

The Use of Performance-Enhancing Substances Amongst Recreational Gym Users: Investigating  
Prevalence, Knowledge, Risk Factors and Attitudes Toward Doping

By

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## Abstract

The use of World Anti-Doping Agency (WADA)-banned substances is not limited to elite sport settings, but permeates all levels of sports, including amongst recreational gym users. The prevalence of recreational gym users in Canada who use WADA-banned substances is unknown, and few interventions have been implemented to attempt to decrease this usage. The purpose of this study is to identify the prevalence of use of WADA-banned substances amongst recreational gym users exercising within the recreational facilities of a major Canadian university and determine if any risk factors identified in the research literature (including gender, body image, dietary supplements, age and sport type) contribute to the use of these substances by recreational gym users. This study also measures the participants' attitudes toward WADA-banned substances and their knowledge about WADA-banned substances. Participants were 278 male and female recreational gym users who use the selected university's recreational facilities. Each participant completed an online questionnaire containing questions about demographics, sport type, dietary supplement use, body dissatisfaction, and attitudes towards doping in sport (the Performance Enhancement Attitude Scale: PEAS, Petróczy, 2006). The data indicates that WADA-banned substances use is relatively high (13.7%) amongst recreational gym users. The results also indicate that males, participants who use nutritional supplements, participants who are not satisfied with their current body image, and participants who are in their mid-20s are more likely to take WADA-banned substances. Therefore, all risk factors including gender, body image, use of nutritional supplements, age and sport type indicate a positive relationship with doping behaviour. Participants' knowledge of WADA-banned substances is low. The results of this study suggest administrators of recreational gyms need to be concerned about WADA-banned substance use by recreational gym users due to the potential side effects of some WADA-banned substances that some of gym members are using.

**Keywords:** *World Anti-Doping Agency (WADA); performance enhancing substances; elite athletes; recreational gym users; Anabolic androgenic substances (AAS); doping; doping knowledge; doping risk factors*

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## **CHAPTER 1**

### **Introduction**

#### **1.1 Background**

Many athletes continuously search for ways to boost their performance and achieve greater records, with some opting for further physical training (Castillo & Comstock, 2007) and others choosing to use various performance-enhancing substances (Backhouse, Whitaker, & Petróczi, 2013). Recent advances in the medical, pharmacological and physiological sciences have brought light to the fact that nutrient intake can be altered to suit the sporting needs of individuals, resulting in the development of a wide range of products that have the potential to affect physical performances (Gleaves, 2014; Molinero & Márquez, 2009). In recent decades, the use of World Anti-Doping Agency (WADA)-prohibited performance-enhancing substances by elite athletes has led to a discussion on the possible adverse health effects of these substances, as well as the related ethical issues (Castillo & Comstock, 2007). Although elite athletes comprise a fairly small population, they are highly visible to the public and highly vulnerable to the use of WADA-banned substances (Papadopoulos, Skalkidis, Parkkari & Petriodou, 2006). There is concern, however, for the extensive consumption of WADA-banned substances in gyms and fitness centers (Bojsen-Møller & Christiansen, 2010), where some athletes of all levels reportedly use WADA-banned substances (Backhouse et al., 2013). Yet, there is no coordinated global movement to address this issue (Bojsen-Møller & Christiansen, 2010).

The use of WADA-banned substances amongst recreational gym users is associated with: 1) nutritional supplement use (Backhouse et al., 2013; Hildebrandt, Harty, & Langenbucher, 2012; Z Yager & O'Dea, 2014), 2) body image (Hildebrandt et al., 2012; Kirby et al., 2011; Nilsson 2004; Smolak, Murnen, & Thompson, 2005; Yager & O'Dea, 2014), 3) gender (Alaranta



et al., 2006; Hutchinson, Moston, & Engelberg, 2018; Kanayama, Boynes, Hudson, Field, & Pope, 2007; Papadopoulos et al., 2006; Simon, Striegel, Aust, Dietz, & Ulrich, 2006; Smith & Stewart, 2012; Thualagant, 2012), 4) age (Bojsen-Møller & Christiansen, 2010; Hallward & Duncan, 2018; Leifman, Rehnman, Sjöblom, & Holgersson, 2011; Sagoe, Schou Andreassen, & Pallesen, 2014) and 5) sport type (Blouin & Goldfield, 1995; Kartakoullis, Phellas, Pouloukas, Petrou, & Loizou, 2008).

For clarity, throughout this thesis, ‘WADA-banned substances’ refers to any substances which are in the WADA-prohibited list (WADA, 2020). The term ‘performance-enhancing substances’ includes both nutritional supplements and WADA-banned substances. ‘Doping behaviour’ or ‘doping’ refers to the use of substances or methods prohibited by WADA. ‘Recreational gym users’ refer to people whose intention is to exercise for their health, enjoyment, enhancing physical appearance or personal image and not to participate in any amateur or elite level sports.

Research has shown that amongst recreational gym users, the main sources of WADA-banned substances are friends, dealers, and the internet, rather than physicians or nutritionists (Baker, Graham, & Davies, 2006). In addition, some athletes purchase WADA-banned substances from unauthorized sellers on the black market, where there is no supervision on production and distribution. This lack of supervision has provided an opportunity for producers and distributors to contaminate their products with steroids (Baker et al., 2006), thereby increasing the effectiveness of the performance-enhancing substances and attracting more customers, while potentially having adverse effects on the health of athletes. Several studies have revealed that some nutritional supplements are contaminated with WADA-banned hormones that have not been labelled (Somerville & Lewis, 2005; Tsarouhas et al., 2018; Waddington, 2005).

Given that studies in several countries have demonstrated that the prevalence of using WADA-banned performance enhancing substances is higher amongst recreational gym users compared to elite athletes (Cohen, Collins, Darkes, & Gwartney, 2007; Molero, Gripenberg, & Bakshi, 2016), more information is needed about the roles and responsibilities of fitness facility managers and gym owners to provide education to the users of their spaces. Some research has found that the use of WADA-banned substances has become so widespread in some sports, such as bodybuilding, that consumption of WADA-banned substances is considered a normative behaviour (Hutchinson, Moston, & Engelberg, 2018). However, some people refuse to take any kind of performance-enhancing substances and nutritional supplements due to concerns about their health (Dunn, Mazanov, & Sitharthan, 2009; Hutchinson et al., 2018). The use of WADA-banned performance-enhancing substances is a complex issue (Hutchinson, Moston, & Engelberg, 2018).

According to WADA (2015) a substance or method is prohibited if it meets at least two of the three criteria that follow:

1. Medical or other scientific evidence, pharmacological effect or experience that the substance or method ... has the potential to enhance or enhances sport performance.
2. Medical or other scientific evidence, pharmacological effect or experience that the use of the substance or method represents an actual or potential health risk to the athlete.
3. WADA's determination that the use of the substance or method violates the spirit of sport. (WADA, 2015, p. 30)

In addition, some WADA-banned performance-enhancing substances have adverse effects on the health of athletes, and giving completely informed consent to the use of WADA-banned

performance-enhancing substances may not be possible if users are unaware what they are taking due to mislabeling, ignorance, or manipulation. For example, it is now well documented that many athletes from the former East German republic were unaware that the nutritional supplements they were given by coaches and doctors included high doses of anabolic androgenic steroids (Franke & Berendonk, 1997).

Another reason for the ban on WADA-banned performance-enhancing substances is the role-model status of athletes in society. If sport stars are perceived to use WADA-banned performance-enhancing substances, youth may think it is okay to do so too without understanding the risks involved (Holt et al., 2018). Amongst the reasons for prohibiting WADA-banned substances, competitive fairness and role-model status generally do not apply to recreational gym users, though the recreational gym user's health is still a matter of concern within recreational settings due to the adverse effects of some WADA-banned substances. Therefore, it is worth considering the side effects of WADA-banned substances.

Some researchers demonstrate that some WADA-banned substances, such as Anabolic Androgenic Steroids (AAS), can be used safely. Hoberman (2005), for example, opposes the prohibition of some WADA-banned substances due to their therapeutic properties. In healthcare, a variety of health issues can be treated by prescribing testosterone or other anabolic substances (Myles, 2011) and cannabinoids (Huestis, Mazzoni & Rabin, 2011). It should be noted, however, that therapeutic use of AAS and other performance-enhancing substances requires adequate knowledge by the user or supervision by a doctor. Yet inadequate knowledge regarding WADA-banned substances and performance-enhancing substances has been reported in several studies, and many athletes (both elite athletes and recreational gym users) who take performance-enhancing substances do not possess adequate information about these substances (Grace, Baker,

& Davies, 2001; Kyselovicova, Antala, & Michalak, 2008; Wanjek, Rosendahl, Strauss, & Gabriel, 2007). Many AAS users do not consult with physicians, and instead take advice from friends or coaches who might also lack sufficient knowledge (Baker et al., 2006).

The adverse effects of performance-enhancing substances, especially in excess and without adequate knowledge, are well documented throughout the literature (Molero et al., 2016; Nocelli et al., 1998; Papadopoulos et al., 2006; Petrocelli, Oberweis & Petrocelli, 2008; Yager & O'Dea, 2014). Research shows that the use of WADA-banned performance-enhancing substances is more prevalent within recreational settings compared to elite settings (Cohen et al., 2007; Molero et al., 2016). Hence, the number of recreational gym users who are exposed to the potential side effects of WADA-banned substances exceeds that of high-performance and professional athletes (Papadopoulos et al., 2006). As a result, a greater portion of the population is at risk of being affected by the adverse effects of WADA-banned performance-enhancing substances, such as reduced fertility, hypertension, stroke, etc. (Bojsen-Moller & Christiansen, 2010), which some people consider a major public health issue as a whole (Molero et al., 2016; Uvacsek et al., 2011; van de Ven, 2016). The question here is whether the concern about doping behaviour amongst recreational gym users is a serious concern, or rather if it is a moral panic.

According to Goode and Ben-Yehuda (1994), in order to consider behaviour as a moral panic, the behaviour should reflect five elements or criteria, including: 1) concern, 2) hostility, 3) consensus, 4) disproportionality, and 5) volatility.

1. *Concern*. An elevated level of concern must exist regarding the behaviour and its burden on society, such that the general public find it to be a threat (Goode & Ben-Yehuda, 1994). As the use of WADA-banned substances is highly prevalent among recreational gym users, and because this prevalence has been reported to be greater in recreational gym users than

in elite athletes (Yager & O'Dea, 2014), and due to the fact that the use of WADA-banned substances including AAS can be harmful to the health of the users (Dunn, Mazanov, & Sitharthan, 2009), it is reasonable to think that recreational gym users' use of WADA-banned substances poses a concern.

2. *Hostility*. An elevated level of hostility must be directed towards people who engage in the threatening act. The behaviour must be seen as being opposed to the norms, values, harmony, way of life and possibly the very foundations of society, presenting the perpetrators as enemies that threaten a peaceful and respectful society (Goode & Ben-Yehuda, 1994). Given the lack of attention given to recreational gym users use of banned performance-enhancing substances, the public does not seem hostile to the possibility of recreational gym users using such substances. The second criteria of moral panics does not seem to be met.

3. *Consensus*. According to Goode and Ben-Yehuda (1994), "There must be a certain minimal measure of agreement in the society as a whole or in designated segments of the society that the threat is real, serious, and caused by the wrongdoing of group members and their behavior" (p. 157). The general public may not consider the use of WADA-banned substances amongst recreational gym users to be as serious as doping behaviour among elite athletes (Nocelli et al., 1998), yet there may be a consensus among experts that the use of WADA-banned substances, such as AAS, can be harmful to the health of the users. Therefore, since consensus exists among the experts that doping behaviour among recreational gym users is serious and real, the third criteria of moral panic seems to also be met.

4. *Disproportionality*. Disproportionality refers to the threat being considered much greater than what an objective evaluation would show (Goode & Ben-Yehuda, 1994). Although some argue that the sanctions for elite athletes are out of proportion to the doping behaviour,

there are studies suggesting that elite athletes find the two-year ban for first use as being rather insignificant and ineffective in the prevention of doping (Kirby, Moran, & Guerin, 2011). It is difficult to assess whether or not reactions to recreational gym users' use of WADA-banned substances and other performing-enhancing substances is disproportionate to the actual threat their usage poses because little data, particularly in the Canadian context, is available.

5. *Volatility*. Finally, Goode and Ben-Yehuda (1994) explain that “Moral panics are volatile: They erupt fairly suddenly and, nearly as suddenly, they subside” (p. 158). Throughout the history of anti-doping movements, many attempts have been made to deal with doping behaviour. Prohibiting doping in 1928 by the International Amateur Athletics Federation (IAAF) (Gleaves & Llewellyn, 2014), conducting initial drug testing in the 1970s by the IAAF (WADA, 2010), establishing an official anti-doping policy in 1974 by International Olympic Committee (IOC) (Todd & Todd, 2001), the creation of WADA in 1999, and the nearly yearly revision to the banned substances and methods list by WADA show that concerns about doping in sport have persisted for nearly a century. As well, many countries have prohibited WADA-banned substances, and in some countries, including Belgium, Denmark, Sweden and Norway, recreational gym users are subject to doping tests and can face the same sanctions as elite athletes if they produce a positive doping test. As a result, anti-doping policies are not volatile, but rather they are continually developing and revised in both recreational and elite settings.

To sum, because of the proven harms and relatively high prevalence of using WADA-banned substances among recreational gym users, preventive measures such as continual anti-doping policies associated with using WADA-banned substances are not disproportionate, but are rather appropriate and necessary. Thus, concerns about recreational gym users' use of

WADA-banned substances do not constitute a moral panic, but rather are better framed as an ongoing and serious concern.

## **1.2 Rationale**

The use of WADA-banned substances is higher amongst recreational gym users compared to elite athletes (Bojsen-Møller & Christiansen, 2010; Cohen et al., 2007; Molero et al., 2016; Wanjek et al., 2007). This is a matter of concern since the consumption of some WADA-banned substances, especially in excess and without adequate knowledge, can have major physical, psychological, social, and financial effects (Petrocelli, Oberweis & Petrocelli, 2008). Yet, little is known about the prevalence of the use of WADA-banned substances and risk factors amongst recreational gym users in Canada. Blouin and Goldfield (1995) conducted the last Canadian study examining the prevalence of WADA-banned substances amongst recreational gym users over 25 years ago. Given changes in the use and easier accessibility to WADA-banned substances (e.g. through online shopping and the legalization of marijuana in Canada), new research can provide up-to-date information regarding the doping behaviour amongst recreational gym users within the Canadian context.

The intent of this study is to obtain more information about the prevalence of using WADA-banned substances within one recreational setting in Canada. As a result, this study may raise awareness about the prevalence of WADA-banned substances and might reduce the short-term and long-term adverse impacts of recreational gym users who consume WADA-banned performance-enhancing substances. Although some WADA-banned substances can be used safely for therapeutic purposes, the research literature demonstrates that some recreational gym users take these substances without adequate knowledge and/or without consulting with a physician and do not consider the side effects of some WADA-banned substances, such as AAS,

which can lead to hypertension, reduced fertility, depression and even the death of the users (Amsterdam, Oppenhuizen, & Hartgens, 2010; Mhillaj et al., 2017; Kanayama, Hudson, & Pope Jr., 2008). In addition, not only have the long-term side effects of some WADA-banned substances been overlooked, but the deaths of a few recreational gym users have attracted less attention compared to professional athletes. For example, the deaths of Luke O'Brien (RTE news, 2017), Taylor Hooton (Dallas news, 2013) and Freddie Dibben (BBC news, 2019) were all linked to anabolic steroid use. A small amount of Stanozolol (which is an anabolic steroid used to increase muscle hypertrophy, strength and to reduce recovery time) has been reported as the catalyst in the death of Luke O'Brien, a student at Cork University in Ireland on 18 June 2017 (RTE news, 2017). This death, which media coverage attributed to a teenager taking a small amount of a WADA-banned substance, highlights the lack of attention paid to the use of WADA-banned substances amongst recreational gym users.

