UNIVERSITI PUTRA MALAYSIA

FACTORS ASSOCIATED WITH MUSCLE DYSMORPHIA AMONG ATHLETES IN UNIVERSITI PUTRA MALAYSIA

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BY

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

ABSTRACT

FACTORS ASSOCIATED WITH MUSCLE DYSMORPHIA AMONG ATHLETES IN UNIVERSITI PUTRA MALAYSIA

Nur Athirah binti Mat Isa

Muscle dysmorphia is characterized by a misconstrued body image, in which individuals who interpret their body size as either small or weak even though they may look normal or highly muscular. Athletes are particularly vulnerable to develop muscle dysmorphia because of the pressures surrounding sport performance and societal trends of promoting muscularity and leanness. Individuals with muscle dysmorphia are disturbed by their preoccupation with their perceived flaws, which negatively impacts their quality of life. This cross sectional study aimed to determine the associations between personal factors, behavioral factors and psychosocial factors with muscle dysmorphia among athletes. A total of 132 athletes (69.7% males and 30.3% females) with a mean age of 22.58 ± 1.91 years old were recruited from Sports Academy, Universiti Putra Malaysia. A self-administered questionnaire consisted of socio-demographic background, muscle dysmorphia, exercise dependence, supplement intake, drive for muscularity, self-esteem, media influence, peer and family pressure were completed by the respondents. Waist circumference and body fat percentage of the respondents were measured by the researcher. Results showed that 18.5% of males and 35.0% of females were at risk of abdominal obesity, whereas 87.0% of males and 84.1% of females had high level of body fat percentage. The mean total score of muscle dysmorphia was 34.56 ± 8.03. More male athletes (M=35.77, SD=7.82) engaged in muscle dysmorphia compared to female athletes (M=31.78, SD=7.92; t=2.689, p=0.008). A significant difference in muscle dysmorphia between types of sport played (F=2.646, p=0.026) was observed, in which those athletes in the rugby group (M=37.09, SD=7.45) scored higher in muscle dysmorphia than athletes in the badminton group (M=29.27, SD=8.14). Body fat percentage (r=-0.243, p=0.005), exercise dependence (r=0.443, p<0.001), self-esteem (r=-0.201, p=0.021), media influence (r=0.307, p<0.001), peer (r=0.276, p=0.001) and family (r=0.225, p=0.009) pressure were significantly correlated with muscle dysmorphia. In conclusion, muscle dysmorphia is a problem among athletes. Health professionals especially sport nutritionists should educate athletes on positive body image to prevent muscle dysmorphia among athletes.

ABSTRAK

FAKTOR YANG BERKAITAN DENGAN *MUSCLE DYSMORPHIA* DALAM KALANGAN ATLET DI UNIVERSITI PUTRA MALAYSIA

Nur Athirah binti Mat Isa

Muscle dysmorphia dicirikan sebagai salah faham mengenai imej badan di mana seseorang individu menganggap saiz badan mereka kecil atau lemah walaupun mereka mungkin kelihatan normal atau sangat berotot. Kebiasaannya atlet lebih terdedah kepada *muscle dysmorphia* disebabkan tekanan prestasi sukan dan trend masyarakat mempromosikan otot. Individu yang menghidap *muscle dysmorphia* terganggu dengan pemikiran beranggapan mereka mempunyai kelemahan, sehingga memberi kesan negatif terhadap kualiti hidup mereka. Kajian keratan rentas ini bertujuan untuk menentukan hubungan antara faktor peribadi, faktor tingkah laku dan faktor psikososial dengan *muscle dysmorphia* dalam kalangan atlet. Seramai 132 orang atlet (69.7% lelaki dan 30.3% perempuan) dengan min umur 22.58 ± 1.91 tahun telah dipilih secara rawak dari Pusat Sukan, Universiti Putra Malaysia. Kaji selidik yang mengandungi soalan berkenaan latar belakang sosio-demografi, *muscle dysmorphia*, pergantungan senaman, pengambilan makanan tambahan, pemacu keupayaan otot, keyakinan diri, pengaruh media, tekanan rakan sebaya dan keluarga dilengkapkan oleh responden. Ukuran lilitan pinggang dan peratusan lemak badan responden diukur oleh penyelidik. Keputusan menunjukkan 18.5% lelaki dan 35.0% perempuan mempunyai risiko obesiti di bahagian abdomen, sedangkan 87.0% lelaki dan 84.1% perempuan mempunyai peratusan lemak badan yang tinggi. Min skor *muscle dysmorphia* adalah 34.56 ± 8.03. Lebih ramai atlet lelaki (M=35.77, SD=7.82) mempunyai *muscle dysmorphia* berbanding atlet perempuan (M=31.78, SD=7.92; t=2.689, p=0.008). Perbezaan yang ketara dalam *muscle dysmorphia* di antara jenis-jenis sukan (F=2.646, p=0.026) juga ditemui, di mana atlet ragbi (M=37.09, SD=7.45) mempunyai skor *muscle dysmorphia* yang tinggi berbanding atlet badminton (M=29.27, SD=8.14). Peratusan lemak badan (r=-0.243, p=0.005), pergantungan senaman (r=0.443, p<0.001), keyakinan diri (r=-0.201, p=0.021), tekanan dari rakan sebaya (r=0.276, p=0.001) dan tekanan dari keluarga (r=0.225, p=0.009) dikaitkan dengan *muscle dysmorphia*. Kesimpulannya, *muscle dysmorphia* merupakan masalah dalam kalangan atlet. Pakar-pakar kesihatan terutamanya pegawai pemakanan sukan harus mendidik para atlet mengenai imej badan yang positif untuk mengelakkan masalah *muscle dysmorphia* dalam kalangan atlet.

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

Muscle dysmorphia (MD) is one of the psychiatric disorders that has been noticeable, which is a proposed clinical subtype of body dysmorphic disorder (BDD) (Pope, Gruber, Choi, Olivardia & Phillips, 1997). *"Muscle dysmorphia (MD) describes a condition characterized by a misconstrued body image in which individuals who interpret their body size as both small or weak even though they may look normal or highly muscular"* (Foster, Shorter, & Griffiths, 2015). According to Compte, Sepulveda, and Torrente (2015), *"muscle dysmorphia is mainly characterized by the persistent and obsessive belief that a one's body does not have enough muscle mass, potentially resulting in clinical distress and functional impairment"*. Body Dysmorphic Disorder (BDD) is defined as *"an intense preoccupation with an imagined physical defect or an overemphasis regarding a slight defect involving specific body parts such as hair, nose, or irregular skin pigment"* (Rhea, Lantz, & Cornelius, 2004). Other types of BDD are focusing on other parts of body, while for MD, it is focusing more on appearance of muscularity. Muscle dysmorphia can affect anyone, but it is more prevalent in males than in females (Pope, Gruber, Choi, Olivardia & Phillips, 1997).

Muscle dysmorphia is currently recognized by Diagnostic and Statistical Manual of Mental Disorder, DSM-5, (American Psychiatric Association, 2013) as a subtype of BDD. According to the American Psychiatric Association (2000), one of the diagnostic criteria

for MD is the individuals are obsessed with the belief that their body should be leaner and more muscular. They should also meet at least two out of four criteria, which are the uncontrollable focus on pursuing the usual training regimen causes the person to miss out on career, social, and other activities. Secondly, the circumstances involving body exposure are preferably avoided. If avoidance is not possible, they tend to become unease and worry occur. Next is the performance in the work and social arenas is affected by the presumed body deficiencies. Lastly, the potentially injurious effects of the training regimen fail to discourage the individual from continuing risky practices. For individual with MD, the person is concerned that his or her body is insufficiently small or muscular.

Muscle dysmorphia is common among athletes (Leone, Sedory, & Gray, 2005). Gill, Drees, Lechner, Hamady and Ludy (2016) claimed that MD was only identified among exercisers (19.4%) compared to non-exercisers (37.5%) and it was more common in males (19.5%) rather than females (4.2%). Athletes are particularly vulnerable to develop body image disorders because of the pressures surrounding sport performance and societal trends of promoting muscularity and leanness (Leone et al., 2005). Individuals who participate in sports, particularly those that require higher muscle mass (such as bodybuilder and weightlifting), are at an increased risk of developing MD (Lowe, 2014).

Many females participated in sports that focus on thinness, such as cross-country running, gymnastics, or dance. While males with MD are typically involved in sports stressing size and strength such as football, wrestling, or competitive bodybuilding (Leone, Sedory, & Gray, 2005). Bodybuilders display higher MD prevalence rates and more MD features

than other resistance training athletes. Individuals who engage in appearance related weight training are at higher risk for MD than individuals take part in weight training to improve performance (Skemp, Mikat, Schenck & Kramer, 2013). Furthermore, Pope, Gruber, Choi, Olivardia and Phillips (1997) found that MD is most often found in persons who are unhappy with their bodies and are heavily involved in weightlifting and other muscle development activities. A study done by Hildebrant, Schlundt, Langenbucher and Chung (2006) stated that 16.9% of the weightlifters had the problem of MD, while Cella et. al (2012) found that 3.4% bodybuilders meet the proposed diagnostic criteria for MD. Therefore, by studying MD among athletes, it can help the researchers to identify possible factors that are associated with MD.

1.2 PROBLEM STATEMENT

Muscle dysmorphia was associated with lower levels of psychological well-being (Bergeron & Tylka, 2007). Individuals with MD are disturbed by their preoccupation with their perceived flaws, which negatively impacts their quality of life (Cerea, Bottesi, Pacelli, Paoli, & Ghisi, 2018). Men with MD are more exposed in several compulsive behaviors (such as excessive weightlifting, exercising, and dieting) and presented significantly greater psychopathology in terms of suicide attempts, and prevalence of substance use disorders, anabolic-androgenic steroid use and quality of life (Pope, Pope, Menard, Fay, Olivardia, & Phillips, 2005). Moreover, people with MD are often anxious and depressed about their appearance severely until it can muddle their daily functions and stop them from accomplishing their goals (Nonahal, Pourshahbaz, Dolatshahi,

Omidian, 2014). Muscle dysmorphia also affect their mental health with negative consequences including alienation, narcissism, and positive deviance (Lantz et al., 2001).

Prevalence of MD that affect young adults is still under-studied (Bo et al., 2014; Cerea, Bottesi, Pacelli, Paoli, & Ghisi, 2018). In Malaysia, there is limited research studying the factors associated with MD among athletes. Personal factors need to be considered when studying MD. Sex is one of the factors that is related to the MD. According to Giardino and Procidano (2012), American men and Mexican men reported significantly more MD symptoms than American and Mexican women. It is because women have tendency to lose weight instead of gaining weight since they are not distressed with improving muscularity (Jonason, 2007).

Besides, prevalence of MD also might be difference due to the university courses taken by the students (Bo et al., 2014). Bo et al. (2014) reported that Exercise and Sport Sciences school was found to be significantly associated with the likelihood of MD as compared to Dietetics and Biology Schools. Type of sports played by the athletes might also be associated with MD (Cerea et al., 2018). Cerea et al. (2018) reported that bodybuilder group scored significantly higher on MD than the fitness practitioner group, while the strength athletes group did not differ from either the bodybuilder or the fitness practitioner groups.

Behavioral factors are important to be considered when studying MD, including drive for muscularity (Chandler & Gammage, 2009; Diehl & Baghurst, 2016; Peterson, 2007),

exercise dependence (Hale et al., 2010; Parnell, 2011; Giordano & Procidano, 2012; Hale et al., 2013), and supplement intake (Campagna & Bowsher, 2016; Danilova, Diekhoff, & Vandehey, 2013; Iftikhar, 2017; Khorramabady, 2017). Furthermore, several previous studies showed that self-esteem was found to be associated with MD (Grieve, 2007; Miracle, 2014). However, a few studies showed contradicting findings, in which they found no significant association between self-esteem and MD (Chaney, 2008; Parnell, 2011). Therefore, more research is needed to determine these associated factors and MD, especially among athletes.

Media exposure may be a source that causes muscle dissatisfaction (Agilita & Tantleff-Dunn, 2004; Leit, Gray, & Pope, 2002). Nonahal, Pourshahbaz, Dolatshahi and Omidian (2014) found that there was a positive relationship between media influence and MD symptoms. Duggan and McCreary (2004) reported that men who read muscle or fitness magazines had higher levels of body dissatisfaction than those who do not. In contrast, Mai, Bajelan and El-Murad (2013) found that there was no significant correlation between time spent watching TV and symptoms of MD in men. Therefore, more study on association between media influence and MD should be conducted.

Besides influence from media, athletes also face sport-specific pressure from teammates, coaches, judges, and fans to have an ideal physique (Petrie et al. 2008). Receiving perceived negative messages from parents and peers predicted that one would engage in strategies to increase weight and muscles (McCabe & Ricciardelli, 2003). Jonda (2007) found that parents have more of an influence on their son's dieting and muscle building

behaviors rather than the media or peers. However, another study done by Stanford and McCabe (2002) found that that messages from peers are more important than messages from parents. Therefore, more research is needed to determine the association between family and peer pressure with MD, especially among athletes.

The prevalence of MD and its associated factors are still under-studied (Bo et al., 2014; Cerea, Bottesi, Pacelli, Paoli, & Ghisi, 2018), particularly among athletes. In Malaysia, there is no published study determining the factors associated with MD among athletes. Thus, this study aimed to determine the associations between personal, behavioral and psychosocial factors with MD among athletes in Universiti Putra Malaysia (UPM).

Research question:

1. What are the associations between personal, behavioral and psychosocial factors with muscle dysmorphia among athletes in UPM?

1.3 SIGNIFICANCE OF THE STUDY

No published study has been conducted on MD among athletes in Malaysia. This study would give benefits on several aspects. Firstly, this study would add to the body of knowledge regarding MD to the researchers. This study would provide knowledge about factors that are associated to MD among athletes.

The findings of this study could also be used as baseline data for future research in understanding the association between personal, behavioral and psychosocial factors with

MD among athletes. Lastly, it is important for coaches, trainers and healthcare professionals to be aware of the problem of MD in athletes. Sport nutritionists can play an important role in preventing and identifying MD among athletes by promoting healthy body image among them. Findings from this study are useful for future intervention programs in order to reduce the problem of MD among athletes.

