Athletes' past experiences with doping prevention education

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ABSTRACT

Background: Adolescent athletes are being exposed to steroids and other illegal doping agents at earlier ages than previous decades. Educational doping prevention programs are being implemented during adolescence, but many athletes still lack doping knowledge. To ensure more effective doping education for adolescents, current gaps in doping knowledge need to be identified and educational program delivery should be tailored to athletes' preferences.

Purpose: The purpose of this study was to explore athletes' experiences with doping education and their recommendations to improve current education to create more effective doping prevention interventions.

Methods: Following a constructivist approach, interviews were conducted with 21 athletes from various sports (n = 11 females and n = 10 males) who have competed at the varsity, provincial, national, or international level. Interviews were audio recorded, transcribed verbatim, and analyzed inductively with thematic analysis.

Results: Six themes were identified relating to athletes' experiences with doping education and their recommendations for improving it. Athletes described three themes surrounding their past experiences with education: "Nobody talked about it", "I don't see how it would be relevant", and "Our education was perfect". The recommendations for improving current doping education included three themes: "It's a collective effort", "Start as young as possible", and "It doesn't need to be long, you just need to scare them." The third theme had two subthemes where athletes spoke about the need for (a) interactive and engaging programs, and (b) the use of scare tactics within doping education.

Conclusions: The athletes described a lack of doping education as adolescent athletes, highlighting the need for more education as a young athlete. Recommendations for future

educational programs included addressing doping prevention collaboratively, implementing education at younger ages, and assuring the programs are engaging and interactive.

RÉSUMÉ

Contexte: Les athlètes adolescents sont exposés à des stéroïdes et à d'autres agents dopants illégaux à un âge plus précoce que dans les décennies précédentes. Des programmes éducatifs de prévention du dopage sont mis en œuvre pendant l'adolescence, mais de nombreux athlètes manquent encore de connaissances en matière de dopage. Pour assurer une éducation antidopage plus efficace aux adolescents, les lacunes actuelles dans les connaissances des adolescents sur le dopage doivent être identifiées et les programmes éducatifs doit être adaptée aux préférences des athlètes.

Objectif: L'objectif de cette étude était d'explorer les expériences des athlètes en matière d'éducation sur le dopage et leurs recommandations pour améliorer l'éducation actuelle afin de créer des interventions de prévention du dopage plus efficaces.

Méthodes: Suivant une approche constructiviste, des entrevues ont été menées auprès de 21 athlètes (n = 11 femmes et n = 10 hommes) de divers sports qui ont compétitionné au niveau universitaire, provincial, national, ou international. Les entrevues ont été enregistrées, transcrites textuellement, et analysées de manière inductive à l'aide d'analyse thématique.

Résultats: Six thèmes ont été identifiés concernant les expériences des athlètes en matière d'éducation sur le dopage et leurs recommandations pour l'améliorer. Les athlètes ont décrit trois thèmes entourant leurs expériences passées en éducation: «Personne n'en parlait», «Je ne vois pas en quoi cela serait pertinent» et «Notre éducation était parfaite». Les recommandations pour améliorer l'éducation antidopage actuelle incluaient les trois thèmes: «C'est un effort collectif», «Commencer le plus jeune que possible» et «Ça n'a pas besoin d'être long, il suffit de les effrayer». Le troisième thème avait deux sous-thèmes dans lesquels les athlètes ont parlé de la nécessité (a) de programmes interactifs et attrayants, et (b) de l'utilisation de tactiques alarmistes

dans l'éducation sur le dopage.

Conclusions: Les athlètes ont décrit un manque d'éducation sur le dopage en tant qu'athlètes adolescents, soulignant le besoin de plus d'éducation en tant que jeune athlète. Les recommandations pour les futurs programmes éducatifs incluaient adresser la prévention du dopage en collaboration, implémenter l'éducation à un plus jeune âge, et s’assurer que les programmes sont attrayants et interactifs.

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PREFACE AND CONTRIBUTION OF AUTHORS

Laura Hallward was the principal contributor to recruitment, data collection, data analysis and interpretation, and the preparation of this thesis/manuscript.