### **1.3 Objectives and Research Questions**

This study identifies the prevalence of WADA-banned substance use by recreational gym users exercising within the recreational facilities of a major Canadian university, as well as risk factors (including gender, body image, dietary supplements, age and sport type) and measures participants' attitudes towards doping. In addition, this study provides insight into recreational gym users' knowledge about the side effects of WADA-banned substances.

#### **Research Questions**

1. How prevalent is the use of WADA-banned substances amongst recreational gym users in one Canadian university gym?
2. Is there a relationship between the use of WADA-banned substances and age, gender, body image, nutritional supplements use and sport discipline amongst recreational gym users?



3. Are recreational gym users knowledgeable about WADA-banned substances?

#### **1.4 Hypotheses**

The following hypotheses were developed from the research questions and the research literature:

1. Recreational gym users who are male, use nutritional supplements, have body image disturbance, and participate in strength sports are more likely to consume WADA-banned substances.
2. Recreational gym users who take WADA-banned substances are not knowledgeable about WADA-banned substances.

After the literature review that follows next, Chapter 3 explains the methods used to test these hypotheses.

## **CHAPTER 2**

### **Literature Review**

#### **2.1.1 Literature Search**

The literature reviewed in this chapter was identified in a systematic literature review using the databases SPORTDiscus, PubMed, Scopus and Google Scholar. The algorithm “((steroid\* OR doping OR supplement\* OR “performance enhance\*”) AND (body image) AND (recreation\*)) NOT (alcohol OR cigarette\*)” was used to scan the aforementioned databases for all related studies. Research studies were included if they met the following criteria: 1) full papers written in English, 2) peer-reviewed, 3) involving participants that were recreational gym users of any age or gender, 4) including evaluation of the use of any kind of WADA-banned substances among recreational gym users, and 5) assessing the role of body image, gender, nutritional supplements, age or sport type in doping behaviour. No limitations were placed on publication dates, study design, and data analysis (quantitative, qualitative and/or mixed methods). Studies on mixed populations, recreational and elite athletes were also included. Due to the nature of the term “doping,” the search was repeated after replacing “doping” with “performance-enhancing substance and method” and “drugs,” ensuring the comprehensiveness of the search. After performing the electronic search, I identified 43 articles meeting the inclusion parameters. I examined the titles and reviewed the abstracts, and then I included the articles involving recreational gym users taking dietary supplements or WADA-banned substances, or examining how supplement and substance usage relates to gender, body image, age or sport type. This search yielded 21 studies. In addition, I conducted a manual search of the references cited in the studies obtained from the electronic search. This yielded seven additional

articles that fulfilled my criteria. Therefore, I obtained and reviewed a total of 28 studies published between 1995 and 2019.

### **2.1.2 Brief History of Doping and Anti-Doping Policies**

Before critically reviewing the 28 studies matching the search parameters, it is helpful to address the historical context of doping and anti-doping policies. Although most people assume that doping in sport is an issue of modern times, the use of any substances in order to improve physical performance dates back to the ancient times where plant- and animal-derived extracts were used for ergogenic purposes (Holt, Erotokritou-Mulligan, & Sönksen, 2009; Yesalis & Bahrke, 2002). Since the beginning of recorded history, people have been searching for substances that enhance physical performance, with the aim of boosting strength, overcoming fatigue, and gaining an edge in sporting competitions (Nocelli et al., 1998; Yesalis & Bahrke, 2002). Historical records have shown that in the ancient times, both athletes and soldiers consumed certain animal parts in order to acquire the agility, speed or strength attributed to specific animals (Applegate & Grivetti, 1997). The first of such records dates back to 668 BCE, when athletes sought to enhance their performance in the Ancient Games via special diets. For example, Charmis, the Spartan winner of the stade race (~200 yards [183m]) utilized dried figs as his performance enhancing diet. Athletes also consumed drugs such as hallucinogenic mushrooms (Holt et al., 2009). Furthermore, knights in the medieval times attempted to boost their battle stamina by using unspecified stimulants (Yesalis & Bahrke, 2002).

With the onset of the industrial and scientific revolutions, research on muscle physiology, fuel use during physical activities, and the specific roles of proteins, fats, carbohydrates, vitamins, minerals, drugs and hormones on altering performance became known (Applegate et al., 1997; Gleaves & Llewellyn, 2014). As a result, the second half of the 19<sup>th</sup> century saw a rise

in the number and types of performance-enhancing substances, and athletes commonly and overtly made use of stimulants (Holt et al., 2009).

The first sport to embrace the use of performance-enhancing substances was horse racing (Gleaves & Llewellyn, 2014). The word ‘doping’ was coined as pharmacological substances were utilized for altering the horse’s performance (Gleaves & Llewellyn, 2014). In fact, contrary to the word’s currently perceived meaning, ‘doping’ in horse racing referred to harming horse performance. Trainers used to dope horses with the aim of reducing their speed to fix races and earn profits from bets. Hence, the first opponents of doping were those who sought fair betting on races, and not those who cared about the true sporting spirit. In 1903, the first anti-doping regulations were put in place by organizers of horse racing events to prevent match fixing (Gleaves & Llewellyn, 2014).

At around the same time, human use of stimulants also began. However, no attempts were made to prohibit such endeavours until the late 1920s. The International Amateur Athletics Federation (now known as World Athletics) became the first international organization to prohibit human doping in 1928 (Gleaves & Llewellyn, 2014; Holt, Erotokritou-Mulligan, & Sönksen, 2009). However, the use of performance-enhancing substances was not effectively stunted given the lack of effective methods of testing, and the IAAF did not ban any athletes (Gleaves & Llewellyn, 2014; Holt et al., 2009). Drug tests were first introduced at the Olympic Winter Games in Grenoble and at the Olympic Games in Mexico in 1968 (Holt et al., 2009), most International Federations began to conduct drug testing in the 1970s as athletes from many countries were suspected of using drugs, particularly anabolic steroids (WADA, 2010). The IOC established an official anti-doping policy in 1974 (Todd & Todd, 2001). Several Olympic

records are still standing from times before the introduction of effective testing, illustrating the potency of the effective and rigorous drug testing (Holt et al., 2009).

The fight against doping suffered a huge blow when police found a high number of prohibited substances at the Tour de France in 1998 (Holt et al., 2009). The IOC subsequently held a World Conference on Doping in Lausanne on 2–4 February, 1999, aiming to bring together the international community involved in the anti-doping struggle. One of the most important outcomes of this conference was the consensus on the need for the establishment of an international agency to target the issue in a standardized and coordinated manner. The direct result of this consensus was the establishment of WADA in late 1999. As a major achievement in the battle against doping, the World Anti-Doping Agency Code was developed and implemented, and a list of forbidden performance enhancing substances was published (Holt, Erotokritou-Mulligan, & Sönksen, 2009).

### **2.1.3 Doping within Recreational Settings**

The use of performance-enhancing substances has not only continued in the modern era, but also has become much more widespread, which is attributable to the fact that elite sports have gained much more importance and many people pursue the fame and wealth that comes with athletic success (Nocelli et al., 1998). Elite athletes who use WADA-banned substances face severe sanctions if caught. However, less attention has been paid to the use of WADA-banned substances, such as AAS, amongst recreational gym users. In studies conducted over the past few decades, the spotlight has mainly been on doping behaviours in elite sports. A few recent studies, however, highlight the fact that the use of WADA-banned performance-enhancing substances is not limited to professional athletes, and is an issue that relates to athletes at all levels (Backhouse et al., 2013; Peretti-Watel et al., 2004). Other studies have demonstrated that

the use of WADA-banned performance-enhancing substances is relatively high amongst recreational gym users and non-professional athletes (Bojsen-Møller & Christiansen, 2010; Kartakoullis, Phellas, Pouloukas, Petrou, & Loizou, 2008; Kyselovicova, Antala, & Michalak, 2008; Wanjek, Rosendahl, Strauss, & Gabriel, 2007; Yager & O'Dea, 2014).

It is quite difficult to evaluate the prevalence of the use of WADA-banned substances in sport settings (Lentillon-Kaestner & Ohl, 2011). It is also difficult to make comparisons because factors such as age, gender, sport discipline, and substance type vary. Hence, a wide range of values have been reported for the use of WADA-banned performance-enhancing substances in the literature (Stubbe, Chorus, Frank, de Hon, & van der Heijden, 2014). For example, a study conducted amongst male recreational bodybuilders found that 43% of participants used WADA-banned substances (Girolamo, Fiotti, Mazzucco, Simunic & Pisot, 2018), while a study conducted amongst Danish recreational male gym users found that only 1.8% of participants took or had taken WADA-banned substances (Singhammer, 2013). This profound difference in prevalence is also related to the fact that some researchers have used direct questioning regarding the use of WADA-banned substances.

Schröter et al. (2016) argue that “compared to direct questioning, indirect methods typically yield higher prevalence rates for sensitive issues and thus provide a more valid picture of behaviour” (p. 2). The use of performance-enhancing substances and doping behaviour, like other stigmatized behaviours, is often deemed as an unacceptable social behaviour and some participants are not eager to disclose their doping behaviours. Such participants might either decline to answer or resort to falsehoods, even if anonymity and confidentiality are assured by the researchers (Clark & Desharnais, 1998). Additionally, the validity of self-reports in doping studies is questionable. Petróczi et al. (2011), through using hair samples of the participants as

well as self-reports about WADA-banned substance use amongst non-professional and professional athletes, found that 12% of participants did not reveal their use of WADA-banned substances. In addition, Stubbe, Chorus, Frank, de Hon, and van der Heijden (2014) illustrated that when they used a direct method to measure WADA-banned substances use amongst Dutch gym-goers, they found that a total of 0.4% admitted that they were doping, while 8.2% were found to be doping when the Randomized Response Technique (RRT) was used, showing a significant difference. Due to methodological constraints pertaining to the measurement of the use of WADA-banned performance-enhancing substances within sport contexts, all the aforementioned factors including the use of indirect methods, assuring the anonymity and confidentiality of the participants should be considered.

A study regarding the prevalence of doping amongst recreational gym users examined the extent of performance- and image-enhancing drugs/substances used amongst recreational gym users (Bojsen-Møller & Christiansen, 2010). This study revealed that out of the total number of Danish recreational gym users ( $n=1398$ ) who submitted enquiries to the Danish anti-doping agency, 30% of them had favourable attitudes towards taking WADA-banned substances, half of whom were either using such substances or had done so in the past. Although the main methodological weakness of Bojsen-Møller and Christiansen's (2010) study is that the sample population was limited to those who sought information from the Danish Anti-Doping Agency, and the participants were not chosen randomly through a standardized procedure, the sample size is relatively large (1398 recreational gym users) and the study was conducted over a period of 18 months. In this study, 15% of respondents were using doping substances despite the probability of random drug tests in Denmark.

In several countries, including, Belgium, Denmark, Sweden and Norway, everyday gym-goers can be subjected to doping tests, and if they have a positive doping test, they will be prohibited from attending gyms (van de Ven, 2016). Beyond statements that testing of recreational gym users can occur in these countries, I could not identify or locate any sources that explain the details (such as frequency, selection methods, costs, etc. of doping tests). While sources note that the tests conducted with gym users are similar to doping tests administered according to the WADA code standards (van de Ven, 2016), no additional details are provided, which makes it difficult to determine and analyze the logistics and specifics of these initiatives.

In many countries, including Canada (Lippi, Franchini, & Guidi, 2008) and Denmark, certain WADA-banned substances such as “AAS, testosterone... and drugs with similar effects are illegal by law to manufacture, import, export, sell, distribute or possess with the exception of use for the prevention or treatment of diseases or for scientific purposes” (Bojsen-Møller & Christiansen, 2010, p. 5). As a result, one might expect that using WADA-prohibited substances might be higher in countries such as Cyprus, Germany and Hungary, where doping tests are not performed on recreational gym users. However, there are no meaningful differences in the rate of doping behaviour reported in these countries compared to the countries that perform doping tests amongst recreational gym users. For example, the use of WADA-banned substances amongst recreational gym users was reported to be 15% in Germany (Wanjek et al., 2007), 14.5% in Hungary (Uvacsek et al., 2011) and 11.6% in Cyprus (Kartakoullis et al., 2008). These findings highlight the fact that the legality of WADA-banned substances and possibility of being selected for a doping test may not be effective in reducing doping behaviours amongst recreational gym users. Yet, it is worth examining whether or not performing doping tests amongst recreational



gym users is consistent with the WADA policies and whether or not WADA has an obligation to deal with doping behaviours amongst recreational gym users.

#### **2.1.4 WADA's Anti-Doping Rules for Recreational Gym Users**

In accordance with WADA's (2015) policies regarding recreational gym users, there is no obligation for anti-doping organizations to implement anti-doping regulations amongst recreational gym users. Rather, it is considered to be optional. As the WADA Code stipulates,

An Anti-Doping Organization has discretion to apply anti-doping rules to an Athlete who is neither an International-Level Athlete nor a National-Level Athlete ... In relation to athletes who are neither International-Level nor National-Level Athletes, an Anti-Doping Organization may elect to conduct limited Testing or no Testing at all (p. 135).

Due to this lack of obligation, very few countries implement anti-doping policies amongst their recreational gym users and non-professional athletes (Bojsen-Møller & Christiansen, 2010; Thualagant, 2012; van de Ven, 2016). Exceptions include Belgium, Denmark, Norway and Sweden where everyday gym-goers can be subjected to drug testing and banned from gyms (van de Ven & Mulrooney, 2016).

Since the early 2000s, recreational gym users in Belgium have been prohibited from using WADA-banned substances. Recreational gym users producing a positive doping test also face the same sanctions as elite athletes. Police are able to conduct a home search based on a positive test, and a gym member may be subject to both a doping and a drug investigation for the same offence. If a recreational gym user tests positive, and it is a first offence, they may be banned for two years from every gym and any form of organised sport in the region. They may also receive a fine of, on average, €1,000-2,000, although fines can be as high as €25,000 approximately (\$37,500 CAD). In Denmark, any person training in a gym that has entered into a

collaboration agreement with Anti-Doping Denmark (the country's national anti-doping organisation) may be subject to doping controls. Gyms in Denmark must indicate at their entrance and on their website by means of a happy or frowning icon whether or not they are part of this agreement. Sweden also has doping controls at training facilities and Norway's anti-doping strategies have an element of monitoring and policing. For instance, fitness centres that adopt the anti-doping programme in Norway receive a licence to carry out tests on members suspected of doping. There is no legal obligation to sign up to be a "Clean Centre," but gyms that do are perceived to have a reputational advantage. About half of Norway's fitness centres now have a Clean Centre certificate (van de Ven & Mulrooney, 2016).

While WADA's rules do not require anti-doping organizations to test athletes participating in leagues or events that are not signatories to the WADA Code, WADA requires that education be available to athletes of all levels. As the 2015 WADA Code states,

Anti-doping informational and educational programs should not be limited to National- or International-Level athletes but should include all persons, including youth, who participate in sport under the authority of any Signatory, government or other sports organization accepting the Code (p. 99).

