfenbrenner, 1974) and social cognitive theory (Bandura, 1989), an individual's food environment (i.e., the foods they consume and the eating behaviours they develop) is almost largely determined by the parents during early years (Birch & Doub, 2014; Paul et al., 2009; Woodruff & Hanning, 2008). Parents determine an individual's food environment by choosing not only the types of foods and quantities in which the child will consume (Woodruff & Hanning, 2008). As such, if parents are often choosing energy-dense, nutrition-low foods and in large quantities for the child, the child will develop eating habits based around such foods (Mennella, Nicklaus, Jagolino, & Yourshaw, 2008; Paul et al., 2009). Conversely, if the parent chooses to feed the child a variety of nutritious foods and small quantities of less nutritious foods, the child will develop eating habits surrounding these foods (Mennella et al., 2008; Paul et al., 2009). Yet, restriction of so-called 'unhealthy' foods, may lead the child to desire these restricted foods even more (Benton, 2004; Farrow et al., 2015). Thus, a balance is needed. Moreover, as individuals age, both parents and siblings act as role models for eating behaviours (Benton, 2004; Blissett, Bennett, Fogel, Harris, & Higgs, 2016; Brown

& Ogden, 2004). If an individual observes family members constantly eating large portions and choosing less nutritious foods, or at the extreme, engaging in restrictive or binge eating behaviours, the individual is more likely to adopt such behaviours (Benton, 2004). In addition, although an individual will eventually achieve an age when they are more in control of their own eating behaviours, the eating behaviours developed during their childhood have been reported to carry through to adolescence, and even adulthood (Neumark-Sztainer et al., 2011; Palfreyman et al, 2015).

Friends. Although parents and family members tend to have the largest influence on eating behaviours during childhood, an individual's eating behaviours may begin to also be influenced by friends as they age, and their physical and social environments begin to expand (Bruening et al., 2014; Dalky, Al Momani, Al-Drabaah, & Jarrah, 2017; Neumark-Sztainer et al., 2011). Even if healthy eating behaviours were instilled in an individual throughout childhood, the eating behaviours of friends may begin to impact an individual's own eating behaviours (Dalky et al., 2017). Bruening et al. (2014) and Stok et al. (2015) suggest that significant associations exist between adolescents' food (e.g., fruit and vegetables, snacks, sugar sweetened beverages) and restaurant choices and the choices their friends, especially in comparison to middle school participants. Thus, as both the socio-ecological model (Bronfenbrenner, 1974) and the social cognitive theory (Bandura, 1989) suggest, friends (who are part of an individual's social environment) influence the eating behaviours of adolescents due to their need to feel accepted and 'fit in' within their given environment.

Media. In addition to family and friends, media is a significant aspect of the social environment that may influence an individual's eating behaviours, especially adolescents

and adult women (Bozsik et al., 2018; Gendron & Lydecker, 2016; Harrison & Cantor, 1997; Latzer, Spivak-Lavi, & Katz, 2015; Mask & Blanchard, 2011). By encouraging women to appear unrealistically thin (Bozsik et al., 2018), youthful (Gendron & Lydecker, 2016), and also muscular (Bozsik et al., 2018), mass media forces adolescent girls and women to be intensely critical about their bodies and often leads women to develop unhealthy eating behaviours as a means by which to try and achieve this ideal body (Harrison & Cantor, 1997; Latzer et al., 2015; Mask & Blanchard, 2011). For example, Latzer et al. (2015) reported that young women who watched television shows such as 'Gossip Girl' and '90210' were more likely to engage in negative eating behaviours such as restricting food intake. It has also been reported that women are more likely to monitor their food intake and limit the consumption of unhealthy foods directly following the viewing of a video encouraging the media-driven thin ideal versus those who watched a neutral video (Mask & Blanchard, 2011). Conversely, although the ideal body portrayed in media implies the need to potentially restrict one's food intake, prime-time television (8:00 p.m. -11:00 p.m.) food-related commercials consist primarily of advertisements for foods and beverages high in calories and low in nutrients such as sugar sweetened beverages and sweets (Adams, 2009; Suzuki & Nelson, 2018).

Social media. Similar to mass media, social media creates a social environment that promotes an ideal body that is both thin (Bozsik et al., 2018) and muscular (Bozsik et al., 2018), as well as youthful (Gendron & Lydecker, 2016) for women. As such, compared to those with low levels of social media use, individuals who engaged in high levels of social media use were reported to have higher levels of concern regarding their eating behaviours (Sidani, Shensa, Hoffman, Hanmer, & Primack, 2016; Santarossa &

Woodruff, 2017; Walker et al., 2015). Lastly, like mass media, social media, depending on the way in which is used, can lead to both positive and negative eating behaviours. For example, many social media influencers provide healthy, easy to make recipes that can encourage healthy eating habits (Deliens, Clarys, De Bourdeaudhuij, & Deforche, 2014). Conversely, advertisements regarding fad diets may promote unhealthy eating behaviours, such as detoxification teas (Tinker & Moulite, 2018).