Melissa Daoust, Geneviève Gill, and Samantha Quinn contributed to the transcription of the audio-recorded interviews.

Dr. Lindsay Duncan, the candidate's supervisor and principal investigator of the grant supporting this project, was actively involved throughout the entire research process, from the conceptualization of this project to the completion of this thesis and manuscript.

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INTRODUCTION

Doping represents a worldwide issue among athletes across all levels and types of sports. In 2016, the World Anti-Doping Agency (WADA) reported that among elite athletes, just under 2% of the samples tested in accredited laboratories around the world were positive for banned substances (WADA, 2016). Other researchers have estimated doping rates among elite athletes to be much higher, ranging between 14% to 39% of elite athletes (de Hon, Kuipers, & van Bottenburg, 2015). Doping is not only limited to elite athletes, such as Olympians or professional athletes. University, high school, and adolescent athletes can also feel the pressure to dope. Research has shown that up to 60% of high school-aged athletes have reported the abuse of some legal performance-enhancing substance (Backhouse, Whitaker, & Petróczi, 2013). Adolescents are being exposed to steroids and other licit or illicit performance-enhancing substances at an earlier age than previous decades (Calfee & Fadale, 2006), with athletes as young as 10 years old reporting doping (Nicholls et al., 2017).

Adolescence represents a vulnerable developmental phase when substance abuse and doping is often initiated (Dodge & Hoagland, 2011). Adolescents are also still forming their attitudes, values, and decision-making skills (Steinberg, 2007), making this a critical period to implement doping prevention to help shape healthy views of doping and prevent adolescents from initiating doping. Article 18 of the World Anti-Doping Code states that doping prevention efforts should be educational, values-based, and implemented among young athletes (WADA, 2015). Research has also suggested doping prevention programs should be tailored to fit the unique characteristics of young athletes (e.g., address risk factors particular to this age group), be derived from social influence approaches and life skills (e.g., refusal skills), be engaging and interactive (e.g., role-playing), delivered and monitored to ensure programs are implemented

with high fidelity, and include booster sessions to reinforce the program messages (Backhouse, McKenna, & Patterson, 2009).

There currently exist doping prevention programs directly targeting adolescents and high school athletes. The programs are typically delivered over multiple sessions, are coach- or peer-led, include information on proper nutrition, weight training practices, and the health consequences of substance use, and target modifiable risk and protective factors of doping. However, there is a scarcity of research examining program effectiveness and programs that have been tested are limited by time, resources, financial costs, the ability for widespread implementation, and in some cases, a lack of program efficacy (Backhouse, Whitaker, Patterson, Erickson, & McKenna, 2016). Backhouse and colleagues (2016) have noted the disappointing effort in developing novel anti-doping interventions within the last decade, highlighting the need for more effective and innovative doping prevention programs. Few studies have been conducted to examine elite athletes' perspectives on current anti-doping programs, and no study, to date, has been conducted among young athletes. With research indicating doping prevention programs should target adolescent athletes and resonate with them to ensure efficacy, adolescents may be well suited to provide their views and opinions with regard to the design and content of doping prevention programs. Therefore, the purpose of this study was to explore adolescent athletes' experiences and opinions with doping education and gather recommendations to improve future doping prevention programs for young athletes.

LITERATURE REVIEW

What is Doping?

Doping refers to an athlete's use of illegal substances or methods to enhance performance that are banned by the WADA (2015). The WADA annually publishes the Prohibited List, an international standard of substances and methods that are prohibited due to their potential to enhance performance or to mask the use of other banned substances. Substances and methods can be banned at all times (i.e., in- and out-of-competition), only within competition, only within particular sports, or restricted (i.e., prohibited only above a certain dosage). Categories of banned substances include anabolic agents, hormones and growth factors, beta-2 agonists, hormone and metabolic modulators, stimulants, narcotics, cannabinoids, glucocorticoids, beta-blockers, diuretics, and masking agents. Prohibited methods include manipulation of blood and blood components, tampering, infusions, and gene doping (WADA, 2018a). The WADA has also established a monitoring program for substances not currently on the Prohibited List, but are being monitored to detect potential patterns of misuse among athletes (e.g., caffeine; WADA, 2015).