However, to date, due to factors such as a lack of adequate resources and a lack of coordination between WADA and other stakeholders, educational programs have not been implemented well in elite settings (Cléret, 2011) let alone non-elite settings.

### **2.1.5 Risk Factors of Doping Behaviour**

In addition to investigating the prevalence of using WADA-banned substances amongst recreational gym users, a number of studies examined factors associated with the use of such substances amongst recreational gym users. These factors included *body image*, (Hildebrandt,

Harty, & Langenbucher, 2012; Kirby et al., 2011; Nilsson, Spak, Marklund, Baigi, & Allebeck, 2004; Smolak, Murnen, & Thompson, 2005; Yager & O'Dea, 2014), *nutritional supplement use*, (Backhouse et al., 2013; Hildebrandt, Harty, & Langenbucher, 2012; Yager & O'Dea, 2014), *gender*, (Alaranta et al., 2006; Hutchinson, Moston, & Engelberg, 2018; Kanayama, Boynes, Hudson, Field, & Pope, 2007; Raschka, Chmiel, Preib & Boos, 2013; Papadopoulos et al., 2006; Simon, Striegel, Aust, Dietz, & Ulrich, 2006; Smith & Stewart, 2012; Thualagant, 2012), *age*, (Bojsen-Møller & Christiansen, 2010; Hallward & Duncan, 2018; Leifman, Peters, Copeland & Dillon, 1999; Rehnman, Sjöblom, & Holgersson, 2011; Sagoe, Andreassen, & Pallesen, 2014) and *sport discipline*, (Blouin & Goldfield, 1995; Kartakoullis et al., 2008) of the participants, and will be discussed separately.

### **2.1.6 Body Image**

Unlike elite athletes whose main motivation for consuming WADA-banned substances is to improve their athletic performance (Kirby et al., 2011), researchers have found that the main reason why recreational gym users take WADA-banned substances is that they are dissatisfied with their body image (Bojsen-Møller & Christiansen, 2010; Hildebrandt et al., 2012). In fact, “the idealized body in contemporary Western societies is a thin and fit physique for the females and a muscular body physique for males” (Kartakoullis et al., 2008, p. 283) and therefore, athletes who seek to lose their weight, as well as athletes who seek to gain weight are more likely to take WADA-banned substances to reach the idealized body (Thompson & Ordaz, 2016, Weaving & Teetzel, 2014).

Yager and O'Dea (2014) conducted a cross-sectional study amongst 1148 Australian male adolescents (age range 11-21 years) and found that a dissatisfaction regarding the body can result in more favourable attitudes towards doping behaviour. Another cross-sectional study

conducted by Nilsson, et al. (2004), reported similar findings amongst 4049 Swedish adolescent boys aged 14-18. Nilsson et al. (2004) found that approximately half of the AAS users' motivation was to improving their body image. Although these two studies have employed relatively high numbers of participants, both studies involved male adolescents only, meaning that the results may not be generalized to women and girls and/or people of different ages. In addition, none of the studies distinguished between the levels of the athletes.

Bojsen-Møller and Christiansen (2010) revealed that recreational gym users who use WADA-banned substances aimed to primarily enhance their physical appearances rather than to improve physical fitness or sport performance. Although they did not mention the exact number of such participants and, as mentioned previously, Bojsen-Møller and Christiansen (2010) did not obtain the sample population randomly and the sample size is limited to those recreational gym users who submitted enquiries to the Danish Anti-Doping Agency, the large sample size of the study (n=1398) and conducting the study over a period of 18 months makes the findings noteworthy. In addition, Kartakoullis et al. (2008) found that 40% of Cyprians' recreational gym users of both genders used WADA-banned substances to improve their looks and appearance. Another study conducted by Hildebrandt et al., (2012) revealed that body image disturbance was associated with favourable beliefs about AAS use amongst both American male and female undergraduate students (n=201), who were mainly recreational gym users.

Based on the studies examining the relationship between body image and the use of WADA-banned substances, the positive relationship between body image and the use of WADA-banned substances amongst adolescents, university students and Danish recreational gym users has been demonstrated, but there is no study amongst Canadian recreational gym users to examine the relationship of body image to using WADA-banned substances.

### 2.1.7 Nutritional Supplements

WADA's banned substances and methods list includes not only drugs but certain supplements. However, supplement use by gym goers is not monitored (Yager & O'Dea, 2014). As a consequence, the use of nutritional supplements amongst recreational gym users is a matter of concern for two reasons. First and foremost, athletes who take dietary supplements are more likely to use WADA-prohibited substances compared to non-users (Backhouse et al., 2013; Hildebrandt, Harty, & Langenbucher, 2012; Hurst et al., 2019; Yager & O'Dea, 2014). In fact, according to the "gateway" theory, researchers argue that "substance use is sequential, with illegal substance use following the use of legal substance use because of the positive relationship between the two" (Backhouse, Whitaker, & Petróczi, 2013, p. 245). Furthermore, Backhouse et al. (2013) found that the use of WADA-banned substances amongst non-professional and professional English young athletes was three-and-a-half times more prevalent in those who used nutritional supplements than those who did not. A greater difference (four times) has been reported amongst nutritional supplements users in six European countries including: Finland, France, Germany, Greece, Italy and Israel (Papadopoulos et al., 2006). In addition, Hurst et al., (2019) found a positive relationship between attitudes towards doping behaviour and the use of nutritional supplements amongst elite British athletes. Consequently, due to the fact that nutritional supplement consumption may lead to the use of WADA-banned substances, it is important to consider the studies that illustrate the rate of supplement use amongst recreational gym users.

A number of studies have shown that the rate of nutritional supplement usage is relatively high amongst recreational gym users (Backhouse et al., 2013; Bojsen-Møller & Christiansen, 2010; Dunn, Mazanov, & Sitharthan, 2009; Molinero & Márquez, 2009; Solheim et al., 2017;

Tsitsimpikou et al., 2011). Surprisingly, some studies have shown 100 per cent prevalence amongst female gym users in Denmark (Solheim et al., 2017) and 94 per cent amongst non-varsity student athletes in the Canada (Kristiansen, Levy-milne, Barr, & Flint, 2005). However, participants were not recruited randomly in these studies, and this can influence the results in terms of generalizability of the findings.

Tsitsimpikou et al. (2011) found the use of nutritional supplements amongst male and female recreational gym users in 11 randomly selected gyms in Athens to be 41%. Similar prevalence rates were found amongst British male adolescents (45%) (Backhouse et al., 2013), and recreational Danish gym users (53%) (Bojsen-Møller & Christiansen, 2010). Even though the latter two studies did not utilize standard and randomized sampling methods, the study in Athens featured appropriate sampling methods, and the relatively high prevalence rate reported (41%) highlights the excessive use of nutritional supplements within recreational settings. Furthermore, Solheim et al., (2017) compared the prevalence of nutritional supplement use between elite athletes and fitness customers and found that it was higher in the latter group.

Research indicates that the use of nutritional supplements is also relatively high among the general population, young Canadian athletes, and young Canadian non-athletes (British Columbia Ministry of Health Planning, 2004; Khoury, Dwyer, Fein, Brauer, & Brennan, 2019; Kristiansen et al, 2005; Parnell, Wiens, & Erdman, 2016). According to the British Columbia Ministry of Health Planning (2004), 64% of the general population (n=1823, aged 19-71) living in British Columbia used nutritional supplements. Kristiansen et al., (2005) found that the prevalence of using nutritional supplements in one Canadian university was 98.6% amongst varsity level athletes and 94.3% amongst non-athlete students. A recent Canadian study found 100% of young athlete participants used nutritional supplements (Khoury et al., 2019).

Specifically, Khoury et al. (2019) found all physically active students (100%), the majority of physically active non-athletes (87%), and the majority of physically inactive students (81%) had used nutritional supplements. The small size of this study (n=84) is a limitation worth mentioning. In addition, both of the studies mentioned above recruited their participants from one Canadian university; therefore, their findings may not be applicable to other Canadian universities. However, in another recent study conducted in Canada, Parnell et al. (2016) reported similar findings with young athletes. In fact, Parnell et al. (2016) found that of 187 participants, 100% of young athletes and 87% of non-athlete university students used nutritional supplements. These studies highlight that the use of nutritional supplements is high amongst Canadian students.

The nutritional supplements most used by recreational gym users are protein supplements, creatine, vitamins and minerals (Bojsen-Møller & Christiansen, 2010; Dunn, et al., 2009; Tsitsimpikou et al., 2011). Taking nutritional supplements are not in itself harmful if they are taken under the supervision of a physicians and/or if they are used properly (Brożyna, Tkaczyk & Rutkowska, 2017). However, the majority of athletes who consume nutritional supplements do so without consulting physicians (Backhouse et al., 2013; Tsitsimpikou et al., 2011; Waddington, 2005). This trend is a matter of concern due to the fact that some studies show excessive use of dietary supplements can harm users' health (Turillazzi, Perilli, Di Paolo, Riezzo & Fineschi, 2011; Yager & O'Dea, 2014). Furthermore, due to the lack of supervision in the production of some nutritional supplements, some substances can be contaminated by anabolic steroids or other WADA-banned substances, whereas this fact is not stated on the label of these products, potentially causing even more problems for athletes who use them

(Backhouse, Whitaker, & Petroczi, 2013; Baume, Mahler, Kamber, Mangin, & Saugy, 2006; Molero et al., 2016; Molinero & Márquez, 2009; Solheim et al., 2017; Tsitsimpikou et al., 2011).

To summarize, based on the studies regarding the use of nutritional supplement, a considerable consumption of non-prescribed nutritional supplements amongst recreational gym users has been reported, which is a matter of concern for two reasons. First, according to ‘gateway theory,’ the use of nutritional supplements has a positive relationship with the use of WADA-banned substances. In addition, due to the probability of some supplements being contaminated with hormones, such as AAS, adverse side effects on the health of recreational gym users may ensue.

### **2.1.8 Gender**

A number of studies have proposed that gender differences have an effect on doping behaviour amongst recreational gym users. In fact, researchers have found that male recreational gym users are more likely to use WADA-banned substances compared to their female counterparts (Alaranta et al., 2006; Hutchinson, Moston, & Engelberg, 2018; Kanayama, Boynes, Hudson, Field, & Pope, 2007; Papadopoulos et al., 2006; Raschka, Chmiel, Preib & Boos, 2013; Smith & Stewart, 2012; Simon, Striegel, Aust, Dietz, & Ulrich, 2006; Thualagant, 2012). Similarly, very few female bodybuilders use WADA-banned substances within recreational settings (Thualagant, 2012).

The consumption of WADA-banned performance enhancing substances varies according to gender of the athletes (Weaving & Teetzel, 2014; Yager & O’Dea, 2014). Weaving and Teetzel (2014) highlighted that gender stereotypes can have an effect on Canadian student-athletes’ tendencies towards doping behaviours. These findings indicated that gender identity stereotypes influenced students-athletes’ perceived acceptability of doping behaviours within



Canadian university sporting programs. Pressure to succeed in male dominated sports or attributing masculinity with muscularity were also factors that led males to take both WADA-prohibited and non-prohibited performance-enhancing supplements. On the other hand, the study showed that the opposite can be said for many female Canadian university student-athletes. The fear of becoming too masculine in appearance seems to have caused reluctance to taking any substances that may alter the female physique in any way that is contrary to the typical feminine stereotype (Weaving & Teetzel, 2014). The study also suggests that men and women might gravitate towards both WADA-prohibited and non-prohibited supplements that reinforce these stereotypes. For men, the uses of steroids or protein supplements were common in order to promote muscle growth. On the contrary, in order to maintain a feminine, slimmer appearance, women were more likely to use both WADA-prohibited and non-prohibited weight-loss supplements.

In addition, results from the study of Weaving and Teetzel (2014) were cross-checked with another study that was conducted in Denmark (among professional Danish athletes of both sexes). The purpose of such a comparison was to determine whether there were any national cultural differences that may have influenced the results. Both studies showed a similar correlation between gender stereotypes and the use of WADA-banned substances (Weaving & Teetzel, 2014). In both studies, indirect methods were utilized to question the participants. Therefore, the findings provide insight into the cultural impact and perception of doping behaviour in relation to gender stereotypes amongst both Canadian university student-athletes and professional Danish athletes. However, due to the qualitative nature and purposeful sampling seen in both studies, their findings are not generalizable and quantitative research can also be conducted to identify the rate of gender differences in doping behaviours.

A study conducted with Spanish university students (n=424) majoring in physical activity and sport science demonstrated that gender stereotypes also have the potential to impact students' opinions about female body image in track and field (Rodriguez Fernandez, Ospina Betancur, & Piedra de la Cuadra, 2016). Rodriguez Fernandez et al. (2016) examined the stereotypes of gender attitudes amongst students majoring in physical activity and sport in three Spanish universities. They found that the students expressed fear of the female body becoming too masculine, and both male and female students stated that they want the females to conform to feminine gender stereotypes. This is a major challenge considering that the kind of training required for female athletes will necessarily cause them to develop muscular bodies, making this seem like an unwanted consequence of participating or competing in track and field (Rodriguez Fernandez et al., 2016). These gender stereotypes and attitudes amongst female athletes can be problematic because, as mentioned in the study by Weaving and Teetzel (2014), female student-athletes were more likely to take both WADA-prohibited and non-prohibited weight-loss supplements in order to maintain a feminine appearance, which is a matter of concern due to health risks associated with these substances.

These three studies regarding gender stereotypes highlight that gender stereotypes exist in western countries, including Canada, Spain and Denmark, despite cultural differences in these countries. Therefore, gender and conformity to gender stereotypes appear to play an important role in both the trend and rate of doping behaviour and the use of nutritional supplements.

### **2.1.9 Sport Discipline**

One of the other factors in the tendency towards doping behaviour is the type of sport that athletes participate in. Studies in this field have revealed that doping is more likely to occur in individual sports (Lazuras, Barkoukis, Rodafinos, & Tzorbatzoudis, 2010) and sports involving

speed and strength (Alaranta et al., 2006). In addition, some researchers have proposed that certain sports are more susceptible to doping behaviour. For example, Ford (2007) found that American college athletes involved in the sports of hockey and soccer are more likely to take WADA-banned substances compared to those involved in basketball and cross country/track events. On the other hand, some researchers have reported that there is no relationship between different sport disciplines and the consumption of WADA-banned substances amongst recreational gym users. For example, Singhammer (2013) reported that the use of AAS followed a similar pattern across different sport disciplines amongst recreational gym users. It should be noted, however, that in Singhammer's (2013) study participants were limited to male recreational gym users only. Furthermore, the response rate was low (38%) and therefore participants involved in using WADA-banned substances may refuse to take part due to fear of disclosure (Petroczi et al., 2010). As a result, the findings are not applicable to a broader population of recreational gym users.

On the other hand, some studies demonstrate a higher prevalence of doping behaviour in recreational bodybuilders compared to other recreational gym goers (Blouin & Goldfield, 1995; Kartakoullis et al., 2008). Blouin and Goldfield (1995) found that the prevalence of using WADA-banned substances is higher amongst male recreational bodybuilders compared to recreational runners and recreational Taekwondo athletes. Kartakoullis et al., (2008) also report that the use of WADA-banned substances amongst both male and female recreational bodybuilders is higher compared to other gym users. As a result, the prevalence of WADA-banned substances amongst recreational gym users, especially athletes whose sport is bodybuilding, is higher than other recreational gym users.

### **2.1.10 Age**

Athlete age has been shown to be one of the factors that affect doping behaviour. The consumption of WADA-banned substances has been reported at an age as early as 10, with the prevalence of doping rising parallel to increasing age (Hallward & Duncan, 2018), usually starting before the age of 30 (Sagoe, Schou Andreassen, & Pallensen, 2014).