Specific environmental influences on eating behaviours. Seeing as though body image, self-esteem, and eating behaviours are all interrelated (Dakanalis et al., 2015), and that the physical and social environments in which individuals' exercise have been reported to significantly impact body image (Prichard & Tiggemann, 2005) and self-esteem (Prichard & Tiggerman, 2008), it is thus not surprising that the exercise environment also influences an individual's eating behaviors (Mooney et al., 2017; Prichard & Tiggemann, 2008; Stubbe, Chorus, Frank, de Hon, & van der Heijden, 2014).

Fitness centres. As previously stated, fitness centres are often cited by women as being environments that are both intimidating (Clark, 2017) and thought to encourage bodily perfection (i.e., the ideal body; Dworkin, 2003). Although research as to the influence of fitness centres impact on eating behaviours is somewhat limited, a study by Prichard and Tiggemann (2008) revealed that time spent exercising within fitness centres was more highly associated with unhealthy eating behaviours (i.e., a composite variable calculated based on drive for thinness, body dissatisfaction, and bulimia subscales of the Eating Disorder Inventory) than exercising in other environments. Moreover, it was also reported that the use of cardiovascular machines within fitness centres was also associated with higher levels of unhealthy eating behaviours compared to other types of

exercise (Prichard & Tiggmann, 2008). Stubbe et al. (2014) also revealed that almost ten percent of fitness centre attendees used some kind of performance enhancing drugs, with stimulants to lose weight being the most prevalent. Similarly, Mooney et al. (2017) reported slightly higher numbers, with 41% of respondents saying they were taking some kind of supplement to increase fitness performance, and 26% of respondents citing having taken some sort of weight loss product.

Yoga studios. Unlike fitness centres, yoga studios, and the practice of yoga itself, seem to have mostly positive effects on women's eating habits (Bryan, Parasher, Cahil, & Zipp, 2013; Watts, Rydell, Eisenberg, Laska, & Neumark-Sztainer, 2018). Yoga encourages the connection between the mind and the body, and as a result, individuals attending yoga studios have been reported to engage in more mindful eating practices (Bryan, Parasher, Cahil, & Zipp, 2013; Watts, Rydell, Eisenberg, Laska, & Neumark-Sztainer, 2018). For example, in a study that utilized interviews to assess the relationships between participation in yoga, healthy eating behaviours and physical activity among young adults, one woman cited choosing foods that fueled her body, rather than simply picking foods that taste good and are convenient (Watts et al., 2018). In comparison to cardiovascular machines that typically take place in a fitness centre setting, yoga was reported to be associated with significantly lower levels of unhealthy eating behaviours (Martin, Prichard, Hutchinson, & Wilson, 2013). Regular attendance to yoga studios is also associated with increased levels of fruit and vegetable intake (Bryan et al., 2013; Ross, Friedmann, Bevans, & Thomas, 2013; Watts et al., 2018), decreased sugar sweetened beverage intake (Watts et al., 2018), better hydration (Bryan et al., 2013), less frequent consumption of fast food (Watts et al., 2018), as well as the overall choosing of

healthier foods (Bryan et al., 2013; Watts et al., 2018). Lastly, in addition to better food choices, individuals practicing yoga are also revealed to have better portion control (Bryan et al., 2013) and are better able to manage their emotional eating (Watts et al., 2018).

CrossFit

Overview. In just under two decades, CrossFit's popularity has dramatically increased, as it has evolved from a single gym in Santa Cruz, California, to 13 other affiliates (referred to as 'affiliates') by 2005, to more than 13,000 affiliates and counting today (CrossFit, 2018a). Developed by Greg Glassman in 2000, CrossFit is a group-based exercise regimen that consists of "constantly varied, high intensity, functional movements" (Glassman, 2007, p. 1) that aims to move the largest loads and expend the greatest amounts of energy in relatively short periods of time (CrossFit, 2018b). CrossFit workouts, known as 'WODs' (i.e., workout of the day), combine aspects of aerobic training (including running, biking, and rowing), gymnastics, weightlifting, powerlifting, strongperson training, mobility exercises, and calisthenics (CrossFit, 2018b; Glassman, 2002, 2007). Although CrossFit's use of group-based exercises classes is not a new exercise method, as group-based exercise classes have been previously and continue to be utilized by Spin, Zumba, boot camps, and yoga studios alike, they are key components of an exercise program that considers itself the "sport of fitness" (Glassman, 2007), and thus encourages comradery between members, friendly competition, fun, and intensity that is normally only achieved through team sports (CrossFit, 2018b). Yet, not unlike other new fitness or exercise regimens/programs, CrossFit has garnered more than its share of criticism and controversy, with its safety (or perceived lack thereof; Diamond, 2015;