In addition to the use of prohibited substances and methods in sport, the 2015 World Anti-Doping Code has also outlined nine additional circumstances in which an athlete can incur anti-doping rule violations, including: (1) use or attempted use of a prohibited substance or method, (2) refusing or failing to submit a sample, (3) missing three tests in a 12 month period, (4) tampering or attempted tampering with the doping control process, (5) possession of a prohibited substance or method, (6) tracking or attempted tracking of a prohibited substance or method, (7) attempting to or administering a prohibited substance or method to another athlete, (8) assisting or covering up an anti-doping rule violation, and (9) associating with prohibited

athletes or other people who have incurred an anti-doping rule violation. If an athlete is caught violating anti-doping rules, they will face sanctions that depend on the severity and circumstances of the violation. Sanctions can include disqualification from an event, results and medals stripped, forfeiting prize money, financial costs, or an ineligibility period in which an athlete cannot compete (WADA, 2015). The Code has provided a formalized list of anti-doping rule violations that addresses all possible doping infractions in sport, but an athlete's use of prohibited substances to enhance sport performance remains the most common violation. Doping can provide athletes with an unfair advantage, but can also put athletes at risk for severe health consequences, and numerous social and moral consequences.

Health effects of doping. Athletes use a wide variety of banned substances to enhance different aspects of their athletic performance, and athletes' incentives to dope can vary considerably depending on age or competitive level (Backhouse et al., 2016). For example, elite athletes have reported doping for reasons such as team selections, career transitions, and financial gain (Backhouse et al., 2016), whereas less competitive athletes have reported doping to improve physical appearance or weight management (Özdemir et al., 2005). The most commonly used banned substances are steroids for their positive effects on increasing muscle mass and strength (Aguilar, Muñoz-Guerra, Plata, & Del Coso, 2017). However, steroids can lead to potential adverse effects such as acne, increased facial hair, premature balding, precocious puberty, infertility, and gynecomastia (Calfee & Fadale, 2006). Steroids can affect multiple organ systems, including reproductive, cardiovascular, hepatic, and musculoskeletal systems and can lead to severe complications like liver failure, acute heart failure, and heart attacks (Hartgens & Kuipers, 2004). For adolescents, steroids can cause premature closure of growth plates, which can stunt growth at an early age (Hartgens & Kuipers, 2004). Long-term

steroid use has also been associated with psychological side effects such as aggression, violence, and mood disorders (Kanayama & Pope, 2012). Steroid use is frequently accompanied by the use of other performance-enhancing substances, like human growth hormone (Kanayama & Pope, 2012). Human growth hormone has long been thought to increase muscle strength and cardiovascular endurance, although there is limited evidence supporting these claims (Birzniece, 2015). Human growth hormone may have some beneficial impact on soft-tissue recovery from injury, but can also result in negative side effects, such as fatigue, reduced concentration, dizziness, fluid retention, cardiac morphology, and an increased risk of diabetes (Birzniece, 2015). Diuretics are commonly used for short term weight loss or to mask other doping agents by diluting the concentration in urine. However, severe water loss depletes the body of essential minerals, which can lead to muscle weakness or cramps (Nikolopoulos, Spiliopoulou, & Theocharis, 2011). Prohibited methods, like blood manipulation, can improve oxygen carrying capacity in the blood to improve cardiovascular endurance, but it can lead to thrombosis and even a heart attack or stroke as a result of increased blood viscosity (Birzniece, 2015). Although banned substances can enhance athletic performance, the harmful health-related consequences associated with doping are substantial. Some athletes have reported the fear of long-term side effects from doping as a strong reason not to dope (e.g., Overbye, Knudsen, & Pfister, 2013). On the other hand, some athletes have reported the health implications of doping as only a minor concern, and are more deterred from doping because of the social and moral consequences (e.g., Kirby, Moran, & Guerin, 2011).