1.4 OBJECTIVES

1.4.1 GENERAL OBJECTIVES

To determine the factors associated with muscle dysmorphia among athletes in UPM.

1.4.2 SPECIFIC OBJECTIVES

1. To determine personal factors (age, sex, ethnicity, monthly allowance, type of sports played, courses and year of study and body composition), behavioral factors (exercise dependence, drive for muscularity and supplement intake), and psychosocial factors (self-esteem, media influence and peer and family pressure) among athletes in UPM.
2. To assess muscle dysmorphia among athletes in UPM.
3. To compare muscle dysmorphia between sexes and types of sport played among athletes in UPM.
4. To determine the associations between personal, behavioral and psychosocial factors with muscle dysmorphia among athletes in UPM.

1.5 RESEARCH HYPOTHESES

1. There are differences in muscle dysmorphia between sexes and types of sport played among athletes in UPM.
2. There are associations between personal, behavioral and psychosocial factors with muscle dysmorphia among athletes in UPM.

1.6 CONCEPTUAL FRAMEWORK

As shown in Figure 1.1, personal, behavioral and psychosocial factors are independent variables while muscle dysmorphia is dependent variable in this study.

According to Giardino and Procidano (2012), American men and Mexican men reported significantly more MD symptoms than American and Mexican women. Previous study also showed that Exercise and Sport Sciences school was found to be significantly associated with the likelihood of MD as compared to Dietetics and Biology Schools (Bo et al., 2014). In addition, bodybuilders displayed higher MD prevalence rates and more MD features than other resistance training athletes or non-athletes (Skemp, Mikat, Schenck & Kramer, 2013; Gill, Drees Lechner, Hamady & Ludy, 2016). Athletes are particularly vulnerable to develop body image disorders because of the pressures surrounding sport performance and societal trends of promoting muscularity and leanness (Leone et al., 2005).

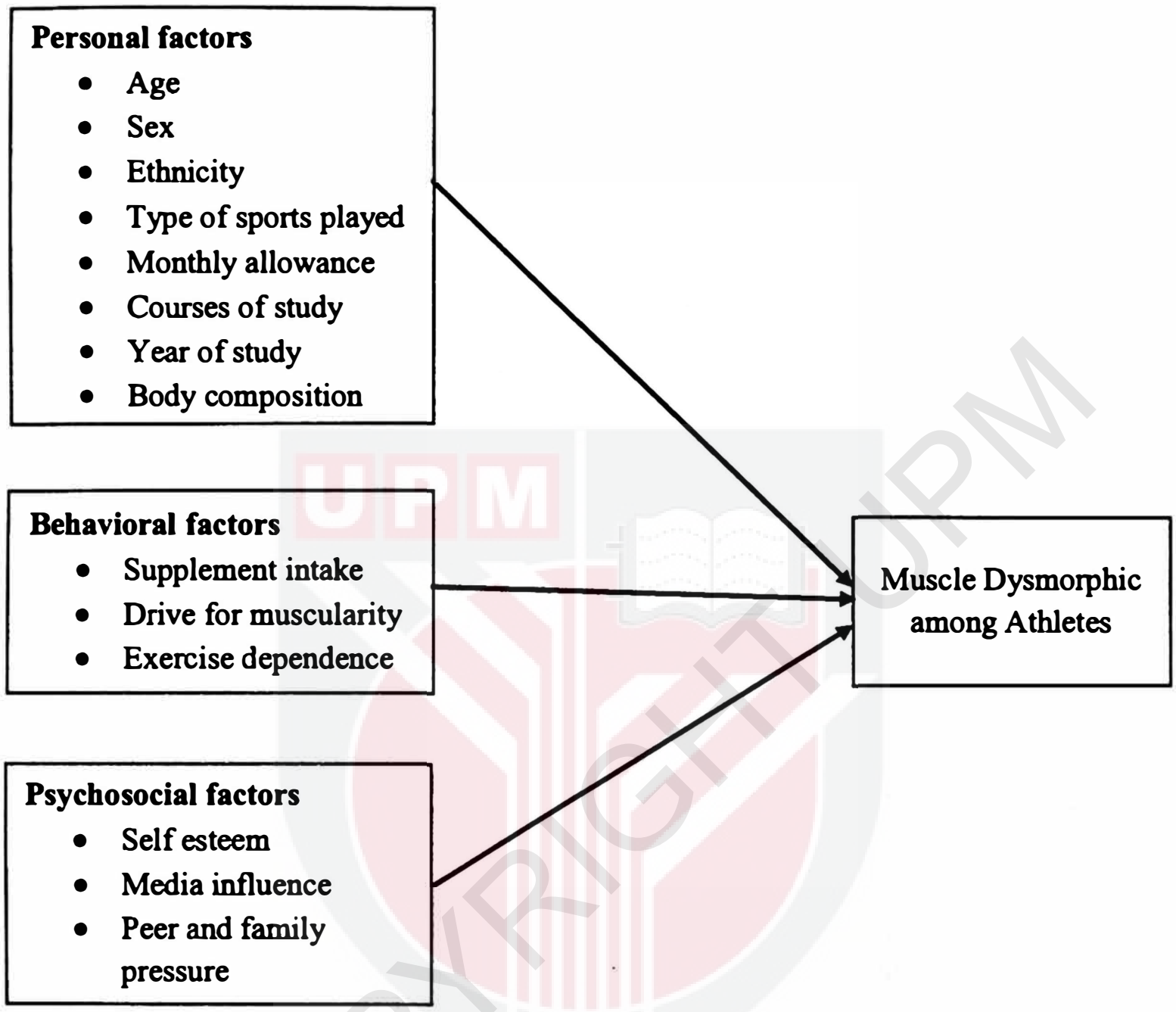

Figure 1.1: Conceptual Framework

In term of behavioral factors, Robert, Munroe-Chandler and Gammage (2009) reported that there was a positive correlation between drive for muscularity and MD in males and females. Besides, Babusaa, Czeglédi, Túrya and Mayville (2015) highlighted that the prevalence of supplement use was the highest in high risk MD group than medium and low risk MD group. They also mentioned that the highest level of exercise dependence associated with high risk MD group because they exercised most frequently and spent the most of the time working out.

Psychosocial factors such as self-esteem, media influence and peer and family pressure also found to be associated with MD among athletes. Individuals with low self-esteem usually involved in muscle building activities which can lead to MD (Grieve, 2007; Lantz et al., 2001). On the other hand, Dryer, Farr, Hiramatsu and Quinton (2016) found that there was a positive relationship between media influence and MD. Furthermore, a study done by McCabe and Ricciardelli (2003) reported that receiving negative messages from parents predicted that one would engage in strategies to increase weight and muscles. Peer influence also has been seen to be associated with symptoms of MD (Dryer, Farr, Hiramatsu & Quinton, 2016).

CHAPTER 2

LITERATURE REVIEW

2.1 Muscle Dysmorphia among Athletes

Muscle dysmorphia (MD) is characterized by a pathological preoccupation with, and pursuit of, a lean hypermuscular body, coupled with the belief that one is insufficiently muscular (Choi, Pope & Olivardia, 2002). Muscle dysmorphia is associated with a self-perceived lack of size and muscularity, and it is characterized by a preoccupation with and pursuit of a hypermesomorphic body (Mitchell et al., 2016).

A study carried out by Gill, Drees, Lechner, Hamady and Ludy (2016) showed that the prevalence of MD was slightly difference due to an individual whether they were an exerciser or not. Exercisers were vulnerable to develop body image disorders because of the pressures surrounding sport performance and societal trends of promoting muscularity and leanness (Leone, Sedory, & Gray, 2005).

Furthermore, a study done by Mitchell et al. (2016) found that MD symptoms may hypothetically be more prevalent in bodybuilders (BBs) than in non-bodybuilder resistance trainers (NBBRTs) (p<0.001). Athletes involved in resistance training and appearance-related resistance training (such as bodybuilders) may be at increased risk for MD development compared to other athletes and athletes that involved in resistance training to improve strength (such as weightlifters). Hildebrandt et al. (2006) reported that 16.9% of a sample of weightlifting males aged 32.64±12.37 years showed symptomology

of MD. In a study done by Babusa (2013), it involved male weightlifters from fitness centre and gym in Budapest. It was identified that 18% of the respondents were classified as high risk MD group, 51.6% of them were classified as low risk MD group and the rest of them (30.2%) were considered as normal group. Therefore, it is important to identify this problem among athletes.

2.2 Association between Personal Factors and Muscle Dysmorphia

Athletes' background in term of socio-economic and demographic background showed association with MD. Age is one of the factors that is related to the MD. A study conducted among competitive and non-competitive body builders in Italy showed that individuals at risk for MD were younger (26.5±6.0 years) than not at risk participants (31.0±9.5 years) (Longobardi, Prino, Fabris & Settanni, 2017). Sex also one of the factors that is related to the MD. Although there is currently an increasing number of female bodybuilders, there have been few studies conducted to examine the prevalence of MD in females. A greater number of women reported trying to lose weight instead of gaining weight because they are not distressed with improving muscularity. The perfect body shape for women is usually small and thin (Jonason, 2007). According to Giardino and Procidano (2012), American men and Mexican men reported significantly more MD symptoms than American and Mexican women. Prior research showed that MD was more prevalent in men than women, but several qualitative studies of female bodybuilders indicated that female bodybuilders showed the same body image concerns (Hale, Diehl, Weaver, & Briggs, 2013).

Furthermore, a study done by Bo et al. (2014) reported that prevalence of MD also might be difference due to the university courses taken by the students. Exercise and Sport Sciences school (p<0.001) to be significantly associated with the likelihood of MD as compared to Dietetics and Biology Schools. Type of sports played by the athletes also might be associated with MD. Bodybuilder group scored significantly higher on the total score of the MDDI than the fitness practitioner group (p=0.02), while the strength athletes group did not differ from either the BB (p=0.21) or the FP groups (p=0.49) (Cerea et al., 2018).

2.3 Association between Exercise Dependence and Muscle Dysmorphia

Exercise dependence (ED) has been defined as *"a craving for leisure time physical activity that results in uncontrollable excessive exercise behavior and that manifests in physiological symptoms (e.g., tolerance, withdrawal) and/or psychological symptoms (e.g., anxiety, depression)"* (Hausenblas & Downs, 2002). There are seven specific characteristics of ED, which are tolerance (need for more exercise to achieve goals or progress slows when using the same amounts of exercise), withdrawal (exercise is used to relieve withdrawal symptoms commonly associated with dependence), intention effect (engaging in more exercise or exercising longer than intended), lack of control (inability to reduce physical activity levels), time (focus on spending or finding time to engage in exercise), reductions in other activities (social life and job expectations are ignored due to exercise habits) and continuance (continuing to work out despite having an injury (physical or mental) that was caused by the same exercise) (Hausenblas & Downs, 2002).

According to Hale et al. (2010), the prevalence rates of ED reported vary greatly, with some studies suggesting prevalence rates as high as 46% to as low as 3% among undergraduates. According to a study done by McNamara and McCabe (2012), 34.8% of the elite athletes that resided in Australia were categorized as "at risk for exercise dependence". Szabo, La Vega, Ruiz-Barquin and Rivera (2013) found that 7% of the sport science athletes, 10% of non-sport science university athletes (8.8% of all university athletes), and 17% of the elite runners were considered to be "at risk for exercise dependence". Babusa (2013) also found that 29.6% of the male weightlifters in Budapest were asymptomatic non-dependent, 61.2% symptomatic non-dependent and the rest of them were at risk for exercise dependence.

Exercise dependence was significantly correlated to MD (r=0.59, p<0.01) among students of Kinesiology and Physical Education classes in the University of North Texas (Parnell, 2011). Another study done by Giardino and Procidano (2012) also found that ED was positively correlated to MD symptoms in both American (r=0.74, p<0.01) and Mexican men (r=0.62, p<0.01). Similarly, another study done by Zeeck, Welter, Alatas, Hildebrandt, Lahmann and Hartmann (2018) found that there was a significant association between MD and exercise dependence among competitive and non-competitive body builders in Italy. A total of 32 of them were classified "at risk for exercise dependence", 189 as "non-dependent asymptomatic" and 131 as "non-dependent symptomatic". The "at risk for exercise dependence" group showed significantly higher values for appearance intolerance (AI) (F=6.387, p<0.002), functional impairment (FI) (F=44.727, p<0.001) as well as the MDDI total score (F=24.565, p<0.001). However, there was no significant

difference in drive for size (DFS) scores between groups. Hale et al. (2013) reported that female bodybuilders seem to be more at risk for ED and MD symptoms than female fitness lifters because they need to gain weight.

2.4 Association between Supplement Intake and Muscle Dysmorphia

The Unites States' FDA defines a dietary supplement as *"a product intended for ingestion that contains a dietary ingredient intended to add further nutritional value to (supplement) the diet."* (U.S. Food & Drug Administration, 2015).

According to a study done by Campagna and Bowsher (2016), they found that there was a strong correlation between having MD and using supplements to get more muscular, in which a positive MD screen was associated with a significant increase of protein supplements (p<0.001), using supplements for muscle strength (p<0.001) and increasing endurance (p<0.001). Another study carried out by Danilova, Diekhoff and Vandehey (2013) found that high MD cases tend to use more dietary supplements that was meant to increase body mass. This study was supported by another study, in which the author mentioned that most of the people use muscle building supplements as they think those supplements will help to improve their athletic skills and attain muscular body (Iftikhar, 2017).

A study done by Khorramabady (2017) found that there was a significant difference between the bodybuilders who used supplements and drugs than those who did not use with MD (t=13.48, p<0.001). Subjects that have MD used more supplements (30.57±5.22)

than subjects without MD (22.04±5.92). In another study, current steroid users displayed significantly higher levels of MD symptoms. Thus, current anabolic androgenic steroid users scored significantly higher on the Muscle Appearance Satisfaction Scale (MASS) total scale (F=23.974, p<0.01) (Babusa, 2013). However, Longobardi, Prino, Fabris and Settanni (2017) found that there was no association between used of steroid and risk of MD (χ^2=0.011, p=0.91) among competitive and non-competitive body builders in Italy.