Ross, 2018) and *cult-like* tendencies (Beck, 2017; Stoddard, 2011), among other critiques, the center of much debate. However, as CrossFit has gained an increasingly larger North American and worldwide reach (as evidenced by indicated the presence of affiliates in over 160 countries; Henderson & Cain, 2018), both in North American and worldwide, the public opinion of CrossFit has begun to shift. What was once an exercise regimen almost solely the subject of critique, is now an exercise regimen beginning to receive praise as well (Blennerhassett, 2019; Hardick, 2018; Health Fitness Revolution, 2015), although its critics still exist.

CrossFit classes. CrossFit classes are typically one hour long and consists of up to 20-30 members exercising at once. Each class is taught and overseen by at least one CrossFit trained coach, who has undergone extensive training to ensure proper movement form and technique are upheld (CrossFit, 2018c). Each workout, which usually consists of a warm up, a strength or skill component, and then a metabolic conditioning component (usually referred to as a 'metcon') that can be anywhere from 2-3 minutes long to 30-40 minutes long or longer. Although some members may be able to perform the workout as it is prescribed, many different *scaling* (i.e., modification) options are provided to enable individuals of all fitness levels to participate in the same class, while finishing roughly at the same time and working at the same relative intensities (CrossFit, 2018a). Yet, before being able to participate in regular classes, most affiliates require individuals to take part in an "On-Ramp Program" (usually consisting of multiple 1-hour sessions), where they will be individually (or in very small groups) taught how to properly perform all CrossFit movements (Windsor CrossFit, 2018).

Tracking progress. CrossFit encourages participants to track their workouts (i.e., weights, times, repetitions) throughout their training. Although not mandatory, most affiliates provide members the option to do so in either a log book/journal, on a white board, or on a computer in order to keep track of their progress (Wodify, 2018).

Previous CrossFit literature.

Safety concerns and injury risk. Although CrossFit has now existed for almost two decades, it was not until the last several years that this exercise regimen became popular (CrossFit, 2018a). As such, research in the area is in its infancy, with the majority of the literature focusing on the safety concerns and risk of injury (and even rhabdomyolysis, i.e., the breakdown of skeletal muscle and the release of muscular cells into the plasma; Gabow, Kaehny, & Kelleher, 1982) associated with participation in CrossFit (Friedman, Stensby, Hillen, Demertzis, & Keener, 2015; Hak, Hodzovic, & Hickey, 2013; Meyer, Sundaram, & Schafhalter-Zoppoth, 2018; Montalvo et al., 2017; Summitt, Cotton, Kays, & Slaven, 2016; Weisenthal, Beck, Maloney, DeHaven, & Giordano, 2014). Whereas some studies focused specifically on injury rates and occurrence in specific body parts such as the shoulder (Summitt et al., 2016), more studies focused on overall injury rates (Hak et al.; Montalvo et al., 2017; Weisenthal et al., 2014). Moreover, there has also been a lot public debate in regard to its safety, with polarizing opinions (e.g., some say it is great, others believe it is dangerous) being shared in popular newspapers like the *New York Times* (Cooperman, 2005), the *Washington Post* (Sutterfield, 2015), and the *Wall Street Journal* (Gay, 2017), among others.

Physiological outcomes. A secondary area of research that is becoming increasingly popular is that of CrossFit and physiological outcomes (Barfield &

Anderson, 2014; Baştuğ, Özcan, Gültekin, & Günay, 2016; Bellar, Hatchett, Judge, Breaux, & Marcus, 2015; Eather, Morgan, & Lubans, 2016; Murawska-Cialowicz, Wojna, & Zuwala-Jagiello, 2015). Like any other new exercise or fitness regimen, its ability to produce desired outcomes is of great interest to both researchers and the population at large. Barfield and Anderson (2014) compared the effects of CrossFit to other, more traditional forms of training (i.e., 10-minute dynamic warm-up, 10-minutes resistance warm up using full body exercise, and 25 minutes of traditional weightlifting targeting large muscle groups), and reported that participants in the CrossFit intervention group had improvements in both aerobic capacity and muscular endurance, with improvement in muscular endurance being significantly greater than those in the tradition training group. Similarly, Eather et al. (2016) reported that CrossFit was able to increase cardiorespiratory fitness in a group of adolescents ($N = 96$, mean age = 15.4 years) compared to a control group. In addition to aerobic capacity, CrossFit has been reported to have positive impacts on body composition (Barfield & Anderson, 2014, Baştuğ et al., 2016; Eather et al., 2016), muscular endurance (Barfield & Anderson, 2014; Eather et al., 2016), muscular power (Barfield & Anderson, 2014; Eather et al., 2016), flexibility (Barfield & Anderson, 2014, Eather et al., 2016), and anaerobic capacity (Barfield & Anderson, 2014).