Social and moral consequences. Doping or getting caught doping can result in a number of social and moral consequences. Doping is considered to destroy the values of sport and the spirit of sport (WADA, 2015). The WADA states the spirit of sport is “the celebration of the

human spirit, body and mind which is characterized by the following values: ethics, fair play and honesty, health, excellence in performance, character and education, fun and joy, teamwork, dedication and commitment, respect for rules and laws, respect for self and other participants, courage, as well as community and solidarity" (WADA, 2015, p. 14). In essence, doping is considered cheating and is banned in sport to protect health, fairness, human dignity, and the equal treatment of all athletes. If an athlete is caught doping, it can result in suspensions or bans from sport, being viewed as a dishonourable athlete, and having a bad reputation that will follow an athlete (and potentially coaches, teammates, family and friends) for the rest of their career and beyond (Ehrnborg & Rosén, 2009). Elite athletes have reported deterrents of doping including fear of a guilty conscience, the ban from sport, the condemnation from people within and outside the sporting environment, and having previous victories viewed as suspicious by fans, teammates, sporting organizations, and the media (Bloodworth & McNamee, 2010; Overbye, Elbe, Knudsen, & Pfister, 2015; Overbye et al., 2013). Athletes who tested positive for banned substances or admitted to doping reported a great deal of shame and guilt, feeling like a cheater, and feeling as if they were going against the rules of the sport or their set of personal beliefs. They experienced public ridicule and loss of friendships as a result of their doping scandal (Kirby et al., 2011).

The Global Issue of Doping

In 2016, the WADA reported that of their samples analyzed from accredited labs across the world, in both Olympic and non-Olympic sports, 1.81% of the samples tested positive for banned substances. For the past decade, the number of positive tests has remained around 2%, despite a significant increase in the number of tests conducted, and the improved accuracy and sensitivity of the tests (de Hon, Kuipers, & van Bottenburg, 2015; WADA, 2016). The most

common substances detected by WADA over the past decade have remained relatively stable, with approximately 58% of their samples testing positive for anabolic agents, followed by stimulants at about 12%, and the remaining groups of substances representing proportions all lower than 10% (Aguilar et al., 2017). Researchers suggest the official WADA anti-doping testing figures severely underestimate the prevalence of doping, and report doping rates ranging from 9% to 39% of elite athletes (de Hon et al., 2015). The underestimation of the magnitude of doping in sport can be explained by several reasons including the low number of tests compared to the number of athletes, the availability of efficient tests to detect new substances, and the ability of dopers to 'beat the system' (Pitsch & Emrich, 2011).

Doping Among Young Athletes

The severity of the issue of doping has been documented among elite athletes, but doping permeates athletes of all ages and competitive levels, with athletes as young as 10 years old reporting doping (Nicholls et al., 2017). The prevalence of doping among adolescent athletes has been reported to range between 1% and 5% (Backhouse et al., 2016); however, there are studies that report significantly higher doping rates. For example, in a Canadian study of 3,573 male and female provincial team athletes from a variety of sports (M_{age} = 15.5 years), over 25% of respondents admitted to having used one or more banned substances in the past 12 months (Goulet, Valois, Buist, & Côté, 2010). Among 2,319 athletes (M_{age} = 15.8 years) surveyed in Germany, 15.1% of athletes reported the use of at least one banned substance in the past year (Wanjek, Rosendahl, Strauss, & Gabriel, 2007). The higher prevalence of doping in these studies may partially be explained by the inclusion of restricted substances (i.e., not completely prohibited), such as caffeine tablets or asthma inhalers (Goulet et al., 2010) and high rates of cannabis use (Wanjek et al., 2007).