2.5 Association between Drive for Muscularity and Muscle Dysmorphia

Drive for muscularity refers to the desire to be beefier and the adoption of behaviors to achieve the desired body (Campana et al., 2013, McCreary et al., 2004). Frederick et al. (2007) found that 90% of the US undergraduate men reported wanting greater muscularity. A study done by Diehl and Baghurst (2016) revealed that the prevalence rate of drive for muscularity for personal trainers in the International Personal Trainer Accrediting Agency were 28%. However, Singaporean men who engaged in regular resistance training did not report a significant higher drive for muscularity (Peng & Shu-Han, 2015).

According to a study done by Robert, Munroe-Chandler, and Gammage (2009), male weight trainers scored significantly higher on the diet subscale (F=26.98, p<0.001) and the attitudinal subscale (F= 4.89, p<0.05) when compared to the female weight trainers in the Drive for Muscularity Scale (DMS), while for the training behavior subscale was not significantly different between men and women. They also found that all the subscales

of the DMS significantly predicted MD characteristics in male (p<0.05) and female (p<0.05) weight trainers.

According to a study done by Hughes, Dean and Allen (2016), there were moderate to strong positive correlations between Drive for Muscularity Scale and Muscle Dysmorphia Inventory in men living in Australia. The strongest correlation was between Drive for Muscularity Scale (Attitudes) and Muscle Dysmorphia Inventory (Physique Protection scales) (r=0.43, p<0.001).

2.6 Association between Self-Esteem and Muscle Dysmorphia

Self-esteem refers to the *"positive or negative feelings individuals may have about themselves"* (Ferris et al., 2010). Grieve (2007) states that low self-esteem contributes to the development of MD. The more ideal body internalization, the lower self-esteem. Those who suffering from low self-esteem may be stressful with some features of their look and find ways to enhance their appearance (Kuennen & Waldron, 2007). Basically, individuals with low self-esteem are likely to take part in muscle building activities to increase their self-esteem (Lantz et al., 2001).

A study done by Lamanna, Grieve, Derryberry, Hakman and McClure (2010) involved the undergraduate Psychology courses at a mid-sized university in the United States. It was found that low self-esteem was associated with MD symptoms in the male samples (r=0.506, p<0.001). However, no significant relationship was found between self-esteem and MD in students of the Kinesiology and Physical Education classes in the University

of North Texas (p>0.05) (Parnell, 2011). This study was supported by a previous study done by Chaney (2008), in which he reported that self-esteem was found to be negatively correlated with MD (r=-0.30, p<0.01) among gay and bisexual men in USA.

2.7 Association between Media Influence and Muscle Dysmorphia

Media exposure may be a source that causes muscle dissatisfaction (Agilita & Tantleff-Dunn, 2004; Leit, Gray, & Pope, 2002). Media such as television, magazines, movies, and advertisements often show images of men who are abnormally muscular (Leit, Pope & Grey, 2000).

A study done by Nonahal et al. (2014) showed a significant positive relationship between media influence and MD symptoms (r=0.26, p<0.01) among bodybuilders in Iran. One aspect of MD among male undergraduate students from the National University of Singapore is more concerns about fulfilling their social roles (Peng & Shu-Han, 2015). Duggan and McCreary (2004) indicated that men who read muscle or fitness magazines showed higher levels of body dissatisfaction than those who did not.

Mass media has also been regarded as the most influential of social pressures (Grieve, 2007). However, a study done by Diehl and Baghurst (2016) found that media influence did not have any significant relationship to MD (p>0.05) among personal trainers in International Personal Trainer Accrediting Agency, United States. In contrast, Waddell (2013) reported that there was a negative relationship between viewing movies with male main characters (muscular and non-muscular) and Muscle Dysmorphia symptomology

and body satisfaction among male students from Western Kentucky University Department of Psychology Study Board.

2.8 Association between Peer and Family Pressure with Muscle Dysmorphia

In addition to sociocultural pressures, athletes also face sport-specific pressure from team mates, coaches, judges, and fans to have an ideal physique (Petrie et al. 2008). One of the study among personal trainers in International Personal Trainer Accrediting Agency found that MD was positively related with family (r=0.08, p<0.05) and peer pressure (r=0.10, p<0.001) (Diehl & Baghurst, 2016). Another study showed that receiving perceived negative messages from parents and peers predicted that one would engage in strategies to increase weight and muscles (McCabe & Ricciardelli, 2003).

According to Lin and DeCusati (2016), there was a significant relationship between MD and the perceived preferences of close female peers (r=0.42, p<0.001) and close male peers (r=0.22, p<0.05) among university students in Northeastern United States. Perception of close male peer preferences (60.95±13.18) was not differ much with the perception of close female peer preferences (58.98±10.07). Jonda (2007) revealed that parents have more of an influence on their son's dieting and muscle building behaviors than the media or peers do. However, another study reported that messages regarding ideal body image from peers were more important than messages from parents (Stanford & McCabe, 2002)

CHAPTER 3

METHODOLOGY

3.1 STUDY DESIGN

This was a cross-sectional study aimed to determine the factors associated with muscle dysmorphia among athletes in Universiti Putra Malaysia.

3.2 STUDY LOCATION

This study was conducted at Universiti Putra Malaysia. Universiti Putra Malaysia is located about 18.6 km from the capital city of Kuala Lumpur and about 7.1 km from Malaysia's administrative capital city, Putrajaya. All athletes in this university are managed by the Athletics Development and Sports Excellence Section, Sports Academy, Universiti Putra Malaysia. It consists of national, state, university and colleges athletes which offer various kind of sports such as endurance and strength, skill sport, aquatic sport, team sport, racket and combat. This study involved national, state and university athletes from all kind of sports.

3.3 SAMPLE SIZE DETERMINATION

As shown in Table 3.1, Pearson correlation sample size formula (Hulley, Cummings, Browner, Grady, & Newman, 2013) was used to calculate the sample size in this study.

$$N = \left[\frac{(Z_\alpha + Z_\beta)}{c}\right]^2 + 3$$

$$c = 0.5 * ln\left[\frac{(1+r)}{(1-r)}\right]$$

The standard normal deviate for $Z\alpha = 1.96$

The standard normal deviate for $Z\beta = 0.84$

The expected correlation coefficient = r

Table 3.1: Sample size calculation for each independent variable based on the previous studies investigating the associations between factors and muscle dysmorphia

Independent variables	Correlation, r	Sample size, n
Self-esteem (Mitchell et al., 2016)	r = -0.42	C = 0.5 * ln [(1 + [-0.42]) / (1 – [-0.42]))] = -0.45 N = [(1.96 + 0.84) / (–0.45)]^2+ 3 = 42
Exercise dependence (Parnell, 2011)	r = 0.59	C = 0.5 * ln [(1 + 0.59) / (1 – 0.59)] = 0.68 N = [(1.96 + 0.84) / (0.68)]^2+ 3 = 20
Media influence (Dryer et al., 2016)	r = 0.49	C = 0.5 * ln [(1 + 0.49) / (1 – 0.49)] = 0.54 N = [(1.96 + 0.84) / (0.54)]^2+ 3 = 30
Peer pressure (Dryer et al., 2016)	r = 0.33	C = 0.5 * ln [(1 + 0.33) / (1 – 0.33)] = 0.34 N = [(1.96 + 0.84) / (0.34)]^2+ 3 = 71
Drive for muscularity (Wilkin, 2014)	r = 0.71	C = 0.5 * ln [(1 + 0.71) / (1 – 0.71)] = 0.89 N = [(1.96 + 0.84) / (0.89)]^2 + 3 = 13

The highest number of sample size was selected as the final sample size of this study, which was 71 respondents based on Table 3.1. Additional adjustment was done in computing the required sample size of this study.

Table 3.2: Additional adjustment in computing the sample size.

Criteria	Adjustment	Sample size, n
Adjust for the estimated sample effect	nadj * DEFF DEFF = 1.3	92.3
Adjust for the expected proportion response rate	response rate = 0.80 (Aday & Cornelius, 2006)	115.38
Adjust for the expected proportion eligible	% Eligible = 0.90	128.19 ≈ 129

After consideration of design effect, response rate, and proportion of eligibility, the final sample size required for this study was 129 respondents.

3.4 RESPONDENTS

The target population of this study was athletes from Universiti Putra Malaysia. Respondents were selected based on the inclusion and exclusion criteria as stated in Table 3.3.

Table 3.3: Inclusion and exclusion criteria for the selection of subjects

Inclusion Criteria	Exclusion Criteria
Malaysian	Physically disabled
National, state and university athletes	Pregnant
Male and female	

3.5 SAMPLING DESIGN

As shown in Figure 3.1, multistage sampling method was used in this study. All of the athletes are students from UPM and they are managed by the Sports Academy of UPM. There are six categories of sports in UPM, which are endurance and strength, skill sport, aquatic, team sport, racket and combat. One sport was randomly selected from each

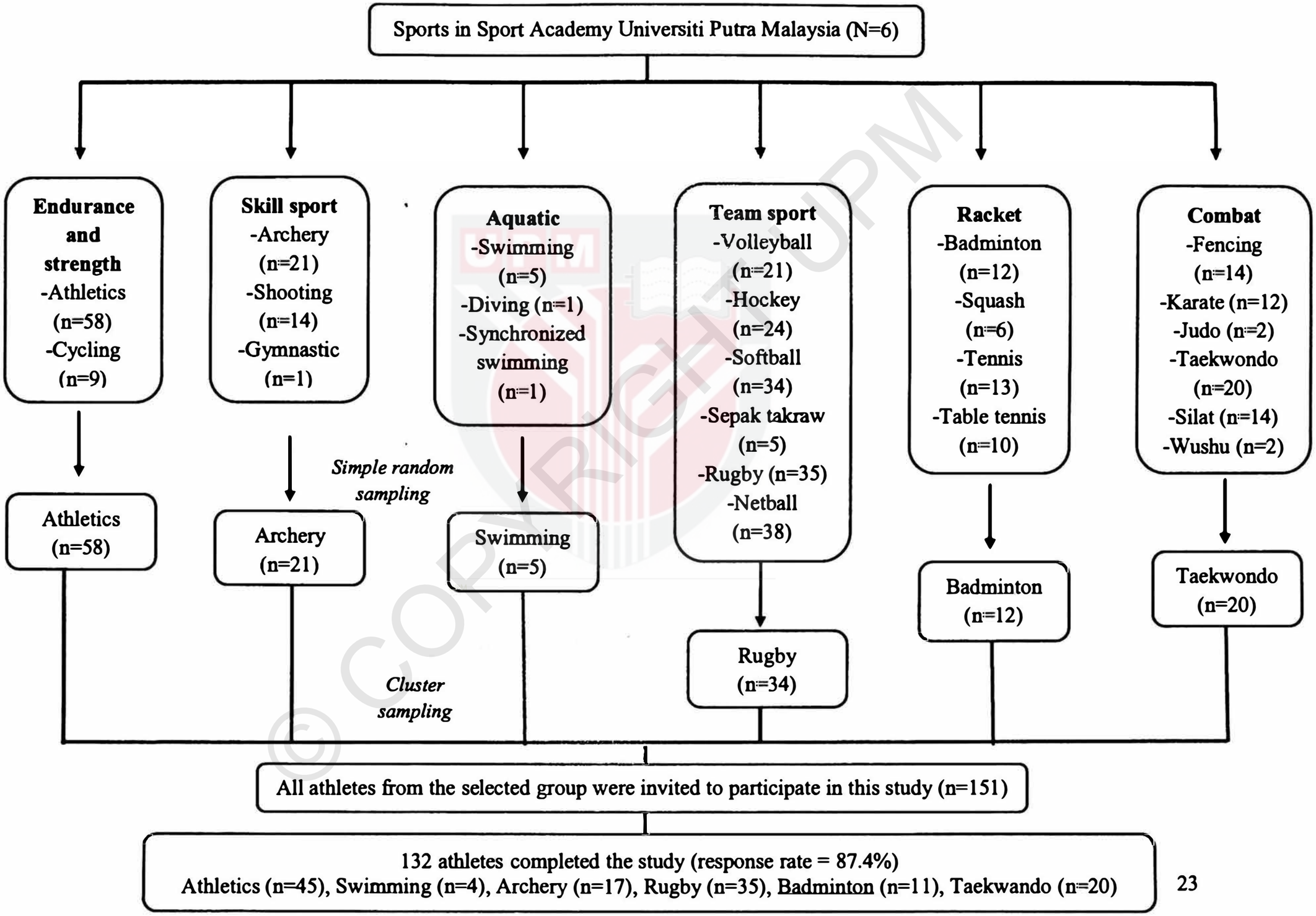

Figure 3.1: Sampling design

category of sport. All athletes in the selected sports were invited to participate in this study (N=151). A total of 132 athletes completed the study, yielding a response rate of 87.4%.

3.6 STUDY INSTRUMENTS

A self-administered questionnaire was used in this study. The questionnaire consisted of three components which are personal factors, behavioral factors and psychosocial factors. Anthropometric measurements (body fat percentage and waist circumference) were measured by the researcher.

3.6.1 SELF-ADMINISTERED QUESTIONNAIRE

3.6.1.1 Socio-Demographic Background

This section contained respondent's personal information which are age, sex, ethnicity, type of sports played, monthly allowance, course of study, and year of study.

3.6.1.2 Muscle Dysmorphia

The Muscle Dysmorphia Disorder Inventory (MDDI) was used in this study to assess characteristics of muscle dysmorphia (Hildebrandt, Langenbucher & Schlundt, 2004). This questionnaire consisted of 13 items and all the items needed to be answered by using a 5-point Likert scale (ranging from 1 = never to 5 = always). MDDI assessed muscle dysmorphia characteristics using a three factor approach, addressing cognitive, emotional, and behavioral aspects of the condition. The three subscales utilized in this inventory are "desire for size" (DFS), "appearance intolerance" (AI), and "functional impairment" (FI).