Atmosphere and sense of community. In addition to both injury risk and the physiological outcomes that can be derived from CrossFit, a very small number of studies have begun to explore the sense of community and unique atmosphere that exists within CrossFit affiliates (Crockett & Butryn, 2018; Pickett, Goldsmith, Damon, & Walker, 2016; Ryan Shuda, & Feito, 2017; Whiteman-Sandland, Hawkins, & Clayton, 2016). A

spatial ethnography of the physical space within CrossFit affiliates was conducted by Crockett and Butryn (2018). The ethnography revealed the simplicity of CrossFit affiliates, meaning instead of a gym consisting of multiple unchangeable subspaces (e.g., a free weights section, a fitness class section, a cardio machine section) that one would typically find in a typical fitness centre, CrossFit affiliates typically consist of one or two large, multipurpose spaces that can easily be converted for that class' given needs (e.g., bikes and rowers are all on wheels and can be taken out when needed; Crockett & Butryn, 2018). Moreover, other studies have attempted to highlight the unique social environment that exists within CrossFit affiliates by utilizing interview techniques to better understand the social capital and sense of community/belongingness members obtain from attending CrossFit (Pickett et al., 2016; Whiteman-Sandland et al., 2016). Lastly, a few studies have also investigated the possible association between CrossFit's unique atmosphere, and how the sense of community built within its physical and social spaces effects continued participation (Ryan Shuda & Feito, 2017; Whiteman-Sandland et al., 2016). For example, Ryan Shuda and Feito (2017) conducted semi-structured interviews with seventeen CrossFit individuals (mean age = 34.9 years) and reported that all participants reported a strong commitment to CrossFit as well as their CrossFit "families" (i.e., their friends at their given CrossFit affiliate). Moreover, many individuals cited that they looked forward to going to CrossFit so they can spend time with the other members, and expressed that they felt CrossFit and its members provide a great support system both inside and outside the affiliate.

Psychological outcomes: Body image, self-esteem, and eating behaviours.

Lastly, a few studies examining the relationship between CrossFit and psychological

outcomes have been published, with a particular focus the differences between the typical ideal body and that which CrossFit promotes (Baştuğ et al., 2016; Podmore & Ogle, 2018). Moreover, the relationship between CrossFit and body image, self-esteem, and eating behaviours has also begun to be investigated (Baştuğ et al., 2016; Kerry, 2017; Knapp, 2015; Köteles, Kollsete, & Kollsete, 2016; Podmore & Ogle, 2018; Washington & Economides, 2016), which is outlined in the subsequent paragraphs.

CrossFit and the ideal body. Although CrossFit brands itself as an exercise regimen and company that encourages equality between sexes (i.e., where women are not seen as the weaker sex; Achauer, 2016), a few researchers have begun to examine the relationship between CrossFit and the subsequent body image it creates, or at least claims to encourage (Baştuğ et al., 2016; Podmore & Ogle, 2018). CrossFit is said to encourage a body type that is unlike the traditional ideal body for women. According to the *CrossFit Journal* (i.e., a non-evidenced based, non-academic journal on CrossFit's main website), CrossFit aims to define 'being hot' by more than just physical appearance (Hayes, 2010). CrossFit prides itself in encouraging women (as well as its other members) to be strong and powerful and to define their bodies by what they can do, rather than how they look (Hayes, 2010). In addition, CrossFit encourages women to fight the traditional ideal body by acknowledging that it is okay for women to be bulky, and that having considerable muscle mass does not make them masculine (Hayes, 2010). Conversely, CrossFit also acknowledges that women do not need to look a certain way to be able to accomplish any given CrossFit movement, and should thus aim to focus their goals on performance outcomes, rather than appearance outcomes (Hayes, 2010). As such, CrossFit is an exercise regimen that aims to help women achieve body satisfaction, yet evidenced-

based, academic research to support (or even contradict) their aims are sufficiently lacking.