Among the studies that have been conducted specifically among recreational gym users, Peters, Copeland, and Dillon (1999) and Bojsen-Møller and Christiansen (2010) reported a mean age of 25 and 26 respectively, which is somewhat in agreement with the findings of Leifman et al., (2011), who reported an age range of 25-29. To conclude, recreational gym users whose age ranges between 25-29 are more likely to use WADA-banned substances.

### **2.1.11 Knowledge**

Due to the fact that, unlike elite athletes, recreational gym users have limited financial and competitive motivations, as well as few ethical reasons to avoid the use of WADA-banned substances, researchers have proposed that focusing on the detrimental effects of drugs and supplements on the health of the users would be the most efficient way to discourage recreational gym users from the use of such substances (Hutchinson et al., 2018; Peters et al., 1999). Other studies have shown that recreational gym users' main deterrent to using WADA-banned substances is concern regarding physical health and side effects rather than legal, social or ethical pressures (Hutchinson et al., 2018; Dunn et al., 2009; Peters et al., 1999). Bojsen-Møller and Christiansen (2010) also found that health issues were the main concern amongst the majority of recreational gym users (58%) who used WADA-banned substances, while only 10% reported that they were mostly worried about doping tests and penalties.

In addition, research shows that gym users lack knowledge regarding the side effects of WADA-banned substances (Molero et al., 2016). Several studies report that recreational gym users have limited knowledge about negative effects on health associated with WADA-prohibited substances (Bojsen-Møller & Christiansen, 2010; Grace, Baker, & Davies, 2001; Kyselovicova, Antala, & Michalak, 2008; Nilsson, Spak, Marklund, Baigi, & Allebeck, 2004; Wanjek et al., 2007). This lack of knowledge regarding WADA-banned substances is mainly due to the fact that unlike elite athletes who take part in seminars and anti-doping courses (Thomas, Dunn, Swift, & Burns, 2011) recreational gym users rarely receive similar information in most countries.

Therefore, a lack of knowledge about the adverse effects of WADA-banned substances may be one of the reasons for the consumption of WADA-banned substances, and, as mentioned, one of the ways to discourage recreational gym users from using such substances may involve focusing on the adverse effects of WADA-banned substances on the health of the users.

## **2.2 Research Gaps**

The research literature reveals that many research teams have studied the prevalence of doping behaviours and risk factors, such as nutritional supplements, body image, gender and age. There is, however, a gap within the literature regarding the sport discipline. Although some studies have shown a greater prevalence of WADA-banned substances (such as anabolic-androgenic steroids) use amongst recreational bodybuilders compared to recreational runners and recreational Tae Kwon Do athletes (Blown & Goldfield, 1995), more recent studies examining other sport disciplines have not been published. In addition, research examining the prevalence of doping behaviour amongst recreational gym users within the Canadian context is lacking. Furthermore, except Weaving and Teetzel (2014) who examined doping behaviour and gender

stereotypes in Canadian university sport, and Blown and Goldfield (1995) who examined steroid use amongst Canadian recreational male gym users (in three sport disciplines including bodybuilding, running and Tae Kwon Do), specific studies examining doping behaviour and/or its risk factors specifically amongst Canadian recreational gym users have not been published.

## **2.3 Summary**

The prevalence of doping behaviour is relatively high amongst the recreationally exercising population (Bojsen-Møller & Christiansen, 2010; Kartakoullis, et al, 2008; Kyselovicova, et al, 2008; Wanjek, et al, 2007; Yager & O'Dea, 2014), and despite the fact that recreational gym users wrestle with the consequences of such use (Dunn et al., 2009), there is no coordinated global movement to address this issue (Bojsen-Møller & Christiansen, 2010). Educational, preventative programs and research are limited to elite levels of sport in many countries. Several countries, such as Denmark and Sweden, have started to tackle doping behaviour within recreational settings through the implementation of educational and/or illegalization programs (Bojsen-Møller & Christiansen, 2010; Molero et al., 2016). Much of what is known about recreational gym users' use of WADA-banned substances and supplements comes from researchers in Denmark and Sweden. For example, Bojsen-Møller and Christiansen (2010) collected data from 1398 recreational Danish gym users over an 18-month period, which is a unique study with respect to the number of participants and the period of collecting data. This study and other studies revealed the relatively high prevalence of using WADA-banned substances amongst recreational gym users, ranging from 1.8% (Singhammer, 2013) to 43% (Girolamo et al., 2018); yet, on average, studies that consider methodological constraints regarding doping behaviour demonstrate 10-15% of participants using WADA-banned substances (Kartakoullis et al., 2008; Uvacsek et al., 2011; Wanjek et al., 2007). The research

literature is silent on the prevalence of using WADA-banned substances amongst recreational gym users within the Canadian context, so this study is the first Canadian study to measure the use of WADA-banned substances and risk factors amongst recreational gym users.

Several studies have examined some risk factors related to doping behaviour amongst recreational gym users, including body image, nutritional supplements, gender, sport discipline and age. Amongst the aforementioned risk factors, the body of literature was richer with respect to nutritional supplements. According to the ‘gateway theory’ the consumption of nutritional supplements can lead to the use of WADA-banned substances and therefore athletes who take nutritional supplements are more likely to take WADA-banned substances (Backhouse et al., 2013; Hildebrandt, Harty, & Langenbucher, 2012; Yager & O’Dea, 2014).

Research has also shown that recreational gym users aging from 25-29 are more likely to consume WADA-banned substances (Bojsen-Møller & Christiansen, 2010; Leifman et al., 2011). There is paucity within the literature regarding sport discipline and doping behaviour. Although some studies have shown a greater prevalence of WADA-banned substances, such as anabolic-androgenic steroids, use amongst recreational bodybuilders (Blouin & Goldfield 1995), prevalence has not been reported in other sport disciplines. This thesis addresses this gap in the literature within a Canadian context regarding the prevalence of doping behaviour and its risk factors amongst recreational Canadian gym users.

## CHAPTER 3

### Methods and Methodology

This chapter describes the methods used to conduct this study. It describes the sampling approach, recruitment procedures, data collection process, data analysis, methodology, limitations and delimitations.

#### 3.1 Methods

The objective of this thesis study is to investigate the risk factors and prevalence of WADA-banned substances used by recreational gym users who exercise within recreation centres in a major university. This sample population was selected to align with the economic constraints of a master's thesis in terms of cost and time, and due to the availability of participants.

##### 3.1.1 Sample Size

I obtained statistics from a staff member of the selected university to calculate how many students or people participate in the recreational sport programs and use the fitness facilities at that university. Approximately 3000 people are gym members at the selected university centre.

A power analysis was conducted by a statistician (using G\*Power software). The required N was suggested to be 278 if alpha error probability=0.05, the effect size  $d=0.3$ , t independent test as a statistical test and with 80 percent power ( $\beta = 0.80$ ).

Therefore, I aimed to recruit a sample of 278 recreational gym users. As well as determining the proportion of participants who use WADA-banned substance, I designed a survey to examine the related risk factors, including nutritional supplement usage, body image, age, gender, sport discipline and knowledge about WADA-banned substances.



### **3.1.2 Data Collection Process**

In this study, I used a descriptive design to examine the prevalence of WADA-banned substances and its risk factors amongst recreational gym users.

#### **Questionnaires**

Questionnaires are structured surveys that are self-administered using pen and paper or electronic formats (O'Donoghue, 2010). The advantages of using questionnaires are many; they are generally more efficient than interviews because respondents complete them in their own time (Petro, 2011). In addition, data can be collected from a large number of participants in a relatively short period of time (O'Donoghue, 2010).

Another advantage of questionnaires is that written forms are standardized, so that everyone is exposed to the same questions in the same way, reducing potential bias from interactions with an interviewer (Petro, 2011). Respondents to questionnaires can take time to think about their answers and to consult records for specific information (Petro, 2011). An additional strength of questionnaires is that questionnaires provide anonymity, encouraging honest and candid responses. Questionnaires are particularly useful as a research method for examining phenomena that can be assessed through self-observation, such as attitudes and values (Petro, 2011; Portney & Watkins, 2015).

On the other hand, the most relevant disadvantages related to written questionnaires are the possible misinterpretation of the questions or response options and the potentially inaccurate responses from participants with improper motives. This is where face-to-face interviewers can clarify misinterpretations and assess the participant's attitude towards giving responses (Petro, 2011). One of the known constraints in the evaluation of doping behaviour during the data collection phase is the presence of the researcher(s) or other individuals. In fact, research has

shown that there is a major difference between the percentage of those athletes who fill out the questionnaire online and those who use hard copies (Moran, Guerin, Kirby, & MacIntyre, 2008):

The internet survey revealed significantly more positive attitudes to doping. This finding may be related to the athletes' fear of revealing their true feelings about doping in the presence of the researcher and other athletes, despite the fact that all surveys were completed anonymously (p. 14).

As a result, this issue can be solved through using online questionnaires, and if some participants tend to use hard copies, or if completing an online survey is not possible for any reason, it is recommended by Lazuras, Barkoukis, Rodafinos, and Tzorbatzoudis (2010) that participants fill out the questionnaire alone. By doing so, the participants would be able to complete the questionnaire at a time and place of their convenience, and the gathered information would be more reliable.

The most common method of distributing questionnaires has traditionally been through the mail, although many research situations allow for in-person distribution. Electronic distribution of surveys is also quickly becoming common practice (Petro, 2011). Survey software is available through many vendors, allowing for anonymity and automatic tallying of responses. Such questionnaires are economical and can reach a large population in a relatively short period (Petro, 2011).

In addition, due to the stigma that can be attached to using WADA-banned substances, traditional recruitment strategies (such as hard copy questionnaires) can make it difficult to recruit participants. In fact, participants often have concerns regarding their confidentiality when filling out questionnaires in person or by mail (Cohen et al., 2007). Another major disadvantage of questionnaires is that the return rate is often quite low. Responses from 60% to 80% of a

sample are usually considered excellent. Realistically, researchers can expect return rates between 30% and 60% for most studies. Actual response rates are lowered further by having to discard returns that are incomplete or incorrectly filled out. Low returns can severely limit the external validity of survey results (Petro, 2011). Therefore, to increase participation, ease recruitment, and avoid the concerns of participants with respect to their confidentiality (Cohen et al., 2007), an internet-based survey tool was designed for this thesis. In addition, valid self-reports of WADA-banned substance use can be collected via internet-based surveys, which also feature efficient accessibility to a relatively high number of participants who represent a specific group (Cohen et al., 2007; Pealer, 2003; Stika & Sargis, 2006).

### **Self-Report**

Survey data that are collected using either an oral interview or a written questionnaire are based on a form of self-report; that is, the researcher does not directly observe the respondent's behaviour or attitudes, but only records the respondent's report of them (Petro, 2011). There is always some potential for bias or inaccuracy in self-reports, particularly if the questions concern personal or controversial issues (Petro, 2011). The phenomenon of recall bias can be a problem when respondents are asked to remember past events, especially if these events were of a sensitive nature. For many variables, however, such as perceptions, fears, motivations and attitudes, self-report is the only direct way to obtain information (Petro, 2011). In the case of doping behaviour in particular, samples of both elite and recreational gym users deemed doping behaviour as an unacceptable social behaviour, and therefore when researchers wish to measure the use of WADA-banned performance enhancing substances amongst athletes, some participants “will refuse to answer or lie” (Clark & Desharnais, 1998, p. 160). Petroczi et al. (2011) found that 12% of participants are not eager to disclose their use of WADA-banned

substances. Using hair samples [the hair of the participants] as well as self-reports about drug use amongst athletes (both professional and non-professional), Petróczi et al. (2011) found that “PEDs [performance enhancement drugs] were detected in hair samples from 10 athletes (12% prevalence), none of whom admitted doping use” (p. 1). In order to overcome this issue researchers have proposed the use of indirect methods and found that survey validity is increased by using indirect questions rather than asking athletes about their personal experiences regarding doping (e.g., Do you know any athletes who are taking, or have previously taken, WADA-banned substances?). Schröter et al. (2016) argue that “compared to direct questioning, these indirect methods typically yield higher prevalence rates for sensitive issues and thus provide a more valid picture of behaviour” (p. 2). As a result, since indirect methods usually provide more valid data, using both direct and indirect questions regarding drug use and providing an opportunity for the participants to choose one of either direct and indirect questions can measure the prevalence of doping behaviour more accurately. In the present research, I used the self-report questionnaire survey in the descriptive section that explores the prevalence of (through both direct and indirect methods) and risk factors related to WADA-banned substance usage by recreational gym users.

In this thesis study, I used Google Forms to design the online questionnaire. Demographic data including age, gender, physical activity, and sport discipline was included in the questionnaire. The Performance Enhancement Attitude Scale (PEAS) (Petróczi, & Aidman, 2009) was used to measure recreational gym users’ general attitudes towards performance-enhancing substances. Previous use of PEAS indicates that it is reliable in measuring self-declaring attitudes toward using doping behaviour, with Cronbach’s alpha values ranging from 0.71 to 0.91 (Petroczi & Aidman, 2009). To maintain validity, I did not make substantial changes

to the PEAS questionnaire. Instead, I added supplemental questions about nutritional supplement usage and body image satisfaction, which Yager and O'Dea (2014) also did in their study. In addition, similar to Morgan et al. (2008), I included questions regarding participants' knowledge about WADA-banned substances. The questionnaire is available in Appendix A.

### **3.1.2 Participant Details and Recruitment Strategy**

I recruited participants between September 2019 to November 2019, (once I received ethics approval) from the University of Manitoba's Education/Nursing Research Ethics Board (ENREB). Convenience sampling was used in this study with continual invitation of recreational gym users to participate in the study until a recommended sample size ( $n=278$ ) was reached. Recruitment posters were displayed in the selected gym (see Appendix B). The poster included an outline of the study's purpose, emphasized the participants' privacy and confidentiality, and highlighted my desire to gain insight into participants' honest and candid responses. I asked the Director of the selected gym to display my research study poster (Appendix C) around the gym and on its screens, and participants who were willing to participate were instructed to request an online questionnaire by sending an e-mail, texting or making a phone call to me. To facilitate recruitment, I was permitted to set up a station in the selected gym to inform more gym users about the study. Gym users could access the online questionnaire with their cell phones by scanning the QR code printed on the posters displayed at my recruitment station and on bulletin boards.

When participants accessed the online questionnaire, the first page clearly stated that the participant's information would be kept confidential (and anonymous if participants did not wish to receive remuneration through email). Participants were required to provide their informed consent on the first page of the questionnaire in order to proceed (see Appendix A). Participants

received an e-gift card for Tim Hortons (worth \$3) after filling out the online questionnaire. Electronic gift cards were sent to the emails that participants provide in the online questionnaire.

The inclusion criteria were as follows: 1) exercising with recreational motivation, 2) being over 18 years old, 3) having access to the Internet, and 4) being a member of the gym selected for this study. There were also variables that lead to the elimination of participants before or during the recruiting process. The internet-based survey could not be sent if respondents left any item related to inclusion and exclusion criteria blank. For example, not consenting, not confirming that they were recreational gym user or not confirming that they were 18 years or older. When I ceased my recruiting efforts, 278 participants had completed the online questionnaire.

### **3.1.3 Data Analysis**

Once data was collected, descriptive data were entered into the Statistical Package for the Social Sciences Software (SPSS) Version 25.0 for Windows. I generated percentage, means, standard deviations and frequencies to summarize sample characteristics, describe study variables and summarize recreational gym users' responses to the survey.