The majority of studies assessing the prevalence of doping among adolescents have focused on the use of anabolic steroids, with fewer studies documenting the prevalence of other substances (Backhouse et al., 2016; Castillo & Comstock, 2007). The prevalence of steroid use is much lower compared to overall doping rates among adolescents, with reported steroid use ranging from 0.2% to 5.4% (Irving, Wall, Neumark Sztainer, & Story, 2002; Thorlindsson & Halldorsson, 2010). Nonetheless, steroid use presents a major concern for young athletes, particularly males where steroid use is consistently higher compared to females (Dunn & White, 2011; Humphreys & Ruseski, 2011; Lorang, Callahan, Cummins, Achar, & Brown, 2011; Sagoe, Andreassen, Molde, Torsheim, & Pallesen, 2015). An American survey conducted in 2013 by the Partnership for Drug-Free Kids reported 11% of athletes in grades 9 to 12 used human growth hormone (without a prescription), more than double the amount in 2012. Not only is the use of human growth hormone increasing among adolescent athletes, but their perceived risk of using human growth hormone has declined (Partnership for Drug-Free Kids, 2014). Adolescents are using banned performance-enhancing substances, disregarding the potential harmful effects and long-term consequences (Castillo & Comstock, 2007).

Athletes competing at a sub-elite level or adolescent athletes represent a unique sample given they may not necessarily be subjected to doping control procedures. In the United States, drug testing among high school athletes is legalized; however, the number of schools that implement testing is minimal, and only a small proportion of those schools even test for banned substances like steroids (Mulcahey, Schiller, & Hulstyn, 2010). The limited testing rates can be explained by financial constraints given the expense of a drug testing program (Gunja, Cox, Rosenbaum, & Appel, 2004). In Canada, testing among high school athletes is not present and only certain athletes are subjected to Canada's Anti-Doping Program. These athletes mainly

compete nationally or internationally, receive funding from Sport Canada, or compete in the Canadian interuniversity sports league (Canadian Centre for Ethics in Sport, 2017). Despite the lack of doping control among adolescent athletes, doping is still reported among young athletes, highlighting the need for prevention efforts among this age group. A challenge of doping prevention among athletes lies in understanding the multiple reasons or circumstances that may lead an athlete to dope for the first time. An in-depth knowledge of these factors that lead to doping initiation is essential when developing prevention programs for young athletes (Backhouse et al., 2013).

Doping Risk Factors

A multitude of personal, social, psychological, and situational factors have been documented to lead to the initiation of doping among all levels of athletes. The predictors or determinants of doping can vary considerably depending on the athlete's age or competitive level (Backhouse et al., 2016). A systematic review by Nicholls et al. (2017) identified nine factors that predict doping among athletes ages 9 to 21 years across all levels of competition: (1) gender, (2) age, (3) ethnicity, (4) sport participation, (5) sport type, (6) psychological variables, (7) athletes' entourage, (8) nutritional supplement use, and (9) health harming behaviours.

(1) Gender. There is conclusive evidence in the literature that attitudes, willingness to dope, and doping rates are higher among males compared to females (e.g., Dodge & Jaccard, 2006; Dunn & White, 2011; Irving et al., 2002; Mallia, Lucidi, Zelli, & Violani, 2013). Based on the articles reviewed by Nicholls et al. (2017), doping rates in the different samples ranged from 0.9% to 6% among adolescent males and 0.2% to 5.3% among adolescent females. In a study of 3,248 high school athletes from across the United States that focused specifically on steroid use, 0.8% of the adolescent females reported doping compared to 2.4% of males (Hoffman et al.,

2008). Research has also documented psychological gender differences with regard to doping. A sample of 645 elite athletes (M_{age} = 22.12 years) were presented with a list of incentives and deterrents of doping and were asked to report to what extent each reason would affect their decision to dope or not, from "great effect", "some effect", to "no effect" (Overbye et al., 2013). Females reported a higher number of doping deterrents that have a "great effect" compared to males. Among the deterrents that females thought would have a "great effect", they were most concerned about fear of a guilty conscience, followed by unfairness towards clean competitors, being banned from sport, risk of suspicion cast on former results, fear of reduced fertility, being exposed in the media, and the embarrassment of testing positive. Gender differences between incentives to dope were minimal (Overbye et al., 2013).