Body image and self-esteem. In a study by Baştuğ et al. (2016) it was suggested that those who participated in an exercise intervention consisting of a mix of CrossFit, Pilates, and Zumba exercises had higher levels of body satisfaction than the control group, who did not engage in any exercise intervention. Yet, as the intervention consisted of a mix of three different exercise types, it is not possible to determine the extent to which CrossFit impacted participants' body image compared to the other two exercise types. Köteles et al. (2016) investigated the relationship between CrossFit participation and psychological variables and reported that more than half of participants wanted to improve their physical abilities, as one of their motivations for engaging in CrossFit, whereas less than fifteen percent referred to appearance related motivations, thus supporting CrossFit's aims. Yet, when analyzing CrossFit participation with self-esteem, body awareness, body satisfaction, and general well-being, no significant associations were reported (Köteles et al., 2016). However, some qualitative results indicated the opposite (e.g., almost a quarter of participants indicated well-being as a motive for engaging in CrossFit; Köteles et al., 2016). Furthermore, Podmore and Ogle (2018) provided mixed results in relation to body image and self-esteem. Although many participants reported that CrossFit allowed them to realize that what the body can do is more important than what the body looks like, others reported anxiety and concern around being too bulky or masculine as a result of CrossFit (i.e., a continued focus on what the body looks like).

Eating behaviours. Lastly, to the author's knowledge, only one study (Podmore & Ogle, 2018) has been published regarding the associations between CrossFit and eating behaviours. Many CrossFit participants reported that their participation in CrossFit made them make changes to their eating behaviours, with many suggesting that they began engaging in 'clean eating' (i.e., avoiding the consumption of processed foods) or following a specific eating pattern (e.g., the Paleo diet, where individuals are encouraged to eat as our ancestors once ate in order to optimize health, reduce chronic disease risk, and/or lose weight; Cordain, n.d.). Conversely, although no participants were considered to be engaging in disordered eating habits, per Podmore and Ogle's (2018) definition, some athletes did say that they use food as a reward for working hard at CrossFit. However, using food as a reward for exercise is very typical across many different types of workouts (Dohle, Wansink, & Zehnder, 2015).

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APPENDIX A

Multidimensional Body-Self Relations Questionnaire (MBSRQ)

INSTRUCTIONS--PLEASE READ CAREFULLY

The following pages contain a series of statements about how people might think, feel, or behave. You are asked to indicate the extent to which each statement pertains to you personally.

Your answers to the items in the questionnaire are anonymous, so please do not write your name on any of the materials. In order to complete the questionnaire, read each statement carefully and decide how much it pertains to you personally. Using a scale like the one below, indicate your answer by entering it to the left of the number of the statement.

EXAMPLE:

_____ I am usually in a good mood.

In the blank space, enter a **1** if you **definitely disagree** with the statement; enter a **2** if you **mostly disagree**;

enter a **3** if you **neither agree nor disagree**; enter a **4** if you **mostly agree**;

There are no right or wrong answers. Just give the answer that is most accurate for you. Remember, your responses are confidential, so please be completely honest and answer all items.

1	2	3	4	5
Definitely Disagree	Mostly Disagree	Neither Agree Nor Disagree	Mostly Agree	Definitely Agree

_____ 1. Before going out in public, I always notice how I look.

_____ 2. I am careful to buy clothes that will make me look my best.

_____ 3. I would pass most physical-fitness tests.

_____ 4. It is important that I have superior physical strength.

_____ 5. My body is sexually appealing.

_____ 6. I am not involved in a regular exercise program.

_____ 7. I am in control of my health.

_____ 8. I know a lot about things that affect my physical health.

_____ 9. I have deliberately developed a healthy lifestyle.

_____ 10. I constantly worry about being or becoming fat.

_____ 11. I like my looks just the way they are.

_____ 12. I check my appearance in a mirror whenever I can.

_____ 13. Before going out, I usually spend a lot of time getting ready.

_____ 14. My physical endurance is good.

_____ 15. Participating in sports is unimportant to me.

_____ 16. I do not actively do things to keep physically fit.

_____ 17. My health is a matter of unexpected ups and downs.

_____ 18. Good health is one of the most important things in my life.

_____ 19. I don't do anything that I know might threaten my health.

continued on next page

1	2	3	4	5
Definitely Disagree	Mostly Disagree	Neither Agree Nor Disagree	Mostly Agree	Definitely Agree

_____ 20. I am very conscious of even small changes in my weight.

_____ 21. Most people would consider me good-looking.

_____ 22. It is important that I always look good.

_____ 23. I use very few grooming products.

_____ 24. I easily learn physical skills.

_____ 25. Being physically fit is not a strong priority in my life.

_____ 26. I do things to increase my physical strength.

_____ 27. I am seldom physically ill.

_____ 28. I take my health for granted.

_____ 29. I often read books and magazines that pertain to health.

_____ 30. I like the way I look without my clothes on.

_____ 31. I am self-conscious if my grooming isn't right.

_____ 32. I usually wear whatever is handy without caring how it looks.

_____ 33. I do poorly in physical sports or games.

_____ 34. I seldom think about my athletic skills.

_____ 35. I work to improve my physical stamina.

_____ 36. From day to day, I never know how my body will feel.

_____ 37. If I am sick, I don't pay much attention to my symptoms.

_____ 38. I make no special effort to eat a balanced and nutritious diet.

continued on next page

1	2	3	4	5
Definitely Disagree	Mostly Disagree	Neither Agree Nor Disagree	Mostly Agree	Definitely Agree