Chi-square Pearson's correlation tests were performed to reveal associations between the use of WADA-banned substances and the categorical study variables including gender, nutritional supplement use and body image. In order to test associations amongst the constructs and to examine differences between groups, I used t-test and ANCOVA. Additionally, in order to measure the attitudes regarding performance enhancing substances the PEAS was used, which consists of 17 items to be measured on a Likert scale from strongly disagree = 1 to strongly agree = 6. All 17 items were scored in the same direction in accordance with the instructions of those who designed the measures. Higher scores on the PEAS indicate more lenient attitudes towards

doping in sport. In other words, higher score indicates a positive attitude toward doping and vice versa. Additionally, the PEAS was modified to reflect the target population. Anything mentioning ‘sport,’ ‘competition’ or ‘athletes’ was modified as the target population did not include competitive or elite athletes. For example, “Doping is an unavoidable part of sport” was replaced with “Doping is an unavoidable part of training.”

### **3.2 Methodology**

A descriptive, non-experimental design was used to address my research questions. There were various reasons behind selecting this design. First and foremost, as the literature review revealed, the quantitative studies done to date regarding the prevalence of doping amongst recreational gym users are scarce, with the issue being often neglected (Papadopoulos et al., 2006). In addition, to my knowledge, the PEAS scale has not been conducted amongst recreational gym users within the Canadian context. Furthermore, the purpose of this thesis was to measure the prevalence of using WADA-banned substances and understand the relationship between prevalence and factors including nutritional supplements, body image, gender, age, sport discipline and knowledge of WADA-banned substances. This thesis strives to directly measure the variables and convert the data into numerical form to allow statistical analysis, making it a quantitative study. Generally, quantitative studies come under the umbrella term of the positivist paradigm, in which the aim of the researchers is to describe, compare or measure human behaviour rather than seeking to understand issues such as feelings, values and emotions (Gratton & Jones, 2010). As a result, this study was influenced by the positivist paradigm.

According to positivism, the only valid form of knowledge is obtained through the scientific method. Positivism holds that studies regarding human behaviour must utilize the objective principles and approaches related to the natural sciences in order to produce valid

knowledge (Graton & Jones, 2011), and subjectivity must be avoided as it is an obstacle to obtaining true and valid results (Graton & Jones, 2011). Moreover, if objectivity is maintained throughout the entire research process, others will be able to personally witness the same evidence and arrive at a similar evidence-based conclusion (Graton & Jones, 2011).

Another characteristic of positivist research is that the study is generally deductive which “involves the development of an idea, or hypothesis, from existing theory which can then be tested through the collection of data” (Graton & Jones, 2011, p. 26). Consistent with the positivist approach, one of the aims of this study is to test the hypotheses that recreational gym users who are male, use nutritional supplements, have body image disturbance, and participate in recreational bodybuilders are more likely to consume WADA-banned substances, and recreational gym users who are knowledgeable about the side effects of using WADA-banned substances are less likely to take WADA-banned substances. These hypotheses are based on the existing literature, making the study deductive and hypothesis driven.



## CHAPTER 4

### Results

Data were collected from 278 recreational gym users who were participating in the recreational sport programs and were using the fitness facilities at one Canadian university.<sup>1</sup> Prior to all analysis, collected data were screened to identify missing data, assess the normality and exclude illogical responses. Of the 278 responses, five were excluded because of their illogical answers, e.g. considering themselves ‘too thin’ but wishing to be ‘a lot lighter.’

#### 4.1. Sample demographics

Table 4.1 includes a summary of descriptive statistics for gender and age. Approximately two thirds of the participants were male (65.9%) and roughly one third of the participants (34.1%) were female. The average age of the participants was 27 years old (Mean=26.99, SD=10.72) and participants ranged in age from 18 to 60.

Table 4.1. Sample Demographics.

Characteristics	Frequency	Percent
<b>Demographics</b>		
Male	180	65.9
Female	93	34.1
<b>Age</b>		
18-24	152	55.67
25-29	49	17.94
30-40	42	15.38
41-60	28	10.25
Missing	2	0.73
Total	273	

<sup>1</sup> 26 people completed the survey from India who lied on their consent forms, but those responses were removed, leaving the total number completing the survey 26 + 278.

## 4.2. The Prevalence of WADA-banned Substances

In response to the direct question regarding the use of WADA-banned substances, 13.6% (n=37) of participants reported that they took WADA-banned substances, which was divided into two groups of recreational and performance enhancing substances (lists of WADA-banned recreational substances and WADA-banned performance-enhancing substances were included in the survey). Specifically, 6.59% (n=18) reported WADA-banned substances use for recreational purposes and 2.93% (n=8) reported performance-enhancing WADA-banned substances use. Similarly, 2.93% (n=8) reported both recreational and performance-enhancing WADA-banned substances use. In addition, 0.04% (n=3) of the participants did not specify that they took recreational or performance enhancing WADA-banned substances, see Table 4.2. In response to the indirect question, “Do you personally know any athletes who are taking, or have previously taken prohibited substances?” 31.86% (n=87) reported that they knew someone using WADA-banned substances. Specifically, 4.76% (n=13) reported that they knew someone who took recreational WADA-banned substances and 17.94% (n=49) reported performance enhancing WADA-banned substances used by others. In addition, 7.69% (n=21) reported both recreational and performance enhancing WADA-banned substances use. Additionally, 1.46% (n=4) of the participants did not answer the question “Do you personally know any athletes who are taking, or have previously taken prohibited substances? If yes, which type of substances?” or specify that others they knew took recreational or performance enhancing WADA-banned substances. Complete results for the prevalence of WADA-banned substances are presented in Table 4.2.

Table 4.2. The Prevalence of WADA-Banned Substances.

Variables	Frequency	Percentage
<b>Knowingly Doped:</b>		
Performance Enhancing	8	2.93
Recreational	18	6.59
Both	8	2.93
Missing	3	1.09
Total	37	13.6
<b>Know others who doped:</b>		
Performance Enhancing	49	17.94
Recreational	13	4.76
Both	21	7.69
Missing	4	1.46
Total	87	31.86

N=273

#### 4.3. Performance Enhancing Attitude Scale (PEAS)

The PEAS consists of 17 items to be measured on a Likert scale from strongly disagree = 1 to strongly agree = 6. All 17 items were scored in the same direction. A higher score indicates positive attitude toward doping and vice versa. The mean of the PEAS scores calculated from the participants' questionnaire responses was 37.44 (SD=10.65) with the lowest score being 17 and the highest being 82. After determining that PEAS scores were normally distributed through the Kolmogov-Smirnov test,  $D(272) = .044, p = .200$ , independent t-tests were performed to assess whether participants who had used WADA-banned substances would differ attitudinally to athletes who had not used WADA-banned substances or who did not know anybody who had.

The 37 participants who had used WADA-banned substances ( $M=46.11$ ,  $SD=11.06$ ) compared to those who had not ( $n=236$ ) indicated significantly more positive attitudes on PEAS scores,  $t(270)=5.51$ ,  $p=.000$ . In addition, participants who knew others who used WADA-banned substances ( $n=86$ ) compared to participants who had not known others who used WADA-banned substances ( $n=186$ ) demonstrated higher PEAS scores, but it was not statistically significant,  $t(270)=1.79$ ,  $p=.074$ . Complete results for differences in PESA between athletes with and without doping behaviour experiences are presented in Table 4.3.

In addition, the literature and the findings of my research indicate that age, nutritional supplement use and gender have effects on the PEAS scores. I therefore analyzed the differences in PEAS scores through one way ANCOVA to determine a statically significant difference between participants who had used WADA-banned substances on PEAS scores controlling for age, nutritional supplement use and gender. The results of the ANCOVA were also statistically significant,  $F(1,266) = 22.87$ ,  $p = .000$ .

Table 4.3. Differences in PESA Between Athletes With and Without Doping Behaviour Experiences. And Differences in PESA Between Athletes Who Knew Others Used WADA-Banned Substances Experiences and Participants Who Did Not.

Variables	M	SD	<i>t</i>	df	<i>p</i>
Used WADA-banned substances	46.11	11.06	5.51	270	.000*
Not used WADA-banned substances	36.12	9.97			
Knew others used WADA-banned substances	39.13	10.35	1.79	270	.074
Did not know others used WADA-banned substances	36.66	10.72			

\* $p<.001$

#### 4.4. Body Image

Two questions were used to measure body image and body dissatisfaction. In response to the direct questions regarding body image, 61.2% of participants reported that they would describe their body as ‘just right’, while 26.7% selected ‘too fat’ and 11.7% selected ‘too thin.’ Complete results for body image are presented in Table 4.4.

Table 4.4. Details of Body Image Question.

	Frequency	Percent
Just Right	167	61.2
Too fat	73	26.7
Too thin	32	11.7
Missing	1	0.4
Total	273	

On the other hand, in response to the question about body dissatisfaction, only 20.5% of participants reported that they would like to be their present weight: 26% selected ‘a little heavier.’ 1.1% selected ‘a lot heavier,’ 41.8% selected ‘a little lighter’ and 10.3% selected ‘a lot lighter.’ See Table 4.5 for more details.

Table 4.5. Details of Body Dissatisfaction Question.

	N	Percentage
A little lighter	114	41.8
A little heavier	71	26
A lot lighter	28	10.3
A lot Heavier	3	1.1
The same as it is now	56	20.5
Missing	1	0.4
Total	273	

Body image and body dissatisfaction responses were recorded into two dichotomous categories of ('just right' versus 'too fat,' 'too thin' – body image) and ('the same as it is now' versus, 'a little lighter,' 'a little heavier,' 'a lot heavier,' 'a lot lighter' – body dissatisfaction) respectively to allow for group comparisons. As a result, 37.83% (n=14) of WADA-banned substance users reported that they would describe their body as 'too thin' or 'too fat.' Even more WADA-banned substance users (n=36, 97.29%) reported that they are not satisfied with their current weight. Of the 180 participants who were not satisfied with their current weight (n=36, 20%) reported WADA-banned substance use while of the 55 participants who were satisfied with their current weight (selected 'the same as it is now') just one (1.81%) reported WADA-banned substance use. The results of chi-square test of independence indicated that the relation between the WADA-banned substances use and body dissatisfaction were significant,  $X^2 (1, N=36) = 8.37, p = .004$ . However, the results of chi-square test of independence were not significant in regards to the body image question,  $X^2 (1, N=14) = .011, p = .918$ .

In regards to the PEAS scores, there was no significant difference for body dissatisfaction,  $t (269) = 1.35, p = .178$ , despite the fact that participants who were not satisfied with their current weight, attained higher scores than participants who were satisfied with their current weight. Additionally, there was no significant difference for body image,  $t (269) = .091, p = .928$ . In fact, participants who describe themselves as 'too thin' or 'too fat' indicated almost similar scores compared to participants who presented themselves as 'just right'. See Table 4.6.

Table 4.6. PEAS Scores and Its Relation to Body Dissatisfaction.

	N	M	SD	<i>t</i>	df	<i>p</i>
<b>Body dissatisfaction</b>						
Just right	166	37.53	11.20	.091	269	.928
Too fat/thin	105	37.4	9.77			
<b>Body Image</b>						
The same as it is now	56	35.78	10.12	1.35	269	.178
A little lighter/heavier, a lot heavier/lighter	215	37.93	10.75			

In regards to the relationship between PEAS and weight change behaviour, participants who were attempting to gain weight indicated statistically significant higher scores than participants who did not  $t(270) = 2.36, p = .019$ . However, the results were not statistically significant if controlling for age and nutritional supplement use,  $F(1,268) = 3.18, p = .075$ . In addition, participants who were attempting to lose weight did not have statistically significant higher PEAS scores than participants who were not trying to lose weight,  $t(270) = -.906, p = .366$ . See Table 4.7 for more details.

Table 4.7. Relationship Between PEAS and Weight Changes.

	N	M	SD	<i>t</i>	<i>p</i>
<b>Weight Loss</b>					
Yes	127	36.81	10.59	-.906	.366
No	145	37.99	10.71		
<b>Weight Gain</b>					
Yes	74	39.93	10.63	2.35	.019*
No	199	36.53	10.54		

\* $p < .05$

In addition, of the 37 participants who reported WADA-banned substances, 16 were trying to gain weight while 12 were trying to lose weight. The results of chi-square test of independence indicated that the relation between the WADA-banned substances use and weight gain were significant,  $X^2(1, N=16) = 5.64, p = .018$ . However, chi-square test of independence indicated that there was no significant association between participants who were attempting to lose weight and using WADA-banned substances,  $X^2(1, N=12) = 3.4, p = .065$ .

#### 4.5. Nutritional Supplements

The majority of participants 69.85% (n=190) reported nutritional supplements use. In addition, men reported taking more supplements than women. See Table 4.8 for more details. The results of chi-square test of independence indicated that there was no significant association between the gender of the participants and nutritional supplements use,  $X^2(1, N=270) = 3.48, p = .062$ . See Table 4.8 for more details. Of the 190 participants who used nutritional supplements, 18.42% (n=35) reported WADA-banned substances use. In addition, of the 37 participants who reported using WADA-banned substances, 94.59% (n=35) reported nutritional supplement use,



while among the 30.4% (n=83) of participants who did not use nutritional supplements, only two (2.4%) reported WADA-banned substance use. The results of chi-square test of independence indicated that the relation between the use of nutritional supplements and WADA-banned substances were significant,  $X^2(1, N=273) = 12.640, p = .000$ . Additionally, an independent-samples t-test was conducted to compare PEAS scores of participants who had taken nutritional supplements and those who did not. There was a significant difference in the scores for nutritional users and non-users,  $t(270) = 2.45, p = .015$ . However, the results of ANCOVA were not statistically significant if controlling for age and gender  $F(11, 185) = 1.45, p = .150$ . See Table 4.8.

Table 4.8. Differences Between Men and Women on PEAS Scores and Using WADA-Banned Substances.

Variables	N	Percentage	M	SD	X <sup>2</sup>	t	df	p
Nutritional Supplement Use								
Yes	190	69.6	38.48	10.58	12.64	2.45	270	.015*
No	83	30.4	35.07	10.49				
Total	273	100	37.44	10.65				
Variables	N	N.S use	Percentage	X <sup>2</sup>	df	p		
Gender								
Male	180	132	73.33	3.48	1	.062		
Female	93	58	62.36					

\* $p < .05$

#### 4.6. Gender

As mentioned previously, approximately two thirds of the sample were men ( $n=180$ , 65.9%) and roughly one third of the participants ( $n=93$ , 34.1%) were women. Of the 93 female participants, five (5.37%) reported the use of WADA-banned substances, while of the 180 male participants, 32 (17.77%) reported WADA-banned substances use. A chi-square test of independence was performed to examine the relation between gender and the use of WADA-banned substances. The relation between these variables was significant,  $X^2(1, N=273) = 8.049$ ,  $p=.005$ . In fact, men were more likely to engage in doping behaviour than women were (17.77% to 5.37%). In addition, an independent-samples t-test was conducted to compare the PEAS scores of men and women. There was a significant difference in the scores for male participants compared to female participants,  $t(270) = 2.03$ ,  $p=.043$ . See Table 4.9. However, the results of ANCOVA were not statistically significant if controlling for age and nutritional supplement use  $F(11,185) = 1.45$ ,  $p = .150$ .

Table 4.9. Differences Between Men and Women on PEAS Scores and Using WADA-Banned Substances.