The desire for size (DFS) subscale consists of questions concerning thoughts of less muscular, being smaller, and weaker than wished, or want to improve size and strength (Items 1,4,5,6 and 8). The appearance intolerance (AI) subscale consisted of questions regarding negative beliefs about one's body and resulting appearance anxiety or body exposure avoidance (Items 2,3,7 and 9). The functional impairment (FI) subscale consisted of questions about behaviors related to maintaining exercise routines, interference of negative emotions when deviating from exercise routines, or avoidance of social situations (Items 10,11,12 and 13). Higher score indicated higher MD symptoms.

This MDDI showed a good convergent and divergent validity (Hildebrandt et al., 2004). It also showed a good internal consistency reliability with Cronbach's alpha coefficients for the drive for size subscale 0.85, 0.77 for appearance intolerance subscale, 0.80 for functional impairment subscale and 0.81 for total MDDI (Cerea et al., 2018). In the present study, the Cronbach's alpha coefficients were 0.753 for total MDDI, 0.685 for appearance intolerance subscale, 0.805 for desire for size subscale, and 0.797 for functional impairment subscale, indicating that this MDDI showed good internal consistency reliability.

3.6.1.3 Supplement Intake

The supplement intake subscale under the Muscle Dysmorphia Inventory (MDI) was used in this study (Rhea, Lantz, & Cornelius, 2004). It consisted of four items with 6-point Likert scale (1 = never to 6 = always). The total score for supplement intake subscale ranged from 4 to 24. A higher score indicated a higher propensity to exhibit characteristics

associated with supplement intake. This subscale showed a good divergent validity and internal consistency reliability (α=0.94) (Rhea et al., 2004). Its Cronbach's alpha coefficient was 0.923, indicating excellent internal consistency reliability.

Additionally, another validated questionnaire from a previous study done by Korybner (2009) on dietary supplement use among athletes at a British University was used to assess respondents' characteristics of supplementation intake. The respondents were first asked their current consumption of the nutritional supplement to get the prevalence of nutritional supplement users and non- users and those who did not consume supplements skipped this section. There were two parts in the questionnaire, in which for Part 1, the type, frequency and reason of nutritional supplement use were asked and for Part 2, the sources of nutritional supplement information was being assessed. Part 1 was divided into six main categories of nutritional supplements which consisted of energy supplement, protein supplements/weight gainers, vitamin and mineral supplements, herbals and others substances. Under each category, various types of nutritional supplement were listed and the respondents' need to identify which types of supplement they consumed. The reasons of supplementation intake were listed with specific codes provided which were used by the respondents' to answer the questionnaire.

3.6.1.4 Exercise Dependence

The Exercise Dependence Scale-21 was used to differentiate who was at risk for exercise dependence, non-dependent symptomatic and non-dependent asymptomatic (Hausenblas & Downs, 2002). This scale has 7 criteria which are Withdrawal Effect (items 1, 8, 15),

Continuance (items 2, 9, 16), Tolerance (items 3, 10, 17), Lack of Control (items 4, 11, 18), Reduction in other activities (items 5, 12, 19), Time (items 6, 13, 20) and Intention Effects (Items 7, 14, 21). The answers provided for each item are in terms of 6-point Likert scale rating from Never, Rarely, Sometimes, Often, Usually, Always. Each item received the following values: Always = 6, Usually = 5, Often = 4, Sometimes = 3, Rarely = 2, Never = 1. A higher score indicated more exercise dependent symptoms.

Individuals who were classified into the dependent range got 3 or more of the criteria were classified as exercise dependence. The dependent range was operationalized as indicating a score of 5 or 6 for that item. Individuals who scored in the 3 to 4 range were classified as symptomatic. These individuals may theoretically be considered at-risk for exercise dependence. Finally, individuals who scored in the 1-2 range were classified as asymptomatic. This scale showed good convergent validity and reliability (Downs, Hausenblas & Nigg, 2004). The Cronbach's alpha coefficients of this scale were 0.789, 0.678, 0.844, 0.815, 0.713, 0.757 and 0.823 for withdrawal effect, continuance, tolerance, lack of control, reduction in other activities, time and intention effect subscales, respectively, indicating good internal consistency reliability.

3.6.1.5 Drive for Muscularity

The Drive for Muscularity Scale (Robert, Munroe-Chandler, and Gammage, 2009) was used in this study to measure an individual's perception that he or she is not muscular enough and that bulk should be added to his or her body frame, in the form of muscle mass. It has two subscales which are Muscularity Oriented Body Image subscale (items

1,7,9,11,13,14 and 15) and Muscularity Behavior subscale (items 2,3,4,5,6,8,10 and 12). All items need to be answered by using a 6-point Likert scale ranging from 1 (always) to 6 (never). All the items were reversed scored and the subscales could be scored separately. For Muscularity Oriented Body Image subscale, the score ranged between 7-42 while for Muscularity Behavior subscale, the score ranged between 8-48. Higher scores on this scale reflected a greater drive for muscularity. This scale showed good construct validity (McPherson, McCarthy, McCreary & McMilla, 2010) and reliability (Robert et al., 2009). The Cronbach's alpha coefficient of this scale in the current study was 0.895. The muscularity oriented body image subscale (Cronbach's alpha = 0.858) and the muscularity behavior subscale (Cronbach's alpha = 0.858) showed good internal consistency reliability.

3.6.1.6 Self-Esteem

The Rosenberg Self-Esteem Scale (RSES) was used in this study to measures global self-worth by measuring both positive and negative feelings about the self (Rosenberg, 1965). All 10 items were answered using a 4-point Likert scale ranging from "strongly agree" to "strongly disagree". Items 2, 5, 6, 8 and 9 were reversely scored (1 = Strongly disagree, 2 = Disagree, 3 = agree, 4 = Strongly agree). After summing all the score in all items, total score of RSES ranged between 10-40. A higher score indicated the higher self-esteem of an individual. This instrument showed a good validity and reliability (Mohd Jamil, 2006). In the current study, the RSES showed good internal consistency reliability (Cronbach's alpha = 0.705).

3.6.1.7 Media Influence and Family and Peer Pressure

The Sociocultural Attitudes Towards Appearance Questionnaire-4 (SATAQ-4) was used in this study to assess societal and interpersonal aspects of appearance ideals and assess sociocultural influences on personal appearance (Thompson, 2011). This questionnaire consisted of 22 items with 5 subscales which were Internalization: Thin/Low Body Fat (items 3,4,5,8 and 9), Internalization: Muscular/Athletic (items 1,2,6,7 and 10), Pressures from family (items 11,12,13 and 14), Pressures from media (items 19,20,21 and 22), Pressures from peers (items 15,16,17 and 18). Three subscales which were pressures from family, media and peers were used in this study. These items were answered by using a 5-point Likert scale (ranging from 1=definitely disagree to 5=definitely agree). Higher scores indicated higher levels of influences and pressures from each source that respondents feel or experience. This SATAQ-4 scale scores demonstrated excellent reliability (α =0.78-0.96) and good convergent validity (Yamamiya, Shimai, Schaefer, Thompsonc, Shroff & Ordazc, 2016). The Cronbach's alpha coefficients for the pressures from media, peers, and family subscales in the present study were 0.939, 0.912 and 0.840, respectively.

3.6.2 ANTHROPOMETRIC MEASUREMENTS

3.6.2.1 Body fat percentage

The body fat percentage of the athletes was measured using an Omron body fat monitor HBF-302 (Omron Matsusaka Co. Ltd, Matsusaka, Japan). The reading obtained was classified according to the classification of body fat percentage are shown in Table 3.4 below (The American Council on Exercise, 2009).

Table 3.4: Body fat category according to American Council on Exercise

Classification	Males	Females
Essential fat	2-5%	10-13%
Athletes	6 – 13%	14-20%
Fitness	14 - 17%	21-24%
Average	18 - 24%	25 - 31%
Obese	> 25%	> 32%

3.6.2.2 Waist circumference

Waist circumference was measured to determine abdominal obesity among respondents by using a Lufkin Executive Diameter steel tape W606PM (Cooper Hand Tools, Raleigh, North Carolina, USA). The measurements were taken by measuring the distance between around the smallest area below the ribcage and above the umbilicus. The tape should be snug and not compress to the skin. The classification of abdominal obesity is shown in the Table 3.5 below (WHO/IOTF/IASO, 2000).

Table 3.5: Waist circumference cut-off points

	Males	Females
Waist circumference	≥ 90 cm	≥ 80 cm

3.7 STUDY APPROVAL

Ethical approval was sought from the Ethics Committee for Research Involving Human Subjects Universiti Putra Malaysia (Reference number: JKEUPM-2018-339; see Appendix A) prior to data collection. Permission from Sport Academy, Universiti Putra Malaysia was obtained.

3.8 PRE-TEST

Pre-testing was conducted at Universiti Putra Malaysia. Thirty athletes from UPM who were eligible to participate in this study were selected randomly to answer the questionnaires (Perneger, Courvoisier, Hudelson, & Gayet-Ageron, 2015). These 30 athletes were excluded from the actual data collection. The purpose of conducting pre-testing were to test the instruments that was used and also to identify any problems before the actual data collection. Respondents spent about 20 minutes to answer all the questions in the questionnaire.

3.9 DATA COLLECTION

Data collection was conducted from December 2018 to March 2019. Information sheet which contained a brief explanation on the aims of the study were given to the respondents. When they agreed to participate in the study, consent form (see Appendix B) was signed prior to the administration of the questionnaire (see Appendix C). The respondents answered a self-administered questionnaire regarding information on personal, behavioral and psychosocial factors. After completing the questionnaire, anthropometry measurements (waist circumference and body fat percentage) were measured by the researcher. Upon study completion, each respondent received an incentive of stationery for his/her participation.

3.10 STATISTICAL ANALYSIS

Statistical analysis was performed by using IBM SPSS Statistics 23 (IBM Corp., Armonk, NY). Descriptive statistics were used to present all the variables in this study. The result

of the continuous variables gives mean and standard deviation while for categorical variables presented as frequencies and percentages. Inferential statistics were used to test the hypothesis. Chi-square test was used to determine the association between two categorical variables. Pearson's product-moment correlation test was used to determine the relationship between two continuous variables. Level of significance was all set at $p<0.05$.

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Personal Factors

4.1.1 Socio-demographic characteristics

Socio-demographic characteristics of the respondents in this study are shown in Table 4.1. A total of 132 athletes (69.7% males and 30.3% females) participated in this study. The mean age of the respondents was 22.58 ± 1.91 years old, ranging from 18 to 27 years old. Majority of the respondents were Malay (83.3%), second year students (28.8%) and from the field of arts and social sciences (62.2%). One in three of the respondents were from athletics (34.1%), followed by rugby (26.5%), taekwondo (15.2%), badminton (8.3%) and swimming (3.0%). The mean monthly allowance received by the respondents was RM 497.73 ± 217.28, ranging from RM 100.00 to RM 1000.00.

Table 4.1: Socio-demographic characteristics in this study (n=132)

Characteristics	Mean ± SD	n (%)
Age (years)	22.58 ± 1.91	
18-19		5 (3.8)
20-22		60 (45.5)
23-25		57 (43.2)
>25		10 (7.6)
Sex		
Male		92 (69.7)
Female		40 (30.3)
Ethnicity		
Malay		110 (83.3)
Chinese		15 (11.4)
Indian		4 (3.0)
Others		3 (2.3)

Table 4.1: Socio-demographic characteristics in this study (n=132) ***(cont.)***

Characteristics	Mean ± SD	n (%)
Type of sport played		
Athletics		45 (34.1)
Swimming		4 (3.0)
Archery		17 (12.9)
Rugby		35 (26.5)
Badminton		11 (8.3)
Taekwondo		20 (15.2)
Year of study		
1st year		32 (24.2)
2nd year		38 (28.8)
3rd year		18 (13.6)
4th year		31 (23.5)
5th year		4 (3.0)
Others (Foundation, postgraduate students)		9 (6.8)
Courses of study		
Arts and Social Sciences		82 (62.2)
Sciences		33 (25.0)
Technical		13 (9.8)
Foundation		4 (3.0)
Monthly allowance (RM)	497.73 ± 217.28	

4.1.2 Waist circumference and body fat percentage

Waist circumference of the respondents is described in Table 4.2. The mean waist circumference for male athletes was 79.51 ± 11.73 cm and 75.80 ± 10.19 cm for female athletes. Nearly one in five of the males (18.5%) and 35.0% of the females were at risk of abdominal obesity. The finding was supported by a study done by Norafidah, Azmawati and Norfazilah (2013) in Tanjung Karang, Selangor, which reported that higher number of females (67.5%) were at risk of abdominal obesity than males (32.5%). Similarly, a study done by Norfazilah, Julaina and Azmawati (2015) also showed that more female adults (45.5%) were at risk of abdominal obesity than male adults (10.8%).

Body fat percentage of the respondents is also described in Table 4.2. The mean body fat percentage for males was 19.43 ± 5.55% and 27.31 ± 7.33% for females. Results showed that majority of the athletes (87.0% males and 84.1% females) had high level of body fat percentage. The finding of this study was similar with a study done by Johari et al. (2017), in which they reported that majority of the adult women (72.8%) had a higher body fat percentage. However, it was contradicted with a study done by Cheah, Majorie Ensayan, Helmy and Chang (2018) which found that only 43.0% of the undergraduate students in a public university in Sarawak had higher body fat percentage. Similarly, a study done by Wan Nudri, Wan Abdul Manan and Mohamed Rusli (2009) also reported that only 13.3% of the athletes in Kota Bharu, Kelantan had a higher body fat percentage.