_____ 39. I like the way my clothes fit me.

_____ 40. I don't care what people think about my appearance.

_____ 41. I take special care with my hair grooming.

_____ 42. I dislike my physique.

_____ 43. I don't care to improve my abilities in physical activities.

_____ 44. I try to be physically active.

_____ 45. I often feel vulnerable to sickness.

_____ 46. I pay close attention to my body for any signs of illness.

_____ 47. If I'm coming down with a cold or flu, I just ignore it and go on as usual.

_____ 48. I am physically unattractive.

_____ 49. I never think about my appearance.

_____ 50. I am always trying to improve my physical appearance.

_____ 51. I am very well coordinated.

_____ 52. I know a lot about physical fitness.

_____ 53. I play a sport regularly throughout the year.

_____ 54. I am a physically healthy person.

_____ 55. I am very aware of small changes in my physical health.

_____ 56. At the first sign of illness, I seek medical advice.

_____ 57. I am on a weight-loss diet.

continued on next page

For the remainder of the items use the response scale given with the item, and enter your answer in the space beside the item.

_____ 58. I have tried to lose weight by fasting or going oncrash diets.

1. Never
2. Rarely
3. Sometimes
4. Often
5. Very Often

_____ 59. I think Iam:

1. Very Underweight
2. Somewhat Underweight
3. Normal Weight
4. Somewhat Overweight
5. Very Overweight

_____ 60. From looking at me, most other people would think I am:

1. Very Underweight
2. Somewhat Underweight
3. Normal Weight
4. Somewhat Overweight
5. Very Overweight

1-69. Use this 1 to 5 scale to indicate <u>how dissatisfied or satisfied you are</u> with each of the following areas or aspects of your body:

1	2	3	4	5
Very Dissatisfied	Mostly Dissatisfied	Neither Satisfied Nor Dissatisfied	Mostly Satisfied	Definitely Satisfied

_____ 61. Face (facial features, complexion)

_____ 62. Hair (color, thickness, texture)

_____ 63. Lower torso (buttocks, hips, thighs, legs)

_____ 64. Mid torso (waist, stomach)

_____ 65. Upper torso (chest or breasts, shoulders, arms)

_____ 66. Muscle tone

_____ 67. Weight

_____ 68. Height

_____ 69. Overall appearance

APPENDIX B

Body-Image Ideals Questionnaire (BIQ)

Instructions. Please read carefully:

Each item on this questionnaire deals with a different physical characteristic. For each characteristic, think about how you would describe yourself as you actually are. Then think about how you wish you were. The difference between the two reveals how close you come to your personal ideal. In some instances, your looks may closely match your ideal. In other instances, they may differ considerably. On **Part A** of each item, rate **how much** you resemble your personal physical ideal by circling a number from 0 to 3.

Your physical ideals may differ in their importance to you, regardless of how close you come to them. You may feel strongly that some ideals embody the way you want to look or to be. In other areas, your ideals may be less important to you. On **Part B** of each item, rate **how important** your ideal is to you by circling a number on the 0 to 3 scale.