	N	Doped	Percent	M	SD	$X^2$	$t$	df	$p$
Male	93	32	17.77	38.38	10.57	8.04	2.03	270	.043*
Female	180	5	5.37	35.63	10.75				
Total	273	37							

\* $p<.05$

## 4.7. Sport Type

Data was also collected on the sport activities that participants do. Participants reported a variety of sports and the majority of participants were engaged in several sports simultaneously ( $n=238$ , 87.17%) with ‘workout’ as the most frequently reported single activity ( $n=221$ ). The breakdown of sport activities is presented in Table 4.10. Being engaged in several sports simultaneously and reporting the sport activity of ‘workout’ is a common feature of recreational gym users. As a result, many participants’ sport activities cannot be classified within specific categories (e.g. strength sports vs endurance sports). However, some participants who chose strength sports ( $n=8$  – Weightlifting, Powerlifting and Athletics) were compared to athletes who chose endurance sports ( $n=27$  – Ball sports, Hockey, Racquet sports, Aerobics, Dance, Martial Arts, Swimming, Canoeing, Jogging, Climbing) and the participants who chose ‘Workout’ or combined types of sports characterized by strength with sports characterized by endurance were considered as a combined group ( $n=238$ ). Of the eight participants engaged in strength sports, three (37.5%) reported WADA-banned substances use, while of the 27 participants engaged in endurance sports, three (11.11%) reported WADA-banned substances use. Of the 238 participants engaged in strength and endurance sport activities simultaneously, 31 (13.02%) reported WADA-banned substances use. Although higher percentage of participants engaged in strength sports, chi-square test of independence indicated that the results were not significant,  $X^2(2, N=273) = 4.11, p = .128$ . However, the results of the independent t-tests indicated that participants engaged in strength sports indicated statistically significant higher PEAS scores compared to endurance sports,  $t(33) = -2.23, p = .032$ . In addition, the results of the t-tests indicate that participants engaged in strength sports report statistically significant higher PEAS scores compared to the combined group,  $t(243) = 2.47, p = .014$ .

Table 4.10. Relationship Between Sport and PEAS scores and WADA-Banned Substances.

Sport	N	M	SD	Cumulative
Athletics	47	38.11	11.88	47
Ball Sports	70	36.84	9.49	117
Hockey	9	32.67	11.79	125
Racquet Sports	44	34.36	11.77	170
Aerobics, Dance	26	40.00	9.90	194
Workout	221	36.97	11.01	416
Weightlifting, Powerlifting	131	37.12	11.28	547
Martial Arts	13	35.31	13.11	560
Swimming	54	39.22	10.05	614
Canoeing	4	36.25	11.87	617
Jogging	122	35.79	10.39	738
Climbing	17	40.00	7.1	755
Total	756			

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N=273

#### 4.8. Age

Age categories were significantly correlated with substance use,  $X^2(1, N=70) = 6.022$ ,  $p = .014$ . The mean age of participants who used WADA-banned substances was 25.11 (SD=5.76) and ranged from 18-36 years of age. Of the participants who reported WADA-banned substance use (n=37), slightly more than half (n=19) were in the age range of 18-24. Almost one quarter (n=9) were in the range age of 25-29 and eight were in the range of 30-40. The frequencies contributing to the significance of the test are the high frequencies of WADA-banned substances

use in the 30-40 age group and the low frequency in the 41-60+ age group. Complete results for age range and WADA-banned substances are presented in Table 4.11.

Table 4.11. The Age of Participants Who Used WADA-Banned Substances.

Age	n	WADA-banned users	Percentage
18-24	152	19	12.5
25-29	49	9	18.36
30-40	42	8	19.04
41-+60	28	0	0
Missing	2	1	
Total	273	37	

#### 4.9. Knowledge

A majority of participants (n=193, 70.7%) had not received any information regarding WADA-banned substances. On the other hand, 28.9% (n=79) received such information. The breakdown of the sources of this information is indicated in Table 4.12. In addition, of those who received information, 43 participants felt confident in their knowledge of WADA-banned substances, but 36 were not. Among participants who had used WADA-banned substances (n=37), 13 (35.13%) received information. Of 35.13% participants who received information, 11 (29.72%) were confident about their knowledge on WADA-banned substances. The implications of these results will be discussed in the next chapter.

Table 4.12. The Breakdown of the Source of Knowledge of WADA-Banned Substances.

Source	Frequencies	Percentage
A presentation	1	1.26
Family	4	5.06
Friends	7	8.86
Gym attendees	2	2.53
Gym coaches	7	8.86
Netflix documentary	1	1.26
Online	43	54.43
Physicians	5	6.32
Post-secondary education	2	2.53
Teacher	1	1.26
WNBF bodybuilding	1	1.26

N=79

## **CHAPTER 5**

### **Discussion**

The purpose of this study was to identify the prevalence of use of WADA-banned substances amongst recreational gym users exercising within the recreational facilities of a major Canadian university and determine if any risk factors identified in the research literature (including gender, body image, dietary supplements, age and sport type) contribute to the use of these substances by recreational gym users. This study also attempts to measure the participants' attitudes toward WADA-banned substances and obtain insight into the knowledge about the side effects of WADA-banned substances amongst the recreational gym users. Identifying the prevalence of doping behaviours and particular factors that associate with doping behaviour may raise awareness, particularly within the Canadian context, and might reduce the short-term and long-term adverse impacts that recreational gym users who consume WADA-banned substances may experience. The collected data indicates that the use of WADA-banned substances was relatively high amongst recreational gym users. The results also indicated that all risk factors, including gender, body image, the use of nutritional supplements, age and sport type, have a positive relationship with doping behaviour. In addition, the knowledge regarding WADA-banned substances is low amongst the sample.

#### **5.1 The Prevalence of WADA-Banned Substances Amongst Recreational Gym Users**

As indicated in previous studies (e.g. Clark & Desharnais, 1998; Petro, 2011; Petroczi et al., 2011; Wanjek et al., 2007) self-reporting questionnaires pertaining to the use of WADA-banned substances often demonstrate limitations in the acquisition of valid responses. In fact, the use of WADA-banned substances and doping behaviour, like other stigmatized behaviours, is often deemed as unacceptable social behaviour and some individuals are not eager to disclose

their prohibited substance use or their doping behaviour because of the fear of non-confidential data handling (Clark & Desharnais, 1998; Wanjek et al., 2007). In the light of this issue, and in order to attain the highest possible validity, I used an online questionnaire to avoid the concerns of research participants with respect to their confidentiality and to provide the possibility of being anonymous. In spite of the aforementioned limitation, the literature indicates that the use of WADA-banned performance-enhancing substances is relatively high amongst recreational gym users and non-professional athletes (Bojsen-Møller & Christiansen, 2010; Kartakoullis et al., 2008; Kyselovicova et al., 2008; Wanjek et al., 2007; Yager & O'Dea, 2014). The findings of this study regarding the use of WADA-banned substances (13.6%) were in line with the research literature. Findings of this study are similar to the findings of Bojsen-Møller and Christiansen (2010) who found that of 1398 Danish recreational gym users 15% were users of WADA-banned substances. Additionally, Kartakoullis et al. (2008) reported 11.6% WADA-banned substances use amongst Cypriot gym attendants, and finally the use of WADA-banned substances was reported at 15% amongst German adolescents who were mainly recreational gym users (Wanjek et al., 2007). As a result, the findings of this study are consistent with the findings of similar studies conducted in others countries.

## **5.2. Performance Enhancing Attitudes Scale (PEAS)**

It was of interest in this study to examine the relationship between having personal experience with the use of WADA-banned substances and attitudes toward doping behaviour through the performance enhancing attitude scale (PEAS), which was modified for use in recreational settings. The PEAS consists of 17 items to be measured on a Likert scale from strongly disagree = 1 to strongly agree = 6. The PEAS total score ranges from 17 to 102, with a theoretical middle-point of 59.5. All 17 items were scored in the same direction in accordance



with the instructions of those who designed the measures. Higher scores on the PEAS represent more lenient attitudes towards doping in sport. In other words, higher score indicates a positive attitude toward doping and vice versa. In all studies that used PEAS, the mean PEAS scores remained below the theoretical mid-point, indicating a general less favourable explicit attitude toward doping (Petroczi & Aidman, 2009). For example, the mean PEAS scores in other studies, such as 38.25 (Yager and O'Dea, 2014) and 39.61 (Wilson, 2014) are consistent with the mean PEAS score of 37.44 found in this study. In addition, standard deviation of the PEAS scores calculated from the participants' questionnaire responses was 10.65 and the lowest score in PEAS indicated 17 and the highest reported 82. The findings indicated that participants who had used WADA-banned substances had statistically significant higher PEAS scores compared to participants who had not (controlling for age, gender and nutritional supplement use). These findings are consistent with the previous studies (Petroczi & Aidman, 2009; Uvacsek et al., 2011) that found a positive relationship between having personal experience of doping behaviour and measuring a higher attitude towards doping using the PEAS scale.

### **5.3. Body Image**

The findings indicated that there is a significant association between body dissatisfaction and WADA-banned substance use. These findings are consistent with the findings of Yager and O'Dea (2014) and Jampel et al. (2015) amongst male adolescents who reported positive relationship between WADA-banned substances use and body dissatisfaction. In regards to the association between PEAS scores and body image, the findings indicated that participants who were not satisfied with their current weight ( $M=37.93$ ,  $SD=10.75$ ) attained higher scores than participants who were satisfied with their current weight ( $M=35.78$ ,  $SD=10.12$ ), yet there was no significant effect for body dissatisfaction, which was not consistent with the findings of Yager

and O'Dea (2015) who reported that participants who were not satisfied with their current weight had significantly higher PEAS scores. The conflicting results may be due to gender differences and athletic status (as Yager and O'Dea, 2015 did not distinguish the level of the participants).

In relation to weight change behaviour, the findings indicated that the relation between the WADA-banned substances use and weight gain were significant. As well, participants who were attempting to gain weight ( $M=39.93$ ,  $SD=10.63$ ) indicated statistically significant higher scores than participants who did not ( $M=36.53$ ,  $SD=10.54$ ). These findings are consistent with the findings of Yager and O'Dea (2015) who reported that male adolescents engaged in gaining weight indicated significant higher PEAS scores compared to participants who were not trying to gain weight. However, the results were not statistically significant when controlling for age and nutritional supplement use,  $F(1,268) = 3.18$ ,  $p = .075$ . In addition, Chi-square test of independence indicated that there was no significant association between participants who were attempting to lose weight and using WADA-banned substances. Similarly, participants who were attempting to lose weight ( $M=36.81$ ,  $SD=10.59$ ) did not have statistically significant higher PEAS scores than participants who were not trying to lose weight ( $M=37.99$ ,  $SD=10.71$ ). Taken together, as stated previously, the conflicting results may be due to gender differences and athletic status. Furthermore, to my knowledge there have not been studies conducted exclusively with recreational gym users that measure the relationship between body dissatisfaction, weight changes and PEAS. As a result, according to the present study, it is safe to say that recreational gym users who are trying to gain weight are more likely to take WADA-banned substances compared to recreational gym users who are trying to lose weight.

#### 5.4. Nutritional Supplement

The results indicate that the reported prevalence of nutritional supplement use is lower than what has been reported in previous studies; 70% of participants reported nutritional supplements use. This prevalence is similar to the findings of the British Columbia Ministry of Health planning (2004) that reported 64% nutritional supplement use amongst the general population of British Columbia. However, other studies conducted with recreational gym users reported large variations in the prevalence of nutritional supplements use, ranging from 41% (Tsitsimpikou et al., 2011) to 100% (Solheim et al., 2017), which is also the case with the studies conducted within Canada. Parnell et al. (2016) reported 87% prevalence amongst university students in the province of Alberta who were non-athletes, and Khoury et al. (2019) also found 87% prevalence amongst non-varsity athletes in the province of Ontario. In British Columbia, the prevalence found among non-varsity university students was 94% (Kristiansen et al., 2005), the prevalence of nutritional supplement use among the general population in British Columbia was 64%. Taken together, the difference between my findings and the aforementioned studies can be explained by including both university students and the general public in the current study. My questionnaire did not distinguish gym members who were students and gym users who were members of the community.

In addition, the findings indicate that males appeared to be more likely than females to use nutritional supplements (73.33% to 62.36%). However, the results of chi-square test of independence indicated that the difference was not significant. Studies conducted amongst non-professional and recreational gym users that examined gender differences in nutritional supplement use differ in their findings. Some report more frequent use amongst male (Bojsen-Møller & Christiansen, 2010; Khoury et al., 2019; Tsitsimpikou et al., 2011), while others in

females (British Columbia Ministry of Health Services, 2004; Kartakoullis et al., 2005; Solheim et al., 2017).

When investigating the association of nutritional supplement use and WADA-banned substances use, the results indicated that there was a significant positive association, which is consistent with previous studies that reported a positive relationship between the use of nutritional supplements and WADA-banned substances (Backhouse et al., 2013; Hildebrandt, Harty, & Langenbucher, 2012; Hurst et al., 2019; Papadopoulos et al., 2006; Solheim et al., 2017; Yager & O’Dea, 2014). Of these studies only Solheim et al. (2017) found a positive relationship between the use of nutritional supplements and WADA-banned substances amongst what they labeled ‘fitness customers’ (non-elite athletes), while other studies included only elite athletes as participants (Backhouse et al., 2013; Hurst et al., 2019), or did not include recreational gym users (Hildebrandt et al., 2012; Papadopoulos et al., 2006; Zali Yager & O’Dea, 2014). As a result, according to the findings of my study and Solheim et al. (2017) the “gateway” theory applies to the recreational gym user. In fact, “gateway theory” states that people who take nutritional supplements are more likely to use WADA-banned prohibited substances (Backhouse et al., 2013).

To my knowledge, conducting PEAS amongst recreational gym users is unique. The PEAS scores indicated that there was a significant difference in the scores for nutritional supplement users and non-users, which is consistent with the findings of Backhouse et al. (2013) who found higher PEAS scores amongst elite athletes who used WADA-banned substances than non-users. However, the results were not statistically significant if controlling for age and gender, which is inconsistent with the findings of Yager and O’Dea (2014) who found a significant higher PEAS scores amongst the adolescent athletes (controlling for age) who used

WADA-banned substances than non-users. However, Yager and O'Dea (2014) did not include female participants, and therefore the conflicting results may be due to gender differences.

### **5.5. Gender**

The majority of participants were male (n=180, 65.9%) and roughly one third of the participants (n=93, 34.1%) were female. Of the 93 female participants, only five (5.37%) reported the use of WADA-banned substances, while of the 180 male participants, 32 (17.77%) reported WADA-banned substances use. A chi-square test of independence indicated a significant positive relationship between gender and the use of WADA-banned substances. In fact, men were more likely to engage in doping behaviour than were women. These findings corresponds to the previous findings within recreational, varsity and elite settings (Alaranta et al., 2006; Hutchinson, Moston, & Engelberg, 2018; Kanayama, Boynes, Hudson, Field, & Pope, 2007; Papadopoulos et al., 2006; Raschka, Chmiel, Preib & Boos, 2013; Smith & Stewart, 2012; Simon, Striegel, Aust, Dietz, & Ulrich, 2006; Thualagant, 2012; Weaving & Teetzel, 2014; Yager & O'Dea, 2014).

In addition, an independent-samples t-test indicated a significant difference on the PEAS scores of men and women. Amongst the aforementioned studies, only Backhouse et al. (2013) performed PEAS on both male and female elite athletes and found that men had significantly higher PEAS scores compared to women, which is consistent with the findings of this study.