Table 4.2: Distribution of respondents by body fat percentage and waist circumference (n=132)

Variable	Mean ± SD/n (%)		
	Male (n=92)	Female (n=40)	Total (n=132)
Waist circumference (cm)	79.51 ± 11.73	75.80 ± 10.19	78.39 ± 11.37
At risk of abdominal obesity	17 (18.5)	14 (35.0)	31 (23.5)
Not at risk of abdominal obesity	75 (81.5)	26 (65.0)	101 (76.5)
Body fat percentage (%)	19.43 ± 5.55	27.31 ± 7.33	21.81 ± 7.12
Normal	12 (13.0)	9 (22.5)	21 (15.9)
High body fat percentage	80 (87.0)	31 (77.5)	111 (84.1)

4.2 Muscle Dysmorphia

As shown in Table 4.3, the mean total score of muscle dysmorphia in this study was 34.56 ± 8.03, ranging from 13.00 to 61.00. There were three subscales in muscle dysmorphia, including desire for size subscale, appearance intolerance subscale and functional impairment subscale. The mean score for desire for size subscale was 12.6 ± 4.74, for appearance intolerance was 10.50 ± 3.60, while for functional impairment was 11.46 ± 3.66. A study done by Nonahal et al. (2013) showed that the mean score for muscle dysmorphia disorder among body builders in Iran was 29.78 ± 7.41, while Williams (2011) found that the mean score for muscle dysmorphia among male weightlifters in Oklahoma State University, drive for size, appearance intolerance and functional impairment subscale were 35.3 ± 9.2, 15.1 ± 5.8, 8.5 ± 4.2 and 11.6 ± 5.1, respectively.

Findings showed that 40.9% of the respondents answered "never" to the statement "*I think my legs are too thin*", while only 4.5% answered "always" to the statement "*I think my chest is too small*". Half of the respondents (50.8%) answered "never" to the statement "*I hate my body*" and one in ten of the respondents (9.8%) reported that they always wear loose clothing so that people cannot see their body. Furthermore, almost half of the respondents (41.7%) answered "sometimes" to the statement "*I feel anxious when I miss one or more workout days*".

Table 4.3: Distribution of respondents by items in the Muscle Dysmorphia Disorder Inventory (n=132)

Item	n (%)				
	Never	Seldom	Sometimes	Often	Always
Desire for size					
I think my body is too small	38 (28.8)	19 (14.4)	47 (35.6)	18 (13.6)	10 (7.6)
I wish I could get bigger	37 (28.0)	22 (16.7)	35 (26.5)	24 (18.2)	14 (10.6)

Table 4.3: Distribution of respondents by items in the Muscle Dysmorphia Disorder Inventory (n=132) *(cont.)*

Item	n (%)				
	Never	Seldom	Sometimes	Often	Always
I think my chest is too small	34 (25.8)	30 (22.7)	41 (31.1)	21 (15.9)	6 (4.5)
I think my legs are too thin	54 (40.9)	34 (25.8)	25 (18.9)	13 (9.8)	6 (4.5)
I wish my arms were bigger	32 (24.2)	29 (22.0)	31 (23.5)	21 (15.9)	19 (14.4)
Mean ± SD	12.6 ± 4.74				
Min – Max	5.00 – 23.00				
Appearance intolerance					
I wear loose clothing so that people can't see my body	20 (15.2)	32 (24.2)	46 (34.8)	21 (15.9)	13 (9.8)
I hate my body	67 (50.8)	22 (16.7)	30 (22.7)	10 (7.6)	3 (2.3)
I feel like I hate too much body fat	27 (20.5)	27 (20.5)	35 (26.5)	22 (16.7)	21 (15.9)
I am very shy about letting people see me with my shirt off	27 (20.5)	27 (20.5)	34 (25.8)	23 (17.4)	21 (15.9)
Mean ± SD	10.50 ± 3.60				
Min – Max	4.00 – 20.00				
Functional impairment					
I feel anxious when I miss one or more workout days	10 (7.6)	18 (13.6)	55 (41.7)	32 (24.2)	17 (12.9)
I pass up social activities with friends because of my workout schedule	18 (13.6)	29 (22.0)	45 (34.1)	23 (17.4)	17 (12.9)
I feel depressed when I miss one or more workout days	30 (22.7)	36 (27.3)	37 (28.0)	22 (16.7)	7 (5.3)
I pass up chances to meet new people because of my workout schedule	28 (21.2)	20 (15.2)	47 (35.6)	29 (22.0)	8 (6.1)
Mean ± SD	11.46 ± 3.66				
Min – Max	4.00 – 20.00				
Total score for Muscle Dysmorphia Disorder Inventory	Mean ± SD	34.56 ± 8.03			
	Min - Max	13.00 – 61.00			

4.3 Behavioral Factors

4.3.1 Supplement intake

As shown in the Figure 4.1, the prevalence rate of nutritional supplement used among athletes in this study was 26.5%. A study done by El Khoury and Antoine-Jonville (2012) found that 36.3% of the exercisers in Beirut City, Lebanon were the nutritional supplement users. Golshanraz, Laleh and Lotfali (2014) also found that one third of the elite Iranian athletes (35.0%) used sport supplements. A study done by Sulaiman and Salam (2013) found that majority of the professional athletes in Saudi Arabia (93.3%) consumed dietary supplements. Mónica, Maria, Pedro, José, Pedro and Vitor (2015) also reported that more than half of the Portuguese athletes (64.0%) consumed nutritional supplements.

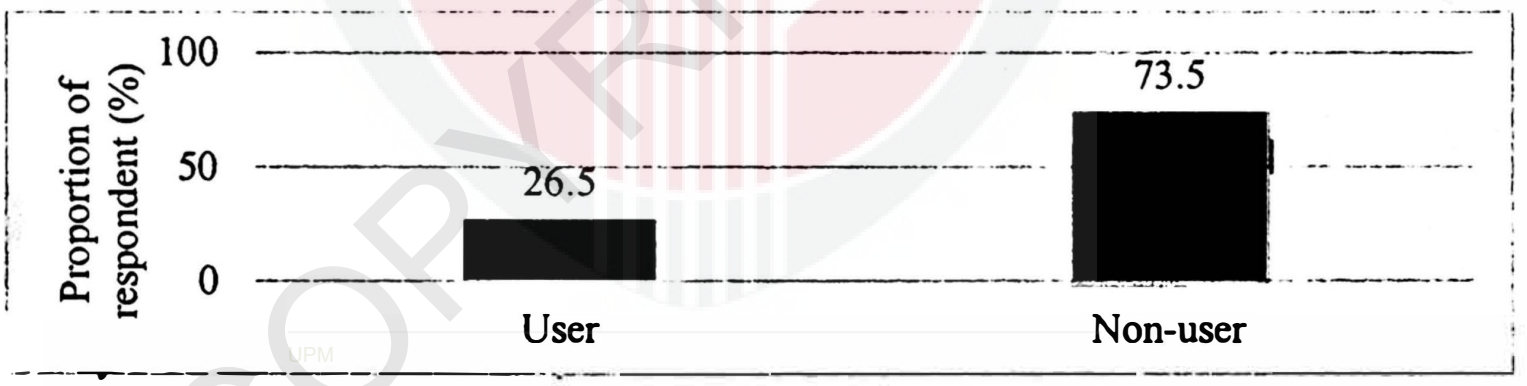

Figure 4.1: Prevalence of nutritional supplement used (n=132)

Table 4.4 shows that majority of the athletes had been using nutritional supplement for years (83.3%) rather than months (13.9%) and weeks (2.8%). More than half of the respondents used nutritional supplement (57.1%) for 5 to 7 days per week. Majority of the respondents consumed nutritional supplement in order to gain muscle or weight

(77.1%) and to improve health (57.1%). Only a few of them consumed nutritional supplement to improve speed (22.9%) and strength (20.0%).

Table 4.4: Distribution of respondents by items in the Dietary Supplement Use (n=132)

Items	n (%)
Duration has been using nutritional supplement	
Weeks	1 (2.8)
Months	5 (13.9)
Years	30 (83.3)
Number of days per week using nutritional supplement	
1-2	7 (20.0)
3-4	8 (22.9)
5-7	20 (57.1)
Reasons of using nutritional supplement	
I decided I needed to use supplement	9 (25.7)
Improve speed or agility	8 (22.9)
Improve strength	7 (20.0)
Weight/muscle gain	27 (77.1)
For health	20 (57.1)
Able to train longer	13 (37.1)
Makes me feel better	10 (28.6)
Increase energy level	16 (45.7)
Improve concentration	12 (34.3)

Table 4.5 shows the most commonly consumed nutritional supplement by the athletes in this study. Two thirds of the respondents consumed energy drinks (65.7%) and whey protein (65.7%), followed by Vitamin C (51.4%), calorie replacement (48.6%), caffeine (40.0%), and creatine (34.3%). Only a few of the respondents reported the used of herbal nutritional supplement such as green tea extract (5.7%) and wheat grass (2.9%). Similarly, a small proportion of them consumed glucosamine (5.7%), diuretics (2.9%) and fat burner (2.9%).

Table 4.5: Distribution of types of nutritional supplement used by the respondents (n=132)

Nutritional supplement	n (%)	
	Yes	No
Energy		
Energy drinks	23 (65.7)	12 (34.3)
Calorie replacement	17 (48.6)	18 (51.4)
Caffeine	14 (40.0)	21 (60.0)
MCT oil	2 (5.7)	33 (94.3)
Protein		
Whey protein	23 (65.7)	12 (34.3)
Weight gainer powder	8 (22.9)	27 (77.1)
Branched chain amino acid (BCAA)	9 (25.7))	26 (74.3)
Amino acids	2 (5.7)	33 (94.3)
Creatine	12 (34.3)	23 (65.7)
Glutamine	6 (17.1)	29 (82.9)
Hydroxy-beta-methylbutyric	1 (2.9)	34 (97.1)
Soy protein	4 (11.4)	31 (88.6)
Vitamin and Mineral		
Multi vitamin	7 (20.0)	28 (80.0)
Vitamin E	4 (11.4)	31 (88.6)
Vitamin C	18 (51.4)	17 (48.6)
B-complex	1 (2.9)	34 (97.1)
Vitamin D	1 (2.9)	34 (97.1)
Multivitamin with mineral	1 (2.9)	34 (97.1)
Iron	1 (2.9)	34 (97.1)
Calcium	5 (14.3)	30 (85.7)
Zinc	1 (2.9)	34 (97.1)
Potassium	1 (2.9)	34 (97.1)
Magnesium	2 (5.7)	33 (94.3)
Cobalt	1 (2.9)	34 (97.1)
Herbals		
Green tea extract	2 (5.7)	33 (94.3)
Wheat grass	1 (2.9)	34 (97.1)
Others		
Glucosamine	2 (5.7)	33 (94.3)
Diuretics	1 (2.9)	34 (97.1)
Fat burner	1 (2.9)	34 (97.1)

This finding was equivalent to the previous studies (El Khoury & Antoine-Jonville, 2012; El-Saleh et al., 2015; Lacerda et al., 2015), which also found that protein supplement was the highest consumed supplement among exercisers.

The supplement intake subscale in the Muscle Dysmorphia Inventory was also used to assess nutritional supplement used by the respondents in this study. As shown in Table 4.6, the mean score for supplement intake subscale was 13.44 ± 5.17, ranging from 4.00 to 24.00. About one in ten of the respondents (8.6%) answered "always" to the statement *"I use supplements to help me recuperate from strenuous workouts"*. Some 40.0% of the respondents answered "sometimes" to the statement *"Before I workout, I consume energy supplements"*.

Table 4.6: Distribution of respondents by items in the Muscle Dysmorphia Inventory (n=132)

Items	n (%)					
	Never	Rarely	Sometimes	Often	Very often	Always
Supplement intake						
1) Before I work out, I consume energy supplements	4 (11.4)	5 (14.3)	14 (40.0)	4 (11.4)	4 (11.4)	4 (11.4)
2) I use supplements to help me recuperate from strenuous workouts	4 (11.4)	5 (14.3)	13 (37.1)	7 (20.0)	3 (8.6)	3 (8.6)
3) I use supplements to increase my lifting performance	5 (14.3)	6 (17.1)	7 (20.0)	10 (28.6)	4 (11.4)	3 (8.6)
4) I use nutritional supplements to help me train through injuries	5 (14.3)	3 (8.6)	8 (22.9)	11 (31.4)	5 (14.3)	3 (8.6)
Mean ± SD	13.44 ± 5.17					
Min - Max	4.00 – 24.00					

4.3.2 Exercise dependence

As shown in Table 4.7, mean total score of exercise dependence was 71.93 ± 15.68. There are seven criteria of exercise dependence, which are withdrawal effect, continuance, tolerance, lack of control, reduction in other activities, time and intention effect. One in ten of the respondents (9.1%) were classified as exercise dependence. A study done by Hale, Diehl, Weaver and Briggs (2013) reported that mean score of exercise dependence for experienced and novice body builder with fitness lifter were 75.19 ± 16.15, 71.41 ± 19.09, and 60.42 ± 15.11, respectively.

One third of the respondents answered "sometimes" to the statements *"I exercise despite persistent physical problems"* (36.4%), *"I think about exercise when I should be concentrating on school/work"* (33.3%), *"I spend a lot of time exercising"* (34.8%). A small proprotion of them answered "always" to the statements *"I exercise when injured"* (1.5%) and *"I am unable to reduce how intense I exercise"* (3.0%). Similarly, a small proportion of the respondents answered "never" to the statement *"I continually increase my exercise duration to achieve the desired effects/benefits"* (1.5%) and *"I exercise to avoid feeling tense"*(4.5%). Almost half of the respondents answered "sometimes" to the statements *"I am unable to reduce how often I exercise"* (43.2%) and *"I exercise longer than I plan"* (40.2%).