1. A. My ideal **height** is:

0	1	2	3
Exactly As I Am	Almost As I Am	Fairly Unlike Me	Very Unlike Me

B. How important to you is your ideal height?

0	1	2	3
Not Important	Somewhat Important	Moderately Important	Very Important

2. A. My ideal **skin complexion** is:

0	1	2	3
Exactly As I Am	Almost As I Am	Fairly Unlike Me	Very Unlike Me

B. How important to you is your ideal skin complexion?

0	1	2	3
Not Important	Somewhat Important	Moderately Important	Very Important

3. A. My ideal **hair texture and thickness** are:

0	1	2	3
Exactly As I Am	Almost As I Am	Fairly Unlike Me	Very Unlike Me

B. How important to you are your ideal hair texture and thickness?

0	1	2	3
Not Important	Somewhat Important	Moderately Important	Very Important

4. A. My ideal **facial features** (eyes, nose, ears, facial shape)

are: 0 1 2 3

Exactly As I Am	Almost As I Am	Fairly Unlike Me	Very Unlike Me

B. How important to you are your ideal facial features?

0	1	2	3
Not Important	Somewhat Important	Moderately Important	Very Important

5. A. My ideal **muscle tone and definition** is:

0	1	2	3
Exactly As I Am	Almost As I Am	Fairly Unlike Me	Very Unlike Me

B. How important to you is your ideal muscle tone and definition?

0	1	2	3
Not Important	Somewhat Important	Moderately Important	Very Important

6. A. My ideal **body proportions** are:

0	1	2	3
Exactly As I Am	Almost As I Am	Fairly Unlike Me	Very Unlike Me

B. How important to you are your ideal body proportions?

0	1	2	3
Not Important	Somewhat Important	Moderately Important	Very Important

7. A. My ideal **weight** is:

0	1	2	3
Exactly As I Am	Almost As I Am	Fairly Unlike Me	Very Unlike Me

B. How important to you is your ideal weight?

0	1	2	3
Not Important	Somewhat Important	Moderately Important	Very Important

8. A. My ideal **chest size** is:

0	1	2	3
Exactly As I Am	Almost As I Am	Fairly Unlike Me	Very Unlike Me

B. How important to you is your ideal chest size?

0	1	2	3
Not Important	Somewhat Important	Moderately Important	Very Important

9. A. My ideal **physical strength** is:

0	1	2	3
Exactly As I Am	Almost As I Am	Fairly Unlike Me	Very Unlike Me

B. How important to you is your ideal physical strength?

0	1	2	3
Not Important	Somewhat Important	Moderately Important	Very Important

10. A. My ideal **physical coordination** is:

0	1	2	3
Exactly As I Am	Almost As I Am	Fairly Unlike Me	Very Unlike Me

B. How important to you is your ideal physical coordination?

0	1	2	3
Not Important	Somewhat Important	Moderately Important	Very Important

11. A. My ideal **overall physical appearance** is:

0	1	2	3
Exactly As I Am	Almost As I Am	Fairly Unlike Me	Very Unlike Me

B. How important to you is your overall physical appearance?

0	1	2	3
Not Important	Somewhat Important	Moderately Important	Very Important

APPENDIX C

Rosenberg Self-Esteem Scale (RSES)

Instructions:

Below is a list of statements dealing with your general feelings about yourself. Please indicate how strongly you agree or disagree with each statement.

1. On the whole, I am satisfied with myself.

Strongly Agree Agree Disagree Strongly Disagree

2. At times I think I am no good at all.

Strongly Agree Agree Disagree Strongly Disagree

3. I feel that I have a number of good qualities.

Strongly Agree Agree Disagree Strongly Disagree

4. I am able to do things as well as most other people.

Strongly Agree Agree Disagree Strongly Disagree

5. I feel I do not have much to be proud of.

Strongly Agree Agree Disagree Strongly Disagree

6. I certainly feel useless at times.

Strongly Agree Agree Disagree Strongly Disagree

7. I feel that I'm a person of worth, at least on an equal plane with others.

Strongly Agree Agree Disagree Strongly Disagree

8. I wish I could have more respect for myself.

Strongly Agree Agree Disagree Strongly Disagree

9. All in all, I am inclined to feel that I am a failure.

Strongly Agree Agree Disagree Strongly Disagree

10. I take a positive attitude toward myself.

Strongly Agree Agree Disagree Strongly Disagree

Scoring:

Strongly Disagree Strongly Disagree Strongly Disagree Strongly Disagree

Items 2, 5, 6, 8, 9 are reverse scored. Give “Strongly Disagree” 1 point, “Disagree” 2 points, “Agree” 3 points, and “Strongly Agree” 4 points. Sum scores for all ten items. Keep scores on a continuous scale. Higher scores indicate higher self-esteem.

APPENDIX D

Eating Attitudes Test (EAT-26)©

Instructions: This is a screening measure to help you determine whether you might have an eating disorder that needs professional attention. This screening measure is not designed to make a diagnosis of an eating disorder or take the place of a professional consultation. Please fill out the below form as accurately, honestly and completely as possible. There are no right or wrong answers. All of your responses are confidential.
Part A: Complete the following questions:
1) Height Feet : Inches: □ □
2) Current Weight (lbs.): 3) Highest Weight (excluding pregnancy):
4) Lowest Adult Weight: 5) Ideal Weight:

	Part B: Check a response for each of the following statements:	Always	Usually	Often	Some times	Rarely	Never
1.	Am terrified about being overweight.	□	□	□	□	□	□
2.	Avoid eating when I am hungry.	□	□	□	□	□	□
3.	Find myself preoccupied with food.	□	□	□	□	□	□
4.	Have gone on eating binges where I feel that I may not be able to stop.	□	□	□	□	□	□
5.	Cut my food into small pieces.	□	□	□	□	□	□