### **5.6. Sport Discipline**

The findings regarding sport activities indicated that the majority of the participants (n=238) were engaged in several sports simultaneously and many participants' sport activities could not be compared with each other. However, participants engaged in 'strength sport' category reported more WADA-banned substances use (n=8, 37.5%) compared to participants

engaged in 'endurance sport' category (n=27, 11.11%). The findings are somewhat in agreement with the findings of Alaranta et al. (2006) who found that doping behaviour is more likely to occur in sports involving speed and strength amongst elite athletes. Furthermore, the PEAS scores revealed that participants engaged in strength sports indicated statistically significant higher PEAS scores compared to endurance and combined groups. However, as mentioned, due to the majority of athletes participating in multiple sports, it was not possible to categorize the sports into individual and team sports or make comparison according to a single sport activity.

### **5.7. Age**

The findings indicated that the majority of individuals exercising were in the age range of 18–24 years. After the age of 26 years there was a decline in the numbers of people who took part in the study, and it seems that because this study was conducted in a university gym the majority of participants were university students. Age categories were significantly correlated with substance use. The frequencies contributing to the significance of the test are the high frequencies of WADA-banned substances use in the 30-40 age group and the low frequency in the 41-60+ age group.

In addition, the mean age of participants who reported WADA-banned substance use was 25.11 years, which is consistent with the findings of Peters et al., (1999) who reported anabolic-androgenic steroid (AAS) use with a mean age of 25 years amongst athletes who were mainly recreational gym users, and the findings of Bojsen-Møller and Christiansen (2010) who reported a mean age of 26 years amongst recreational gym users. Additionally, most participants who used WADA-banned substances were in the range of 25-29 (18.36%) and 30-40 (19.04%). These findings are somewhat consistent with the findings of Leifman et al. (2011), who reported the highest AAS use amongst gym users in the 25-29 age group, and Papadopoulos et al. (2006) who

reported higher percentage of WADA-banned substance use amongst 27 years and older university students. The findings are also somewhat consistent with the findings of Singhammer (2013) who reported most WADA-banned substance use in the 25-43 age group (amongst recreational gym users). However, in a study conducted amongst recreational gym users, Kartakoullis et al., (2008) reported that the highest percentage of people who used WADA-banned substances were in the 26-35 age group.

### **5.8. Knowledge**

In relation to the knowledge pertaining to WADA-banned substances, 29% of the participants received information regarding WADA-banned substances. Of these participants 15.75% were confident regarding their knowledge on WADA-banned substances. These findings are consistent with the findings of Wanjek et al. (2007) who reported 'poor knowledge' regarding doping behaviour amongst recreational young athletes. In addition, of the participants who used WADA-banned substances, 35.13% received information about WADA-banned substances. Of these participants, 29.72% were confident about their knowledge of WADA-banned substances. These findings are different from the findings of Kyselovicova et al. (2008) who reported that none of the recreational male athletes (attending in the gyms) who used WADA-banned substances (specifically anabolic steroids) had any information about it. The conflicting results may be due to the sample of the current study, which was conducted amongst recreational gym users who were mainly students. Furthermore, due to the time gap between the current research and the study of Kyselovicova et al. (2008), more information on WADA-banned substances, like other data, is available online. This can be confirmed due to the fact that the majority of participants' source of information on WADA-banned substances (54.43%) was online resources. Kyselovicova et al. (2008) previously found that the majority of participants

received information on WADA-banned substances through elite athletes and magazines. To conclude, the findings of this study and other studies indicate that the majority of WADA-banned substance users were neither informed nor confident about their knowledge on WADA-banned substances.



## **CHAPTER 6**

### **Conclusions**

The purpose of this study was to identify the prevalence of use of WADA-banned substances amongst recreational gym users exercising within the recreational facilities of a major Canadian university, and to determine if any risk factors identified in the research literature (including gender, body image, dietary supplements, age and sport type) contribute to the use of these substances by recreational gym users. This study also attempted to measure the participants' attitudes toward WADA-banned substances through PEAS and obtain insight into the knowledge about the side effects of WADA-banned substances amongst the recreational gym users. As far as the strengths of this study are concerned, a power analysis was conducted prior to the start of the study and  $n$  of 278 was recommended. The required  $n$  was obtained and the results related to hypotheses testing analysis (i.e. correlations) were found to be statistically significant in the majority of analysis. This was achieved mainly due to the continuous presence of the researcher in the gyms, straightforwardness and easy access to the survey (participants could easily scan the QR code printed on the posters and they could complete the survey with their cell phones). Overall, these efforts may have led to the consistency of the findings of the present study with previous research despite the potential limitations that exists with the use of self-report survey design, such as the concern with validity and accuracy of participants' responses. The researcher assumed that respondents were frank and honest in their responses to survey items. Responses that were illogical were removed after screening all the responses. In addition, I have several years' experience in gyms as an athlete, coach and physical education teacher, which was helpful in interacting with potential participants in the gym. However, participants still might not have answered the questions honestly due to doping being a socially stigmatized behaviour.

Of course, there is no single answer to why athletes use WADA-banned substances. WADA-banned substance use and attitudes toward performance-enhancing substances use amongst recreational gym users must be understood in the context of any increasingly drug-obsessed society, as it is not realistic to expect gym goers to isolate themselves from a culture in which pharmacists and doctors supply medication for all symptoms (Sage & Eitzen, 2013). This study, to the best of my knowledge, was the first study to identify the prevalence of doping behaviour and examine several risk factors at the same time that had not previously been studied together. Furthermore, PEAS was used to measure attitudes toward doping behaviour, which was used in previous studies by Backhouse et al. (2013) and Yager and O'Dea (2014). Yet, this study provides modifications of the PEAS for recreational settings and measured the PEAS for the first time amongst recreational gym users. Participants' PEAS scores indicated almost the same results compared to the previous studies, which is a unique contribution of this study.

In order to achieve the research goals, 278 recreational gym users were surveyed. The findings of this study support the study hypotheses. One of the most important findings of the current study was the prevalence of use of WADA-banned substance, which align with previous research conducted exclusively amongst recreational gym users in other countries. The results of PEAS, which was used for the first time amongst Canadian recreational gym users, indicate that participants who used WADA-banned substances had a positive attitude towards doping. The findings also indicate that the use of nutritional supplements, age, gender, body image and sport type were positively associated with WADA-banned substance use.

This study was a non-experimental descriptive correlational survey design. It was the best design for a research problem at the Master's level that involves complex concepts that are not easily amendable to experimentation. The current study contributes to the limited literature

pertaining to doping behaviour amongst recreational gym users. Recreational gym users consist of the majority of athletes and therefore the findings are applicable to a broader population compared to the studies conducting exclusively amongst elite athletes. However, the findings of this study have to be interpreted with caution due to not using random and standard sampling. In fact, the findings are limited to the recreational facilities of a major Canadian university. Overall, the findings of the current study raise concerns.

First, the prevalence of doping behaviour has been reported relatively high amongst the current sample. Despite the fact that recreational gym users wrestle with the consequences of such use (Dunn et al., 2009), there is no coordinated global movement to address this issue (Bojsen-Møller & Christiansen, 2010). Educational and preventative programs are limited to elite levels of sport in many countries. Several countries, such as Denmark and Sweden, have started to tackle doping behaviour within recreational settings through the implementation of educational and/or illegalization programs (Bojsen-Møller & Christiansen, 2010; Molero et al., 2016). Currently in Canada, educational and/or deterrent programmes are not available for recreational gym users.

Second, the considerable consumption of nutritional supplements reported in this study is a matter of concern for two reasons. First, according to ‘gateway theory,’ the use of nutritional supplements has a positive relationship with the use of WADA-banned substances (Backhouse et al., 2013; Hildebrandt, Harty, & Langenbucher, 2012; Yager & O’Dea, 2014). In addition, due to the probability of some supplements being contaminated with hormones, such as AAS, adverse side effects on the health of recreational gym users may ensue (Backhouse, Whitaker & Petroczi, 2013; Baume, Mahler, Kamber, Mangin, & Saugy, 2006; Molero et al., 2016; Molinero & Márquez, 2009; Solheim et al., 2017; Tsitsimpikou et al., 2011).

## 6.1 Limitations

This study is not without limitations. Although the data set was large due to the relatively large sample size needed to obtain significant data, ideally it would have had equal numbers of participants in all groups, including sports and genders. Due to all the participants being recreational gym users, it was anticipated that participants were not exclusively active in a single sport activity. Therefore, they were allowed to choose several sports activities. The majority of participants combined several sports. Participants' mixture of sports did not allow comparison between sports, and the comparison between strength and endurance sports included very few participants. Furthermore, recruiting participants from other gyms or other universities recreational programs would have been beneficial. However, time and money provided some restraints to being able to conduct the study within other gyms and/or schools that could have added to the richness of the data set.

Another limitation to note is that this study only examined the use of WADA-banned substances generally. Almost half of the WADA-banned substances used were in the "recreational WADA-banned substances" category, which includes caffeine, alcohol and cannabis. These substances can be used legally and are likely to be taken for recreational purposes only, not for performance-enhancement purposes. As a result, including specific questions about the main purpose of using WADA-banned substances and/or the specific WADA-banned substances could provide more useful data. However, in order to design a short survey, increase participation and acknowledge participants' potential reluctance to name the particular WADA-banned substances they took (since some WADA-banned substances, such as heroin, are illegal by law), similar to Moran et al.'s (2008) protocol, I divided the WADA-banned substances into two categories of recreational and performance enhancing only.

Other limitations to note included the use of a convenience sampling method. Recreational gym users who participated may differ from recreational gym users who did not. In addition, selecting one Canadian university in this study prevented inter-provincial or inter-cultural comparison. In a convenience sample, participation is voluntary and only a limited number of individuals will participate (Dunn et al., 2009). Despite this limitation, convenience sampling was used in previous research into WADA-banned substances (e.g. by Backhouse et al., 2013; Cohen et al., 2007). Although using convenience sampling may limit the generalizability of the findings, it may be seen as a feasible alternative when targeting a specific population, such as recreational gym users (Dunn et al., 2009).

Another potential limitation is that participants may under report their use of WADA-banned substances due to social desirability. Although, some researchers argue that use of WADA-banned substances within elite sport is always hidden or denied and this is not the case amongst recreational gym users (Bojsen-Moller & Christiansen, 2010), research indicates that the use of performance enhancing substances and doping behaviours, like other stigmatized behaviours, is often deemed as unacceptable social conduct and some participants are not eager to reveal their doping behaviours. Such participants might either decline to answer, resort to falsehood or refuse to participate, even if anonymity and confidentiality are assured by the researchers (Clark & Desharnais, 1998). As a result, participants could underreport their WADA-banned use despite the fact that anonymity and confidentiality were assured in this study. In fact, in order to obtain more honest answers, the first page of the survey clearly stated that the participant's information would be kept confidential. Participants could also remain anonymous if they did not wish to receive remuneration through their email.

## 6.2 Key Contributions to Research

This study contributes to research in the field of doping behaviour in general and within recreational settings, in particular. In fact, the current study is the first Canadian research since 1995 with respect to WADA-banned substances use amongst recreational gym users and to the best of my knowledge, was the first study to identify the prevalence of doping behaviour and examining several risk factors at the same time that have not previously been studied together. Previous studies were restricted to one or fewer variables associated with doping behaviour compared to the current study. In addition, the findings of this study were significant in most variables that were investigated due to the relatively large sample size recruited for this study. The current study confirmed that the use of WADA-banned substances is relatively high amongst recreational gym users, which is consistent with the majority of studies conducted amongst recreational gym users (Bojsen-Møller & Christiansen, 2010; Cohen et al., 2007; Molero et al., 2016; Wanjek et al., 2007). This is a matter of concern since the consumption of some WADA-banned substances, especially in excess and without adequate knowledge, can have major physical, psychological, social and financial effects (Petrocelli et al. 2008). Yet, little is known about the prevalence of the use of WADA-banned substances and risk factors amongst recreational gym users in many countries, including Canada. The present study, as the first Canadian study including recreational gym users as participants, identified recreational gym users who are more ‘at-risk’ for using WADA-banned substances: recreational gym users who used nutritional supplements, had body dissatisfaction and were male. Therefore, anti-doping education could be targeted with these findings in mind. Further, regardless of its methodological limitations, this study provides some of the first Canadian data on WADA-banned substance

users, from which other hypotheses can be generated that can be more rigorously tested in future research.

### **6.3 Future Directions**

The current study investigated a number of variables in association with WADA-banned substances and attitudes of doping, along with an acceptable sample size of both genders, of different ages with a variety of sports. This study can lead to a wide array of future research topics. Given the lack of both quantitative and qualitative research in this area, as was confirmed in Chapter II, the areas in which future research can be conducted vary greatly and lead to more questions than answers. First, this study investigated the prevalence of WADA-banned substance use and its risk factors within one major Canadian university gyms only, and despite the fact that in addition to the university students, other individuals who were attending within university gyms could also participate, the majority of participants were university students from a single university. As a result, in an effort to endorse the findings of this study, the model of current study within other populations will be essential to enhance validity and generalizability. This could be done by conducting research amongst recreational gym users within randomly selected sport centres, gyms, sport clubs, etc. As well, the model of the current study can be conducted within other Canadian universities.

In addition, almost half of the participants who reported WADA-banned substances took recreational WADA-banned substances. This half of WADA-banned substance users could have used recreational WADA-banned substances for both recreational reasons and to enhance their sport performances. From the findings of this study, the main motivation for using WADA-banned substances is not differentiated. Therefore, future studies can distinguish the main intention of using both recreational and performance enhancing WADA-banned substances. In

fact, there are some performance-enhancing WADA-banned substances, such as testosterone, which is prohibited both by law and by WADA but can be used for treatment (Mhillaj et al., 2015). On the other hand, there are some substances, such as caffeine, alcohol and cannabis, which are legal but banned by WADA in competition.

Furthermore, conducting qualitative studies amongst recreational gym users who take WADA-banned substances can provide a detailed picture about why people act in certain ways, which is deeper than quantitative studies that analyse ranks and counts by recording attitudes, feelings and behaviours. In addition, qualitative research can encourage participants to expand on their responses to open up new topic areas that were not initially considered (Gratton & Jones, 2010; Markula & Silk, 2011). As a result, qualitative studies can identify new factors related to doping behaviour that cannot be identified within quantitative research.



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## APPENDIX A: Questionnaire and Consent Form

### APPENDIX A. WORD VERSION OF THE SURVEY



**Research Project Title: The Use of Performance Enhancing Substances Amongst Recreational Gym Users, Knowledge, Prevalence and Risk Factors**

\*Please provide a valid email address to receive e gift card and receiving the results of the study (if interested). **\*(Required if participants wanted to receive gift card)**

Email address\* \_\_\_\_\_

### **Consent Form**

Investigator: Mahdi Ebrahimian, Master student in the Faculty of Kinesiology.

Email: [ebrahimm@myumanitoba.ca](mailto:ebrahimm@myumanitoba.ca)

Advisor: Dr. jay johnson. Email: [jay.johnson@umanitoba.ca](mailto:jay.johnson@umanitoba.ca)

**You are being asked to participate in a research study. Please take your time to review this consent form and discuss any questions you may have with the study investigator. You may take your time to make your decision about participating in this study and you may discuss it with your friends or your family. This consent form may contain words that you do not understand. Please contact the investigator to explain any words or information that you do not clearly understand.**

### **Purpose of the Study**

This research study is being conducted to study the use of and knowledge about World Anti-

doping Agency(WADA) banned substances among recreational gym users, and the factors that can lead to doping behaviour. WADA is an independent agency working towards eradicating the improper use of drugs in sport at all levels. More information and research regarding the doping behaviour among recreational gym users may raise awareness particularly within Canadian context and might reduce the short-term and long-term adverse impacts of recreational gym users who consume WADA-banned substances. An online questionnaire will be used to allow participants to describe their personal experiences regarding performance enhancing substances including both WADA-non-prohibited substances (such as creatine, nutritional supplements, etc.) and WADA-banned (such as testosterone) performance enhancing substances.