Table 4.7: Distribution of respondents by items in the Exercise Dependence Scale 21 (n=132)

Items	n (%)					
	Never	Rarely	Sometimes	Often	Very often	Always
Withdrawal effect						
I exercise to avoid feeling irritable	9 (6.8)	10 (7.6)	45 (34.1)	35 (26.5)	24 (18.2)	9 (6.8)
I exercise to avoid feeling anxious	7 (5.3)	15 (11.4)	39 (29.5)	38 (28.8)	23 (17.4)	10 (7.6)
I exercise to avoid feeling tense	6 (4.5)	14 (10.6)	39 (29.5)	38 (28.8)	23 (17.4)	12 (9.1)
Mean ± SD	10.98 ± 3.17					
Min – Max	3.00 – 18.00					
Continuance						
I exercise despite recurring physical problems	11 (8.3)	15 (11.4)	43 (32.6)	40 (30.3)	18 (13.6)	5 (3.8)
I exercise when injured	28 (21.2)	29 (22.0)	37 (28.0)	27 (20.5)	9 (6.8)	2 (1.5)
I exercise despite persistent physical problems	14 (10.6)	14 (10.6)	48 (36.4)	36 (27.3)	16 (12.1)	4 (3.0)
Mean ± SD	9.44 ± 2.90					
Min – Max	3.00 – 17.00					
Tolerance						
I continually increase my exercise intensity to achieve the desired effects/benefits	2 (1.5)	6 (4.5)	34 (25.8)	44 (33.3)	26 (19.7)	20 (15.2)
I continually increase my exercise frequency to achieve the desired effects/benefits	4 (3.0)	10 (7.6)	43 (32.6)	32 (24.2)	37 (20.5)	16 (12.1)
I continually increase my exercise duration to achieve the desired effects/benefits	2 (1.5)	9 (6.8)	40 (30.3)	43 (32.6)	24 (18.2)	14 (10.6)
Mean ± SD	11.89 ± 3.13					
Min – Max	3.00 – 18.00					

Table 4.7: Distribution of respondents by items in the Exercise Dependence Scale 21 (n=132) *(cont.)*

Items	n (%)					
	Never	Rarely	Sometimes	Often	Very often	Always
Lack of control						
I am unable to reduce how long I exercise	10 (7.6)	21 (15.9)	53 (40.2)	33 (25.0)	13 (9.8)	2 (1.5)
I am unable to reduce how often I exercise	15 (11.4)	18 (13.6)	57 (43.2)	28 (21.2)	9 (6.8)	5 (3.8)
I am unable to reduce how intense I exercise	11 (8.3)	19 (14.4)	50 (37.9)	36 (27.3)	12 (9.1)	4 (3.0)
Mean ± SD	9.52 ± 2.95					
Min – Max	3.00 – 16.00					
Reduction in other activities						
I would rather exercise than spend time with family/friend	25 (18.9)	28 (21.2)	38 (28.8)	26 (19.7)	11 (8.3)	4 (3.0)
I think about exercise when I should be concentrating on school/work	12 (9.1)	19 (14.4)	44 (33.3)	37 (28.0)	14 (10.6)	6 (4.5)
I choose to exercise so that I can get out of spending time with family/friends	28 (21.2)	22 (16.7)	39 (29.5)	25 (18.9)	13 (9.8)	5 (3.8)
Mean ± SD	9.08 ± 3.16					
Min – Max	3.00 – 17.00					

Table 4.7: Distribution of respondents by items in the Exercise Dependence Scale 21 (n=132) *(cont.)*

Items		n (%)					
		Never	Rarely	Sometimes	Often	Very often	Always
Time							
I spend a lot of time exercising		5 (3.8)	13 (9.8)	46 (34.8)	34 (25.8)	21 (15.9)	13 (9.8)
I spend most of my free time exercising		7 (5.3)	19 (14.4)	41 (31.1)	44 (33.3)	15 (11.4)	6 (4.5)
A great deal of my time is spent exercising		6 (4.5)	14 (10.6)	38 (28.8)	43 (32.6)	20 (15.2)	11 (8.3)
	Mean ± SD	10.83 ± 2.99					
	Min – Max	3.00 – 18.00					
Intention effect							
I exercise longer than I intend		6 (4.5)	22 (16.7)	48 (36.4)	34 (25.8)	14 (10.6)	8 (6.1)
I exercise longer than I expect		7 (5.3)	15 (11.4)	52 (39.4)	36 (27.3)	17 (12.9)	5 (3.8)
I exercise longer than I plan		7 (5.3)	15 (11.4)	53 (40.2)	39 (29.5)	13 (9.8)	5 (3.8)
	Mean ± SD	10.20 ± 2.95					
	Min – Max	3.00 – 18.00					
Total score of Exercise Dependence Scale-21	Mean ± SD	71.93 ± 15.68					
	Min - Max	25.00 – 118.00					

4.3.3 Drive for muscularity

Table 4.8 presents the descriptive data on drive for muscularity. There are two subscales which are muscularity oriented body image subscale and muscularity behavior subscale. The mean score for muscularity oriented body image subscale was 24.17 ± 7.59 and the mean score for muscularity behavior subscale was 32.30 ± 8.81. The mean total score for drive for muscularity was 56.47 ± 14.34. The finding was consistent with a study conducted by Compte, Sepulveda and Torrente (2015) which reported that the mean score for drive for muscularity among university students in Bueno Aires, Argentina was 59.1 ± 6.71.

One third of the respondents (34.1%) answered "sometimes" to the statement *"I think that my legs are not muscular enough"* and only 6.1% of them answered "never" to the statement *"I think that I would feel stronger if I gained a little more muscle mass"*. More than one third of the respondents (37.9%) answered "sometimes" to the statement *"I feel guilty if I miss a weight training session"*. About one in ten of the respondents (6.1%) answered "always" to the statement *"I think that my weight training schedule interferes with other aspects of my life"*.

Table 4.8: Distribution of respondents by items in the Drive for Muscularity Scale-15 (n=132)

Items	n (%)					
	Always	Very often	Often	Sometimes	Rarely	Never
Muscularity Oriented Body Image						
I wish that I were more muscular	27 (20.5)	13 (9.8)	28 (21.2)	40 (30.3)	14 (10.6)	10 (7.6)
I think I would feel more confident if I had more muscle mass	20 (15.2)	16 (12.1)	30 (22.7)	38 (28.8)	18 (13.6)	10 (7.6)
I think that I would look better if gained 4.5 kg in bulk	12 (9.1)	13 (9.8)	23 (17.4)	29 (22.0)	22 (16.7)	33 (25.0)
I think that I would feel stronger if I gained a little more muscle mass	24 (18.2)	14 (10.6)	25 (18.9)	39 (29.5)	22 (16.7)	8 (6.1)
I think that my arms are not muscular enough	20 (15.2)	17 (12.9)	31 (23.5)	38 (28.8)	16 (12.1)	10 (7.6)
I think that my chest is not muscular enough	15 (11.4)	13 (9.8)	29 (22.0)	44 (33.3)	18 (13.6)	13 (9.8)
I think that my legs are not muscular enough	17 (12.9)	21 (15.9)	29 (22.0)	45 (34.1)	10 (7.6)	10 (7.6)
Mean ± SD	24.17 ± 7.59					
Min – Max	7.00 – 42.00					
Muscularity Behavior						
I lift weight to build up muscle	15 (11.4)	11 (8.3)	32 (24.2)	42 (31.8)	20 (15.2)	12 (9.1)
I use protein or energy supplements	9 (6.8)	9 (6.8)	22 (16.7)	24 (18.2)	23 (17.4)	45 (34.1)
I drink weight gain or protein shakes	13 (9.8)	10 (7.6)	15 (11.4)	24 (18.2)	23 (17.4)	47 (35.6)
I try to consume as many calories as I can in a day	14 (10.6)	9 (6.8)	25 (18.9)	37 (28.0)	22 (16.7)	25 (18.9)

Table 4.8: Distribution of respondents by items in the Drive for Muscularity Scale-15 (n=132) ***(cont.)***

Items		n (%)					
		Always	Very often	Often	Sometimes	Rarely	Never
I feel guilty if I miss a weight training session		6 (4.5)	11 (8.3)	27 (20.5)	50 (37.9)	20 (15.2)	18 (13.6)
Other people think I work out with weights too often		6 (4.5)	15 (11.4)	29 (22.0)	32 (24.2)	26 (19.7)	24 (18.2)
I think about taking anabolic steroids		18 (13.6)	8 (6.1)	15 (11.4)	16 (12.1)	12 (9.1)	63 (47.7)
I think that my weight training schedule interferes with other aspects of my life		8 (6.1)	12 (9.1)	31 (23.5)	41 (31.1)	21 (15.9)	19 (14.4)
	Mean ± SD	32.30 ± 8.81					
	Min – Max	8.00 – 46.00					
Total score of Drive for Muscularity-15	Mean ± SD	56.47 ± 14.34					
	Min - Max	15.00 – 83.00					

4.4 Psychosocial factors

4.4.1 Self-esteem

As shown in Table 4.9, the mean score of self-esteem was 23.67 ± 4.78, ranging from 10-47. A study done by Compte, Sepulveda and Torrente (2015) showed that the mean score for self-esteem among university students in Bueno Aires was 32.47 ± 4.4. A local study done by Rosli et al. (2012) reported that the mean score for self-esteem among undergraduate students in Universiti Kebangsaan Malaysia was 17.44 ± 3.44.

One third of the respondents (34.1%) answered "strongly agree" for the statement *"I take a positive attitude toward myself*". More than half of the respondents (54.5%) answered "agree" for the statement *"I feel that I'm a person of worth, at least on an equal plane with others"*. However, nearly one in five of the respondents (16.7%) strongly disagreed that they feel themselves to be useless. About one third of them (37.4%) disagreed that they have not much to be proud of.

Table 4.9: Distribution of respondents by items in the Rosenberg Self-Esteem Scale (n=132)

Items	n (%)			
	Strongly agree	Agree	Disagree	Strongly disagree
1)On the whole, I am satisfied with myself	27 (20.5)	56 (42.4)	41 (31.1)	8 (6.1)
2) At times I think I am no good at all	14 (10.6)	57 (43.2)	44 (33.3)	17 (12.9)
3) I feel that I have a number of good qualities	21 (15.9)	71 (53.8)	35 (26.5)	5 (3.8)
4) I am able to do things as well as most other people	21 (15.9)	67 (50.8)	38 (28.8)	6 (4.5)
5) I feel do not have much to be proud of	13 (9.8)	58 (43.9)	49 (37.1)	12 (9.1)

Table 4.9: Distribution of respondents by items in the Rosenberg Self-Esteem Scale (n=132) *(cont.)*

Items	n (%)			
	Strongly agree	**Agree**	**Disagree**	**Strongly disagree**
6) I certainly feel useless at times	16 (12.1)	46 (34.8)	48 (36.4)	22 (16.7)
7) I feel that I'm a person of worth, at least on an equal plane with others	21 (15.9)	72 (54.5)	37 (28.0)	2 (1.5)
8) I wish I could have more respect for myself	31 (23.5)	64 (48.5)	24 (18.2)	13 (9.8)
9) All in all, I am inclined to feel that I am a failure	13 (9.8)	51 (38.6)	46 (34.8)	22 (16.7)
10) I take a positive attitude toward myself	45 (34.1)	57 (43.2)	21 (15.9)	9 (6.8)
Mean ± SD	23.67 ± 4.78			
Min - Max	10.00 – 47.00			

4.4.2 Media influence, peer and family pressure

As shown in Table 4.10, the mean score for family pressure was 11.17 ± 4.43. One in four of the respondents (25.0%) answered "mostly agree" for the statement *"I feel pressure from family members to improve my appearance"*. One third of the respondents (34.1%) answered "mostly agree" of "definitely agree" to the statement "family members encourage me to get in better shape". On the other hand, the mean score for peer pressure was 11.08 ± 4.24. About one in five of the respondents (22.0%) of the respondents answered "mostly disagree" to the statement *"My peers encourage me to get thinner"*. More than one third of the respondents (37.9%) disagreed that they felt pressure from peers to improve their appearance. For the media influence subscale, the mean score was

Table 4.10: Distribution of respondents by items in the Sociocultural Attitudes towards Appearance Questionnaire-4 (n=132)

Items	n (%)				
	Definitely disagree	**Mostly disagree**	**Neither agree nor disagree**	**Mostly agree**	**Definitely agree**
Pressures from family					
I feel pressure from family members to look thinner	31 (23.5)	34 (25.8)	41 (31.1)	19 (14.4)	7 (5.3)
I feel pressure from family members to improve my appearance	24 (18.2)	33 (25.0)	47 (35.6)	19 (14.4)	9 (6.8)
Family members encourage me to decrease my level of body fat	31 (23.5)	24 (18.2)	43 (32.6)	22 (16.7)	12 (9.1)
Family members encourage me to get in better shape	17 (12.9)	23 (17.4)	47 (35.6)	28 (21.2)	17 (12.9)
Mean ± SD	11.17 ± 4.43				
Min – Max	4.00 – 20.00				
Pressures from peer					
My peers encourage me to get thinner	27 (20.5)	29 (22.0)	45 (34.1)	21 (15.9)	10 (7.6)
I feel pressure from my peers to improve my appearance	23 (17.4)	27 (20.5)	48 (36.4)	24 (18.2)	10 (7.6)
I feel pressure from my peers to look in better shape	24 (18.2)	22 (16.7)	48 (36.4)	24 (18.2)	14 (10.6)
I get pressure from my peers to decrease my level of body fat	26 (19.7)	24 (18.2)	49 (37.1)	22 (16.7)	11 (8.3)
Mean ± SD	11.08 ± 4.24				
Min – Max	4.00 – 20.00				

Table 4.10: Distribution of respondents by items in the Sociocultural Attitudes towards Appearance Questionnaire-4 (n=132) ***(cont.)***

Items	n (%)				
	Definitely disagree	Mostly disagree	Neither agree nor disagree	Mostly agree	Definitely agree
Pressures from media					
I feel pressure from the media to look in better shape	24 (18.2)	24 (18.2)	44 (33.3)	25 (18.9)	15 (11.4)
I feel pressure from the media to look thinner	28 (21.2)	31 (23.5)	42 (31.8)	22 (16.7)	9 (6.8)
I feel pressure from the media to improve my appearance	22 (16.7)	25 (18.9)	44 (33.3)	30 (22.7)	11 (8.3)
I feel pressure from the media to decrease my level of body fat	25 (18.9)	26 (19.7)	42 (31.8)	30 (22.7)	9 (6.8)
Mean ± SD	10.92 ± 3.90				
Min – Max	4.00 – 20.00				

10.92 ± 3.90. One third of the respondents agreed that they felt pressure from the media to improve their appearance (31.0%) and to decrease their level of body fat (29.5%).