6.	Aware of the calorie content of foods that I eat.	□	□	□	□	□	□
7.	Particularly avoid food with a high carbohydrate content (i.e. bread, rice, potatoes, etc.)	□	□	□	□	□	□
8.	Feel that others would prefer if I ate more.	□	□	□	□	□	□
9.	Vomit after I have eaten.	□	□	□	□	□	□
10.	Feel extremely guilty after eating.	□	□	□	□	□	□
11.	Am preoccupied with a desire to be thinner.	□	□	□	□	□	□
12.	Think about burning up calories when I exercise.	□	□	□	□	□	□
13.	Other people think that I am too thin.	□	□	□	□	□	□
14.	Am preoccupied with the thought of having fat on my body.	□	□	□	□	□	□
15.	Take longer than others to eat my meals.	□	□	□	□	□	□
16.	Avoid foods with sugar in them.	□	□	□	□	□	□
17.	Eat diet foods.	□	□	□	□	□	□
18.	Feel that food controls my life.	□	□	□	□	□	□
19.	Display self-control around food.	□	□	□	□	□	□
20.	Feel that others pressure me to eat.	□	□	□	□	□	□
21.	Give too much time and thought to food.	□	□	□	□	□	□

22.	Feel uncomfortable after eating sweets.	□	□	□	□	□	□
23.	Engage in dieting behavior.	□	□	□	□	□	□
24.	Like my stomach to be empty.	□	□	□	□	□	□
25.	Have the impulse to vomit after meals.	□	□	□	□	□	□
26.	Enjoy trying new rich foods.	□	□	□	□	□	□

Part C: Behavioral Questions: **In the past 6 months have you:**		Never	Once a month or less	2-3 times a month	Once a week	2-6 times a week	Once a day or more
A	Gone on eating binges where you feel that you may not be able to stop? *	□	□	□	□	□	□
B	Ever made yourself sick (vomited) to control your weight or shape?	□	□	□	□	□	□
C	Ever used laxatives, diet pills or diuretics (water pills) to control your weight or shape?	□	□	□	□	□	□
D	Exercised more than 60 minutes a day to lose or to control your weight?	□	□	□	□	□	□
E	Lost 20 pounds or more in the past 6 months	Yes □		No □			

* Defined as eating much more than most people would under the same circumstances and feeling that eating is out of control

APPENDIX E

Survey: Demographics, Covariates, and Independent Variables

Demographics

1. Please indicate your gender? (please note, this survey is to be completed by WOMEN only): _____

2. What month were you born?: _____

3. What year were you born?: _____

4. Which CrossFit Gym do you currently attend?

a. Windsor CrossFit
b. Maple City CrossFit
c. All Levels CrossFit
d. WHL CrossFit
e. Chatham CrossFit
f. Other

Independent Variables

1. How many months have you been engaging in CrossFit?:

_____

2. On average, how many days a week do you attend CrossFit?: _____ days/week

3. What is your CrossFit skill level?

a. Beginner (recently joined CrossFit and/or still learning the fundamental movements of CrossFit)

b. Intermediate (attend CrossFit for general health reasons, do not necessarily care about 'getting better at CrossFit but simply want to stay active and/or who may still be learning the fundamentals)
c. Advanced (have the fundamental CrossFit movements, as well as some of the more challenging CrossFit movements (e.g., kipping pullups, handstand push ups), and who are constantly trying to get better at CrossFit)
d. Competitive (perform most, if not all WODs "RX". Also known as "as prescribed")
e. Elite (compete in CrossFit sanctioned events such as the CrossFit Games, the Granite Games, or Wodapalooza)

Covariates

1. Outside of CrossFit, please indicate the number of minutes a week you spend performing other types of moderate-to-vigorous physical activity. Please note, moderate-to-vigorous physical activity includes activities that make you sweat (a little or a lot) and breath harder (or even be out of breath). Examples of moderate physical activity may include bike riding and brisk walking. Examples of vigorous physical activity may include jogging and playing soccer:

Total minutes per week: _____

APPENDIX F

Study 1: Open-ended questions

1. What are your motivations for participating in CrossFit?

(open-ended question with space provided to answer)

2. How is the atmosphere of your CrossFit affiliate different than other environments you have/do exercise in (e.g., a typical fitness centre, yoga studio, bootcamp, etc.)? Please explain.

(open-ended question with space provided to answer)

APPENDIX G

Study 2: Open-ended questions

1. Do you think the physical (e.g., how the affiliate is set up, what equipment is available, where things are, etc.) and/or social environments (e.g., how people do/don't interact with each other) at your CrossFit affiliate have influenced your body image? If so, please provide specific examples.

(open-ended question with space provided to answer)

2. Do you think the physical (e.g., how the affiliate is set up, what equipment is available, where things are, etc.) and/or social environments (e.g., how people do/don't interact with each other) at your CrossFit affiliate have influenced your self-esteem? If so, please provide specific examples.

(open-ended question with space provided to answer)

3. Do you think the physical (e.g., how the affiliate is set up, what equipment is available, where things are, etc.) and/or social environments (e.g., how people do/don't interact with each other) at your CrossFit affiliate have influenced your eating behaviours? If so, please provide specific examples.

(open-ended question with space provided to answer)

VITA AUCTORIS

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