A total of 278 participants will participate in this study. Your participation in this research is entirely optional and you should know that you can refuse to answer any questions while filling out the questionnaire. This information package is designed to give you an idea of what the research is about and what participation in the research will involve. If you would like more detailed information, or information not included here, you should feel free to contact Mahdi Ebrahimian, the principal investigator, by email [ebrahimmm@myumanitoba.ca](mailto:ebrahimmm@myumanitoba.ca) or by telephone



### **Study Procedures**

If you decide to participate in this study, you will receive an online questionnaire. The questionnaire was designed to gain information about your demographics, the use of WADA-prohibited and non-prohibited performance enhancing substances and your attitudes towards doping in general. Filling out the online questionnaire will take approximately 10-15 minutes. You will be sent a copy of your own filled out questionnaire via email (if you provide a valid email). You should know that if you do not provide an email address, you can only withdraw up

until you submit the survey. However, if you provide an email address you can stop participating at any time before September 2019 through contacting Mahdi Ebrahimian (Principal Researcher) by phone or email. Withdrawing will not negatively impact you in any way. If you wish to withdraw from the study, all of the information you have shared up until that point (e.g. analyzing your responses) will be destroyed. You will be provided with the results of the study four months after completion of the study, at the latest (Date: 01/ 01/ 2020).

### **Potential Risks and Discomforts**

The risks associated with participating in this research are minimal. There are no known physical, psychological, economic, or social risks associated with participation in this study. Every measure will be taken to keep your identity private in all aspects of the project.

### **Benefits**

There may or may not be direct benefit to you from participating in this study. We hope the information learned from this study will increase the knowledge about the use of WADA-prohibited and non-prohibited substances among recreational gym users.

### **Costs**

All the procedures, which will be performed as part of this study, are provided at no cost to you.

### **Payment for participation**

You will be given a Tim Hortons e-gift card (worth \$3) per completed study visit to a maximum of one upon completion of your participation in this research study.

### **Anonymity and Confidentiality**

Information gathered in this research study will be presented and published as a Master Thesis study and may be presented at conferences or published in peer-reviewed journals, however your name, email and other identifying information (which will be kept separate from non-identifiable

data) will not be used or revealed. In this research study, participants will be referred as “recreational gym users”. You should know that you should provide your email address if you want to receive the e-gift card, and if you wish to remain anonymous, you should fill out the version of the questionnaire that does not require an email address and you will not receive e-gift card. All data (i.e. your personal information) will only be available to the researcher (Mahdi Ebrahimian) and your information will be de-identifiable since the researcher will bear only your assigned study number. The University of Manitoba Health Research Ethics Board may review records related to the study for quality assurance purposes. All data will be kept in a secure location (on a password protected computer in an encrypted folder). After the completion of the study, research data will be kept for a maximum of four months and then destroyed. All electronic files (i.e. completed online questionnaire) will be placed in the "trash" and the trash will be secured.

### **Feedback**

You will be provided the opportunity to see your completed questionnaire, and you will receive a copy of your responses if you provide email address. If, after viewing, you find that you object to any of the answers that you provided, you can edit your responses after submission. All removed responses will be destroyed by being placed in the “trash” bin and the trash will be secured.

### **Voluntary participation/Withdrawal from the study**

Your decision to take part in this study is voluntary. You may refuse to participate and you may withdraw from the study at any time through informing the researcher via email, texting or making a phone call. Your decision not to participate or to withdraw from the study will not adversely impact you in any way.

Do not approve this consent form unless you have had a chance to ask questions and have received satisfactory answers to all of your questions.

### **Questions**

**If you have any questions about this research, you can contact Mahdi Ebrahimian by phone [REDACTED] or email ([ebrahimm@myumanitoba.ca](mailto:ebrahimm@myumanitoba.ca)). If you decide to participate in this research study, please verify this consent form (via a provided checkbox at the end of this form) which will be sent to the project researcher.**

**This research has been approved by the Education/Nursing Research Ethics Board. If you have any concerns or complaints about this project you may contact any of the above-named persons or the Human Ethics Coordinator (HEC).**

### Statement of Consent

I have read this consent form. I have had the opportunity to discuss this research study with Mahdi Ebrahimian Besharat. I have had my questions answered by him in language that I understand. The risks and benefits have been explained to me. Any relationship (such as teacher, supervisor or family member) I may have with the study team has not affected my decision to participate. I understand that I will be given a copy of this consent form after signing it. I understand that my participation in this study is voluntary and that I may choose to withdraw at any time. I freely agree to participate in this research study. I understand that information regarding my personal identity will be kept confidential, but that confidentiality is not guaranteed. I authorize the inspection of any of my records that relate to this study by The University of Manitoba Research Ethics Board. Your verification on

this form indicates that you have not waived any of the legal rights that you have as a participant in a research study.\*

☐ I agree (Mandatory in online questionnaire)

In order to participate in this research study, you must be a recreational gym user. Please do not complete this questionnaire if you are a professional or varsity level athlete and your sport club, organization, or your employer require you to adhere to an anti-doping policy such as the World Anti-Doping Code or the Canadian Anti-Doping Program. Please indicate that you are recreational gym user via inserting a check mark below.

I am a recreational gym user and not a varsity or professional athlete. \* ☐ (Mandatory in online questionnaire)

I am 18 years old or older.\* ☐ (Mandatory in online questionnaire)

Date:

Day/month/year

Feedback Request Form:

I would like to receive a final cut of the research that I may review. The final results will be sent out to your email address, four months after completion of the study, at the latest (Date: 01/ 01/ 2020)

☐ Yes ☐ No



### Demographic Information

1. Age:  
Choose ▼ (Participants can choose the range between 18 to +60)
2. Gender:  
☐ Female  
☐ Male
3. Sports and physical activities you participate in at the gym:  
☐ Athletics   ☐ Ball Sports (Soccer, Football, Basketball, Volleyball, Baseball, Cricket)  
☐ Hockey   ☐ Racket Sports( tennis, golf, badminton, squash, ping pong)   ☐ Aerobics,  
Dance, Yoga   ☐ Workout   ☐ Weighlifting   Powerlifting   ☐ Martial Arts   ☐  
Swimming   ☐ Canoaing   ☐ Jogging(Walking, bicycling, running)   ☐ climbing  
Other:\_\_\_\_\_
4. How often do you go to the gym?  
Choose ▼ (Every day, Six times per week, Five times per week, Four times per week,  
Three times per week, Twice per week, Once per week, Three times in a month, Twice  
in a month, Once in a month)
5. On average, how much time do you spend on exercising in the gym?  
Choose ▼ (Options are from Half an Hour to more than 12 hours)

### Knowledge and the Use of Supplements and Drugs

6. Have you ever taken any substances whose use is prohibited in sport such as  
Testosterone, Growth hormone, etc.?
- For the purpose of this study, the following are categorized as:
- \*1. Performance- enhancing drugs/methods: stimulants (i.e., amphetamine, ephedrine, etc.) -overcoming tiredness; beta-blockers - calm nerves and steady hands; diuretics - reduce weight and mask presence of drug in urine; steroids (i.e., testosterone) - accelerate muscle growth and allow longer, more intense training; human growth hormone - builds muscle size and strength; erythropoitein (EPO) - increases production of red blood cells, which improves endurance; and blood doping - reinjected blood increases oxygen supply

to muscles, which improves endurance.

\* 2. Recreational drugs: tobacco and alcohol, cannabis, tranquilizers, barbiturates (sedatives), heroin, cocaine/crack, speed, hallucinogens (LSD, PCP), and inhalants (glue, etc.).

☐ Yes ☐ No

If yes, which type of substance? ☐ Recreational ☐ Performance enhancing ☐ Both

7. Have you received information about substances and methods banned by the World Anti-Doping Agency?

☐ Yes ☐ No

If yes, from whom? ☐ Physicians ☐ Gym Coaches ☐ Online Sources (such as online news, online magazines, online articles, etc.) ☐ My family ☐ Friends ☐ Other:\_\_\_\_\_

8. Are you confident in your knowledge about banned substances in your sport?

☐ Yes ☐ No

9. Do you personally know any athletes who are taking, or have previously taken prohibited substances?

☐ Yes ☐ No

If yes, which type of substance? ☐ Recreational ☐ Performance enhancing ☐ Both

10. Do you think you are: ☐ Too fat ☐ just right ☐ too thin

11. Would you like to be:

☐ A little lighter ☐ A lot lighter ☐ The same as it is now ☐ A little Heavier ☐ A lot heavier

12. Have you take any kind of nutritional supplements such as sports drinks, vitamins and minerals, energy drinks, protein powders, herbal supplements, and creatine in the past two months?

☐ Yes ☐ No

13. Are you currently trying to gain weight? ☐ Yes ☐ No

14. Are you currently trying to lose weight? ☐ Yes ☐ No

### Performance Enhancement Attitude Scale (PEA-SCALE)

Please read each item below carefully and select the appropriate number after each statement, which shows the level of your agreement.

*My opinion regarding sport in general is that...*

15. Doping is necessary for training.

Strongly disagree      Disagree      Slightly disagree      Slightly agree      Agree      Strongly agree

☐      ☐      ☐      ☐      ☐      ☐

16. Doping is not cheating since everyone does it.

Strongly disagree      Disagree      Slightly disagree      Slightly agree      Agree      Strongly agree

☐      ☐      ☐      ☐      ☐      ☐

17. Athletes often lose time due to injuries and drugs can be used to help to make up the lost time.

Strongly disagree      Disagree      Slightly disagree      Slightly agree      Agree      Strongly agree

☐      ☐      ☐      ☐      ☐      ☐

18. Only the quality of performance should matter, not the way athletes achieve it.

Strongly disagree      Disagree      Slightly disagree      Slightly agree      Agree      Strongly agree

19. Gym users /People in my sport are pressured to take performance-enhancing drugs.

Strongly disagree      Disagree      Slightly disagree      Slightly agree      Agree      Strongly agree

☐      ☐      ☐      ☐      ☐      ☐

20. Gym users / People who take recreational drugs use them because they help them in training situations.

Strongly disagree	Disagree	Slightly disagree	Slightly agree	Agree	Strongly agree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

21. People should not feel guilty about breaking the rules and taking performance-enhancing drugs.

Strongly disagree	Disagree	Slightly disagree	Slightly agree	Agree	Strongly agree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

22. The risks related to doping are exaggerated.

Strongly disagree	Disagree	Slightly disagree	Slightly agree	Agree	Strongly agree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

23. Athletes have no alternative career choices, but sport.

Strongly disagree	Disagree	Slightly disagree	Slightly agree	Agree	Strongly agree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

24. Recreational drugs assist in motivating athletes to train and compete at the highest level.

Strongly disagree	Disagree	Slightly disagree	Slightly agree	Agree	Strongly agree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

25. Doping is an unavoidable part of training.

Strongly disagree	Disagree	Slightly disagree	Slightly agree	Agree	Strongly agree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

26. Recreational drugs help to overcome boredom outside of training.

Strongly disagree	Disagree	Slightly disagree	Slightly agree	Agree	Strongly agree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

27. There is no difference between drugs and the technical equipment that can be used to

enhance performance (e.g. high altitude simulating environments)

Strongly disagree    Disagree    Slightly disagree    Slightly agree    Agree    Strongly agree

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28. The media should talk less about doping.

Strongly disagree      Disagree      Slightly disagree      Slightly agree      Agree      Strongly agree

□ □ □ □ □ □ □

29. The media blows the doping issue out of proportion.

Strongly disagree      Disagree      Slightly disagree      Slightly agree      Agree      Strongly agree

□ □ □ □ □ □ □ □

30. Health problems related to rigorous training and injuries are just as bad doping side effects.

Strongly disagree      Disagree      Slightly disagree      Slightly agree      Agree      Strongly agree

31. Legalizing performance enhancements would be beneficial for sports.

Strongly disagree    Disagree    Slightly disagree    Slightly agree    Agree    Strongly agree

□ □ □ □ □ □ □ □

## Appendix B: Poster



Faculty of Kinesiology and  
Recreation Management

# Research Participants Needed

This research study is being conducted to study the use of and knowledge about World Anti-doping Agency(WADA) banned substances among recreational gym users, and the factors that can lead to doping behavior.

For this study, you will be asked to complete an online questionnaire. The inclusion criteria will be as follows: exercising with recreational motivation, having access to the Internet, holding registration within the U of M gyms & being 18 years or older. Filling out the questionnaire will take approximately 5 minutes and you will receive a \$3 gift card to Tim Hortons.

WADA is an independent agency working towards eradicating the improper use of drugs in sport at all levels. More information and research regarding the doping behavior among recreational gym users may raise awareness particularly within Canadian context and might reduce the short-term and long-term adverse impacts of recreational gym users who consume WADA-banned substances.

This research has been approved by the Education/Nursing REB and the participant's responses will be kept confidential and secure. If you have any concerns or complaints about this project you may contact any of the persons mentioned below or the Human Ethics at [humanethics@umanitoba.ca](mailto:humanethics@umanitoba.ca)



LINK TO SURVEY OPTION 1  
YOUR EMAIL ADDRESS WILL BE NEEDED  
YOU WILL GET A \$3 GIFT CARD TO TIM HORTONS



LINK TO SURVEY OPTION 2  
YOU WILL REMAIN ANONYMOUS  
YOU WILL NOT GET A \$3 GIFT CARD TO TIM HORTONS

Contact (researcher): Mahdi Ebrahimian  
Master's student, Faculty of Kinesiology and Recreation Management  
[mahebrahim@myumanitoba.ca](mailto:mahebrahim@myumanitoba.ca)

Contact (research advisor): Dr. Jay Johnson  
Faculty member, Faculty of Kinesiology and Recreation Management  
[jay.johnson@umanitoba.ca](mailto:jay.johnson@umanitoba.ca)

### **Appendix C: REQUEST FOR PERMISSION TO CONDUCT RESEARCH**

Dear [REDACTED]

My name is Mahdi, and I am a Master student in the faculty of Kinesiology and Recreation Management [REDACTED]. I am writing this letter to get permission to conduct my research within the [REDACTED] gyms and recreation facilities, [REDACTED]. The research I wish to conduct for my Master's Thesis involves "recruiting individuals who use the recreation facilities within the University [REDACTED] and the purpose of my research is to identify the prevalence of WADA-banned substances, and its relationship with gender, age, nutritional supplement use, body image, their knowledge about WADA-banned substances and sport discipline of the recreational gym users". This project will be conducted under the supervision of Dr. Jay Johnson and Dr. Sarah Teetzel.

I am hereby seeking your consent to approach a number of gym users attending in the [REDACTED] recreation facilities, through displaying the poster of my research study around the gym and on its screens as well as advertising my research project in Rec Services' email newsletter to provide participants for this project.

I have provided you with a copy of my questionnaire and consent forms which will be used in the research process, as well as a copy of the approval letter which I received from the ENREB Research Ethics Committee.

If you require any further information, please do not hesitate to contact me on

[REDACTED], Email: [ebrahim@myumanitoba.ca](mailto:ebrahim@myumanitoba.ca)

Thank you for your time and consideration in this matter.

Yours sincerely,

Mahdi Ebrahimian Besharat