4.5 Comparison of muscle dysmorphia between sexes and types of sport played

As shown in Table 4.11, there was a significant difference in muscle dysmorphia between sexes (t=2.689, p=0.008). Males (M=35.77, SD=7.82) were found to have higher mean score of muscle dysmorphia than females (M=31.78, SD=7.92) in this study. The finding of this study was consistent with a previous study done by Giordano and Procidano (2012). They found that American and Mexican men reported significantly more muscle dysmorphia symptoms than American and Mexican women. Similarly, Robert, Munroe-Chandler and Gammage (2009) also reported that males scored higher for muscle dysmorphia than females. Females usually involved in activities that focused on thinness, while males participated in activities that require much strength and muscle (Leone, Sedory, & Gray, 2005).

Table 4.11: Comparison of muscle dysmorphia between sexes

Characteristics	Mean	SD	t-value	p-value
Sex				
Male	35.77	7.82	2.689	0.008
Female	31.78	7.92		

Table 4.12 shows the ANOVA analysis to compare muscle dysmorphia between different types of sport played. Results showed that there was a significant difference in muscle dysmorphia between types of sport played (F=2.646, p=0.026). The highest mean score of muscle dysmorphia was reported in rugby group (M=37.09, SD=7.45), while the lowest mean score was reported in badminton group (M=29.27, SD=8.14). Post Hoc test further

portrayed that there was a significant difference in muscle dysmorphia between rugby and badminton (p=0.049), in which those athletes in the rugby group scored higher in muscle dysmorphia than athletes in the badminton group.

Table 4.12: Comparison of muscle dysmorphia between types of sport played

Characteristic	Mean	SD	*F*-value	*p*-value
Type of sports played			2.646	0.026
Athletics	35.76	8.93		
Swimming	29.75	5.32		
Archery	32.53	5.60		
Rugby	37.09	7.45		
Badminton	29.27	8.14		
Taekwondo	33.05	7.29		

Post Hoc test (Tukey) shows significance difference between:
Rugby and Badminton (p=0.049)

4.6 Factors associated with muscle dysmorphia

In this study, age, monthly allowance, year of study, body fat percentage, waist circumference, exercise dependence, supplement intake, drive for muscularity, self-esteem, media influence, peer and family pressure were the factors investigated in association with muscle dysmorphia among athletes in Sports Academy, UPM.

4.6.1 Personal factors with muscle dysmorphia

Based on Table 4.13, no significant relationships were reported between age (r=0.078, p=0.373), monthly allowance (r=-0.053, p=0.542), and year of study (r=0.027, p=0.542) with muscle dysmorphia. The finding of this study is in contrast with a study done by Longobardi, Prino, Fabris and Settanni (2017). They found that among competitive and non-competitive body builders in Italy, it stated that those who were at risk for muscle dysmorphia were younger (26.5 ± 6.0 years) than not at risk participants (31.0 ± 9.5 years).

Table 4.13: Associations between personal factors, behavioral and psychosocial factors with muscle dysmorphia

Variable	Muscle dysmorphia	
	r	*p*-value
Personal factors		
Age	0.078	0.373
Monthly allowance	-0.053	0.542
Year of study	0.027	0.762
Anthropometric measurement		
Body fat percentage	-0.243**	0.005
Waist circumference	-0.118	0.176
Behavioral factors		
Exercise dependence	0.443**	<0.001
Supplement intake	-0.067	0.443
Drive for muscularity		
Muscularity oriented body image	-0.103	0.241
Muscularity behavior	-0.160	0.067
Psychosocial factors		
Self-esteem	-0.201*	0.021
Media influence	0.307**	<0.001
Peer pressure	0.276**	0.001
Family pressure	0.225**	0.009

*Correlation is significant at the 0.05 level

**Correlation is significant at the 0.01 level

Hildebrandt et al. (2006) found that 16.9% of the weightlifting males aged 32.64±12.37 years showed symptoms of muscle dysmorphia. Olivardia et al (2000) showed that the average age of onset for muscle dysmorphia was between 19 and 20 years of age.

Body fat percentage was significantly and negatively correlated to muscle dysmorphia (r=-0.243, p=0.005). This finding was inconsistent with a previous study which found that body fat percentage was not correlated with total score of muscle dysmorphia, but significantly correlated with drive for size subscale (r=-0.392, p=0.05) (Williams, 2011). He also mentioned that due to the nature of competition, it is common for athletes,

especially bodybuilders with muscle dysmorphia have extremely low body fat levels. However, waist circumference was not significantly associated with muscle dysmorphia (r=-0.118, p=0.176) among athletes. There is no study determining the association of waist circumference and muscle dysmorphia.

4.6.2 Exercise dependence with muscle dysmorphia

As shown in Table 4.15, there was a positive correlation between exercise dependence and muscle dysmorphia (r=0.443, p<0.001). This finding was supported by a study done by Parnell (2011), which found that exercise dependence was significantly correlated to muscle dysmorphia among students of Kinesiology and Physical Education classes in the University of North Texas (r=0.59, p<0.01). Another study done by Giordano and Procidano (2012) also found positive correlation between exercise dependence and muscle dysmorphia symptoms in American (r=0.74, p<0.01) and Mexican (r=0.62, p<0.01) men. Similarly, Zeeck, Welter, Alatas, Hildebrandt, Lahmann and Hartmann (2018) reported that there was a significant association between muscle dysmorphia and exercise dependence among competitive and non-competitive body builders in Italy.

4.6.3 Supplement intake with muscle dysmorphia

Results showed that there was no significant association between supplement intake and muscle dysmorphia (r=-0.067, p=0.443). This finding was supported by a study done by Longobardi, Prino, Fabris and Settanni (2017), which found that among competitive and non-competitive body builders in Italy, there was no association between used of steroid and risk of muscle dysmorphia (p=0.91). However, another study done by Campagna and

Bowsher (2016) found that there was a strong correlation between having muscle dysmorphia and using supplements for muscle strength (p<0.001) and increasing endurance (p<0.001). Another study also found that high muscle dysmorphia cases tend to use more dietary supplements to increase body mass, improve athletic skills and to get muscular body (Danilova, Diekhoff & Vandehey, 2013; Iftikhar, 2017) .

4.6.4 Drive for muscularity with muscle dysmorphia

Results showed that there was no significant association between muscularity oriented body image (r=-0.103, p=0241) and muscularity behavior (r=-0.160, p=0.067) with muscle dysmorphia (Table 4.13). These results were supported by a study done by Peng and Shu-Han (2015), which reported that Singaporean men who engaged in regular resistance training did not report a significant higher drive for muscularity. In contrast, Hughes, Dean and Allen (2016) revealed that there was a positive correlations between drive for muscularity and muscle dysmorphia in Australian men.

4.6.5 Self-esteem with muscle dysmorphia

This study found a negative association between self-esteem and muscle dysmorphia (r=-0.201, p=0.021). This finding was supported by a study done by Chaney (2008), which reported that self-esteem was negatively correlated with MD (r=-0.30, p <0.01) among gay and bisexual men in USA. Similarly, low self-esteem was associated with muscle dysmorphia symptoms among undergraduate male students of Psychology courses in one of the universities in USA (r=-0.506, p<0.001) (Lamanna, Grieve, Derryberry, Hakman

& McClure, 2010). Individual with low self-esteem may be stressful with some features of their look and find ways to enhance their appearance (Kuennen & Waldron, 2007).

4.6.6 Media influence and muscle dysmorphia

There was a positive correlation between media influence and muscle dysmorphia (r=0.307, p<0.001) (Table 4.13). A study done by Nonahal et al. (2014) found that there was a significant positive relationship between media influence and muscle dysmorphia symptoms (r=0.26, p<0.01) among bodybuilders in Iran. Similarly, a study done by Duggan and McCreary (2004) also found that men who read muscle or fitness magazines showed higher levels of body dissatisfaction than those who did not.

4.6.7 Peer and family pressure with muscle dysmorphia

Both peer (r=0.276, p=0.001) and family (r=0.225, p=0.009) pressure were positively associated with muscle dysmorphia (Table 4.13). This result was consistent with a study done by Diehl and Baghurst (2016) which found that muscle dysmorphia was positively related with family (r=0.08, p<0.05) and peer pressures (r=0.10, p<0.001) among personal trainers in International Personal Trainer Accrediting Agency. Another study also showed that there was a significant relationship between muscle dysmorphia and the perceived preferences of close female peers (r=0.42, p<0.001) and male peers (r=0.22, p<0.05) among male college students in college of Northeastern United States (Lin & DeCusati, 2016). However, several studies mentioned that only family played important roles in shaping muscle building behavior and some studies showed that only peers played important roles (Jonda, 2007; Stanford & McCabe, 2002). Both of this factor might be

associated to muscle dysmorphia because negative messages from parents and peers might cause them to engage in increasing weight and muscles (McCabe & Ricciardelli, 2003).

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

Muscle dysmorphia is characterized by a misconstrued body image in which individuals who interpret their body size as either small or weak even though they may look normal or highly muscular (Foster, Shorter & Griffiths, 2015). Athletes are particularly vulnerable to develop muscle dysmorphia because of the pressures surrounding sport performance and societal trends of promoting muscularity and leanness (Leone et al., 2005). The present study provides information on muscle dysmorphia as well as its association with personal factors, anthropometric measurement, behavioral factors and psychosocial factors among athletes in Universiti Putra Malaysia.

The findings of this study revealed that muscle dysmorphia is a problem among athletes. More male athletes reported to have this problem than female athletes. Rugby player was also reported to have the highest mean score of muscle dysmorphia as compared to the other types of sports. Majority of the athletes (84.1%) had a high body fat percentage and 23.5% of them were at risk of abdominal obesity. Bivariate analysis showed that body fat percentage, exercise dependence, self-esteem, peer and family pressure were significantly associated to muscle dysmorphia among athletes. Health professionals especially sport nutritionists should educate and advise athletes about the risks of muscle dysmorphia in order to prevent this problem among athletes.

5.2 Limitations of the Study

Several limitations are found in this study. Firstly, the causality relationship of the independent and dependent variables cannot be determined as the cross-sectional study design was used in this study. Secondly, this study was only conducted in Universiti Putra Malaysia, therefore the results of the study cannot be generalized to all athletes in Malaysia. Thirdly, there is no cut-off point for the Muscle Dysmorphia Disorder Inventory (MDDI) to classify the athletes into with or without muscle dysmorphia.

Furthermore, this study collected data by using a self-administered questionnaire. Hence, under- or over-reporting of the questionnaire might occur. The current condition of athletes could affect the accuracy of the results in this study. Data collection was conducted during the training session, in which athletes might get fatigue and stress due to continuous training. They were more likely to be lack of focus and tend to under- or over-report the items in the questionnaire. However, the findings from this study can provide the prevalence and factors associated with muscle dysmorphia among athletes in UPM, in which it can be used as baseline data for future research in related field.

5.3 Recommendations

Cohort studies should be conducted in the future in order to provide information on causation between personal, behavioral and psychosocial factors with muscle dysmorphia. Future studies should be conducted in a larger sample size and involved different locations in Malaysia to increase the generalization of the findings of the study.

Health professionals should plan for a psychoeducational program in order to assist athletes with muscle dysmorphia. Furthermore, future studies regarding muscle dysmorphia should consider determining other factors, such as dietary intake (Segura, Castell, Baeza, & Guillén, 2015) and eating disorder (Compte, Sepulveda, & Torrente, 2018; Devrim, Bingic, & Hongu, 2018).

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APPENDIX B: INFORMATION SHEET AND CONSENT FORM

JAWATANKUASA ETIKA UNIVERSITI UNTUK PENYELIDIKAN MELIBATKAN MANUSIA (JKEUPM)
UNIVERSITI PUTRA MALAYSIA, 43400 UPM SERDANG, SELANGOR, MALAYSIA

FORM 2.4: RESPONDENT'S INFORMATION SHEET AND INFORMED CONSENT FORM

Please read the following information carefully and do not hesitate to discuss any questions you may have with the researcher.

1. STUDY TITLE :

FACTORS ASSOCIATED WITH MUSCLE DYSMORPHIA AMONG ATHLETES IN UNIVERSITI PUTRA MALAYSIA.

2. INTRODUCTION.

Muscle dysmorphia (MD) is a condition characterized by a misconstrued body image in which individuals who interpret their body size as both small or weak even though they may look normal or highly muscular. People with muscle dysmorphia are often anxious and depressed about their appearance severely until it can muddle their daily functions and stop them from accomplishing their goals. Athletes are one of the group that have higher tendency to muscle dysmorphia. Therefore, the purpose of this study is to determine the factors (personal, behavioral and psychosocial factors) associated with muscle dysmorphia among athletes in Universiti Putra Malaysia.

This study is part of the graduation requirement for Bachelor of Science (Nutrition and Community Health) from Faculty of Medicine and Health Sciences, Universiti Putra Malaysia which is expected to be completed within one year of study. A total of 129 athletes from Universiti Putra Malaysia will participate in this study.

3. WHAT WILL YOU HAVE TO DO?

You need to read and understand about this study in Respondent's Information Sheet. If you voluntarily agree to participate in this study, you are required to sign the respondent's consent form in Page 3. Upon completing the respondent's consent form, please return it to the researcher.

During data collection, you need to complete a set of questionnaire including information on MD, supplement intake, exercise dependence, drive for muscularity, self-esteem, media, peer and family influences. Respondent's body fat percentage and waist circumference will be measured during the data collection.

Your participation in this study will take approximately 30 minutes. Your participation in this study is voluntary. You have the right to withdraw from this study at any time without giving any reasons and no penalty will be applied upon your withdrawal.

4. WHO SHOULD NOT PARTICIPATE IN THE STUDY?

Athletes who are:

a) pregnant
b) physically disabled

5. WHAT WILL BE THE BENEFITS OF THE STUDY:

(a) TO YOU AS THE SUBJECT?

You will know your body fat percentage and waist circumference. Once you have successfully completed this study, stationery will be given to you as a token of appreciation for your participation in this study.

(b) TO THE INVESTIGATOR?

Findings of this study will provide information on muscle dysmorphia and its related factors among athletes. Findings of this study also could serve as baseline data for future research and it also could give an information for health professionals to develop and conduct health promotion programs to promote healthy body image among athletes.

6. WHAT ARE THE POSSIBLE RISKS?

This study has minimal risk where it only involves measurements on waist circumference and percentage of body fat as well as filling up a questionnaire. If you are found to have any symptoms on muscle dysmorphia or other psychological problems, you will be referred to a counselor.

7. WILL THE INFORMATION THAT YOU PROVIDE AND YOUR IDENTITY REMAIN CONFIDENTIAL?

All the information and respondents' identity will be kept private and confidential and used for academic purposes only. Researchers will not disclose your name or any personal information to third parties. No individual description will be made on any parts of the study or publication.

8. WHO SHOULD YOU CONTACT IF YOU HAVE ADDITIONAL QUESTIONS DURING THE COURSE OF THE RESEARCH?

If you have any enquiries, you can contact as follows;

Researcher:
Nur Athirah binti Mat Isa
017-2486496

Supervisor
Dr. Gan Wan Ying
03-89472469

*Please initial here if you have read and understood the contents of this page*_____

9. CONSENT

I ..... Identity Card No. .....

address.....

..... hereby voluntarily agree to take part in the research stated above *(clinical /drug trial/video recording/ focus group/interview-based/ questionnaire-based).

I have been informed about the nature of the research in terms of methodology, possible adverse effects and complications (as written in the Respondent's Information Sheet). I understand that I have the right to withdraw from this research at any time without giving any reason whatsoever. I also understand that this study is confidential and all information provided with regard to my identity will remain private and confidential.

I* wish / do not wish to know the results related to my participation in the research.

I agree/do not agree that the images/photos/video recordings/voice recordings related to me be used in any form of publication or presentation (if applicable).

* delete where necessary

Signature ..... Signature .....
(Respondent) (Witness)

Date ..... Name .....

I/C No. .....

I confirm that I have explained to the respondent the nature and purpose of the above-mentioned research.

Date ..... Signature .....
(Researcher)

APPENDIX C: QUESTIONNAIRE

Reference No: .....

UNIVERSITI PUTRA MALAYSIA

FACULTY OF MEDICINE AND HEALTH SCIENCES
DEPARTMENT OF NUTRITION AND DIETETICS

QUESTIONNAIRE FORM

"CONFIDENTIAL"

RESEARCH TITLE:

FACTORS ASSOCIATED WITH MUSCLE DYSMORPHIA AMONG ATHLETES IN UNIVERSITI PUTRA MALAYSIA

Researcher : Nur Athirah binti Mat Isa

Supervisor : Dr. Gan Wan Ying

Date : / / 2018

Instruction: Questions in this questionnaire form are for academic purposes only. All *information collected is secured. Your involvement and cooperation are greatly appreciated.*

1

SECTION A:

Instruction: Fill in the blank or tick (√) in the space provided below.

No	Information	Choices
1.	Date of birth	___ / ___ / _____ (dd/mm/yyyy)
2.	Sex	[ ] Male [ ] Female
3.	Ethnicity	[ ] Malay [ ] Chinese [ ] Indian [ ] Others: .....
4.	Type of sports played	[ ] Athletics [ ] Swimming [ ] Archery [ ] Rugby [ ] Badminton [ ] Tackwondo [ ] Others: .....
5.	Year of study	[ ] 1st year [ ] 2nd year [ ] 3rd year [ ] 4th year [ ] 5th year [ ] Others: .....
6.	Course of study	
7.	Monthly allowance	RM

Instructions: Answer all questions and tick one answer only. There is no correct or wrong answer. All your answers are confidential.

SECTION B

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

NO	ITEMS	1	2	3	4	5
1	I think my body is too small					
2	I wear loose clothing so that people can't see my body					
3	I hate my body					
4	I wish I could get bigger					
5	I think my chest is too small					
6	I think my legs are too thin					
7	I feel like I have too much body fat					
8	I wish my arms were bigger					
9	I am very shy about letting people see me with my shirt off					
10	I feel anxious when I miss one or more workout days					
11	I pass up social activities with friends because of my workout schedule					
12	I feel depressed when I miss one or more workout days					
13	I pass up chances to meet new people because of my workout schedule					

SECTION C

1. Do you currently take any form of nutritional supplement?

☐ Yes → Please complete Part 1 and 2
☐ No → Skip to Section D

PART 1

Instruction: Please write or tick (√) your answer in the column provided.

Category 1: Energy Supplement					
Tick (√) which nutritional supplement you are currently taking **Yes** **No**			How long have you been taking supplement?	How many days per week?	**Fill in **alphabets** for reason of usage (Refer below)
		Energy Drinks			
		Caloric Replacements (e.g. energy bars, recovery bar)			
		Caffeine			
		ATP			
		MCT oils			
		Pyruvate			
		Other: Please specify _____			

**** Reason of energy supplement usage**

A	I decided I needed to use supplement	I	Weight/fat loss
B	Inadequate diet	J	Makes me feel better
C	Improve speed or agility	K	Increase energy levels
D	Improve strength or power	L	Prevent injury and illness
E	Weight/muscle gain	M	Increase my ability to cope with pain
F	For my health	N	Improve my concentration
G	Able to train longer/endurance	O	Alter my genes to enhance my performance
H	Speed up my recovery (after injury)	P	Help me to relax

Category 2: Protein Supplements/Weight Gainers					
Tick (√) which nutritional supplement you are currently taking **Yes** **No**			How long have you been taking supplement?	How many days per week?	**Fill in **alphabets** for reason of usage (Refer below)
		Whey protein			
		Weight gainer powders			
		Protein powder			
		Branched Chain Amino Acids (BCAA)			

		Amino acids			
		Creatine			
		Arginine			
		Aspartic acid			
		Glutamine			
		Hydroxy beta-methylbutyric			
		Soy protein and isoflavones			
		Other: Please specify_____			

**** Reason for protein supplement/weight gainers usage**

A	I decided I needed to use supplement	I	Weight/fat loss
B	Inadequate diet	J	Makes me feel better
C	Improve speed or agility	K	Increase energy levels
D	Improve strength or power	L	Prevent injury and illness
E	Weight/muscle gain	M	Increase my ability to cope with pain
F	For my health	N	Improve my concentration
G	Able to train longer/endurance	O	Alter my genes to enhance my performance
H	Speed up my recovery (after injury)	P	Help me to relax

Category 3: Vitamins and Mineral Supplements					
Tick (√) which nutritional supplement you are currently taking **Yes No**			How long have you been taking supplement?	How many days per week?	**Fill in alphabets for reason of usage (Refer table below)
		Multi-vitamin			
		Vitamin E			
		Vitamin C			
		Beta-Carotene			
		Folic Acid			
		B 6			
		B 12			
		Biotin			
		Pantothenic Acid			
		Niacin			
		B-Complex Vitamins			
		Vitamin D			
		Multi-vitamin with mineral			
		Iron			
		Calcium			
		Phosphorus			
		Zinc			
		Potassium			
		Selenium			
		Sodium Bicarbonate			
		Copper			
		Magnesium			
		Cobalt			

4

**** Reasons for vitamin/mine ral suppleme nts usage**

A	I decided I needed to use supplement	I	Weight/fat loss
B	Inadequate diet	J	Makes me feel better
C	Improve speed or agility	K	Increase energy levels
D	Improve strength or power	L	Prevent injury and illness
E	Weight/muscle gain	M	Increase my ability to cope with pain
F	For my health	N	Improve my concentration
G	Able to train longer/endurance	O	Alter my genes to enhance my performance
H	Speed up my recovery (after injury)	P	Help me to relax

Category 4: Herbals					
Tick (√) which nutritional supplement you are currently taking **Yes**	**No**		How long have you been taking supplement?	How many days per week?	****Fill in alphabets for reason of usage (Refer table below)**
		Ginseng			
		Ginkgo biloba			
		Green Tea Extract			
		St. John"s Wart			
		Echinacea			
		Ma Huang (Ephedra)			
		Saw-Palmeto			
		Wheat grass/ barley grass			
		Yohimbine			
		Herbal mix			
		Other: Please specify_____			

**** Reasons for herbal's usage**

A	I decided I needed to use supplement	I	Weight/fat loss
B	Inadequate diet	J	Makes me feel better
C	Improve speed or agility	K	Increase energy levels
D	Improve strength or power	L	Prevent injury and illness
E	Weight/muscle gain	M	Increase my ability to cope with pain
F	For my health	N	Improve my concentration
G	Able to train longer/endurance	O	Alter my genes to enhance my performance
H	Speed up my recovery (after injury)	P	Help me to relax

Category 5: Others Substances					
Tick (√) which nutritional supplement you are currently taking			How long have you been taking supplement?	How many days per week?	**Fill in alphabets for reason of usage (Refer table below)
Yes	No				
		Steroids			
		Androstendione			
		Probiotics			
		DHEA			
		L-Carnitine			
		Glucosamine			
		Maximuscle			
		Diuretics			
		Nicotine			
		Prebiotics			
		Melatonin			
		Fat burner			
		Other: Please specify_____			

**** Reasons for other substances' usage**

A	I decided I needed to use supplement	I	Weight/fat loss
B	Inadequate diet	J	Makes me feel better
C	Improve speed or agility	K	Increase energy levels
D	Improve strength or power	L	Prevent injury and illness
E	Weight/muscle gain	M	Increase my ability to cope with pain
F	For my health	N	Improve my concentration
G	Able to train longer/endurance	O	Alter my genes to enhance my performance
H	Speed up my recovery (after injury)	P	Help me to relax

PART 2

2. Where have you heard or learned about nutritional supplement. Please tick (√) your answer in the column provided (Your answer can be more than one).

Sources of information	√
Doctor	
Pharmacist	
Registered Dietitian	
Fellow students athletes	
Professional athletes	
Family	
Friends	
Coach	
Fitness trainer	
Strength coach	
Magazines	
Television	

Radio	
Books	
Internet	
Store nutritionist	
Self	
Other	

1 = Never 2 = Rarely 3 = Sometimes 4 = Often 5 = Very often 6 = Always

NO	ITEM	1	2	3	4	5	6
3	Before I work out, I consume energy supplements						
4	I use supplements to help me recuperate from strenuous workouts						
5	I use supplements to increase my lifting performance						
6	I use nutritional supplements to help me train through injuries						

SECTION D

Using the scale provided below, please complete the following questions as honestly as possible. The questions refer to current exercise beliefs and behaviours that have occurred in the past 3 months.

1 = Never 2 = Rarely 3 = Sometimes 4 = Often 5 = Very often 6 = Always

NO	ITEMS	1	2	3	4	5	6
1	I exercise to avoid feeling irritable						
2	I exercise despite recurring physical problems						
3	I continually increase my exercise intensity to achieve the desired effects/benefits						
4	I am unable to reduce how long I exercise						
5	I would rather exercise than spend time with family/friends						
6	I spend a lot of time exercising						
7	I exercise longer than I intend						
8	I exercise to avoid feeling anxious						
9	I exercise when injured						
10	I continually increase my exercise frequency to achieve the desired effects/benefits						
11	I am unable to reduce how often I exercise						
12	I think about exercise when I should be concentrating on school/work						
13	I spend most of my free time exercising						
14	I exercise longer than I expect						
15	I exercise to avoid feeling tense						
16	I exercise despite persistent physical problems						
17	I continually increase my exercise duration to achieve the desired effects/benefits						
18	I am unable to reduce how intense I exercise.						
19	I choose to exercise so that I can get out of spending time with family/friends						
20	A great deal of my time is spent exercising						
21	I exercise longer than I plan						

SECTION E

1 = Always 2 = Very often 3 = Often 4 = Sometimes 5 = Rarely 6 = Never

NO	ITEM	1	2	3	4	5	6
1	I wish that I were more muscular						
2	I lift weights to build up muscle						
3	I use protein or energy supplements						
4	I drink weight gain or protein shakes						
5	I try to consume as many calories as I can in a day						
6	I feel guilty if I miss a weight training session						
7	I think I would feel more confident if I had more muscle mass						
8	Other people think I work out with weights too often						
9	I think that I would look better if I gained 10 pounds (4.5 kg) in bulk						
10	I think about taking anabolic steroids.						
11	I think that I would feel stronger if I gained a little more muscle mass						
12	I think that my weight training schedule interferes with other aspects of my life						
13	I think that my arms are not muscular enough						
14	I think that my chest are not muscular enough						
15	I think that my legs are not muscular enough						

SECTION F

1 = Strongly agree 2 = Agree 3 = Disagree 4 = Strongly disagree

NO	ITEMS	1	2	3	4
1	On the whole, I am satisfied with myself.				
2	At times I think I am no good at all				
3	I feel that I have a number of good qualities				
4	I am able to do things as well as most other people				
5	I feel I do not have much to be proud of				
6	I certainly feel useless at times				
7	I feel that I'm a person of worth, at least on an equal plane with others				
8	I wish I could have more respect for myself				
9	All in all, I am inclined to feel that I am a failure				
10	I take a positive attitude toward myself				

SECTION G

1 = Definitely Disagree 2 = Mostly Disagree 3 = Neither Agree nor Disagree
4 = Mostly Agree 5 = Definitely Agree

NO	ITEMS	1	2	3	4	5
1	It is important for me to look athletic.					
2	I think a lot about looking muscular.					
3	I want my body to look very thin.					
4	I want my body to look like it has little fat.					
5	I think a lot about looking thin.					
6	I spend a lot of time doing things to look more athletic.					
7	I think a lot about looking athletic.					
8	I want my body to look very lean.					
9	I think a lot about having very little body fat.					
10	I spend a lot of time doing things to look more muscular.					
11	I feel pressure from family members to look thinner.					
12	I feel pressure from family members to improve my appearance.					
13	Family members encourage me to decrease my level of body fat.					
14	Family members encourage me to get in better shape.					
15	My peers encourage me to get thinner.					
16	I feel pressure from my peers to improve my appearance.					
17	I feel pressure from my peers to look in better shape.					
18	I get pressure from my peers to decrease my level of body fat.					
19	I feel pressure from the media to look in better shape.					
20	I feel pressure from the media to look thinner.					
21	I feel pressure from the media to improve my appearance.					
22	I feel pressure from the media to decrease my level of body fat.					

SECTION I

Anthropometry Measurement (Fill by researcher)

Measurement	Reading 1	Reading 2	Average
Body Fat Percentage (%)			
Waist circumference (cm)			

END OF QUESTIONNAIRE