(2) Age. When considering age as a predictive factor of doping, there are mixed results in the literature. Some studies demonstrate doping rates increase with age, whereas other studies indicate a higher prevalence of doping among younger athletes compared to their older counterparts. Using cross-sectional study designs, Wanjek et al. (2007) reported increased rates of doping with increasing grade level, and Mallia et al. (2013) reported athletes over 17 years of age were more likely to dope than athletes under 17 years old. In a prospective cohort study, athletes between the ages of 11 and 12 were followed over a 4-year period. Findings indicated doping rates increased from 1.2% at baseline to 3% over the 4-year period (Laure and Binsinger, 2007). Hoffman et al. (2008) demonstrated increased rates of steroid use with increasing age, with a 2.5 times higher use of steroids among males in 12^{th} grade compared to 11^{th} grade. On the contrary, Dunn and White (2011) reported that 12 to 15 year olds were more likely to misuse steroids than 16 and 17 year olds. Irving et al. (2002) found athletes in middle school (grades 7 to 8) were more likely to report using steroids than those in high school (grades 9 to 12). Regardless

of age, doping is prevalent across all ages of athletes, beginning as young as 10 years old (Nicholls et al., 2017).

(3) Ethnicity. There are mixed findings with regard to athletes' ethnicity and associated doping rates. For example, Elliot, Cheong, Moe, and Goldberg (2007) reported that Caucasian female athletes were more likely to take steroids compared to Hispanic or African-American female athletes. In contrast, Irving et al. (2002) found that white males have lower rates of steroid use compared to other ethnic groups, such as African-Americans or Asian-Americans. Given the mixed findings considering ethnicity exclusively, future research should consider other factors in concurrence with ethnicity, such as education, socio-economic status, and the physical demands of the sport (Nicholls et al., 2017).

(4) Sport participation. The evidence is mixed when comparing doping rates between athletes and non-athletes. Both Mallia et al. (2013) and Laure, Lecerf, Friser, and Binsinger (2004) reported higher doping rates among athletes versus non-athletes. In a study among American high school athletes, sport participation was a significant predictor of steroid use (Irving et al., 2002). Athletes who competed in more than one team sport had a higher likelihood of steroid use compared to athletes competing in one team sport (Humphreys & Ruseski, 2011). The prevalence of doping among athletes and non-athletes can also vary depending on the substance used. When comparing steroid use, Elliot et al. (2007) and Wanjek et al. (2007) indicated no difference between the two groups. However, use of stimulants was reported to be higher among non-athletes compared to recreational or competitive athletes (Wanjek et al., 2007).

(5) Sport type. The type of sport has also been shown to predict doping rates. Doping is more commonly reported in individual sports compared to team sports (Chan et al., 2014).

Athletes competing in strength-based sports, for example, football, wrestling, and boxing, had higher rates of doping (Nicholls et al., 2017). Lorang et al. (2011) demonstrated the strongest predictor of steroid use among high school athletes was participating in football, wrestling, and soccer. Sports with outcomes measured in centimeters, grams, or seconds, compared to sports measured in goals, points, or judged scores, have been found to have a higher likelihood of dopers given the large emphasis on physical capabilities, and less focus on technical and tactical abilities (Pitsch & Emrich, 2011).

(6) Psychological variables. Nicholls et al. (2017) identified 22 psychological constructs that are positively or negatively associated with doping among youth. Aggression, anticipated regret, anxiety, attitudes, deception strategies, depressive mood, drive for muscularity or thinness, ego-orientation, fear of failure, intentions, moral disengagement, social norms, resisting social pressure, suicide risk, and susceptibility were all positive correlates of doping. Constructs such as autonomous motivation, happiness, self-control, self-esteem, moral conviction, and perfectionism were all negatively associated with doping (Nicholls et al., 2017).

(7) Athletes' entourage. An athlete's entourage, including coaches, trainers, doctors, physiotherapists, teammates, friends, parents, etc. can all play a positive or negative role in an athlete's decision to dope. In a survey of 3,573 adolescent athletes, the pressure experienced from the athlete's entourage to gain or lose weight was positively associated with intentions to dope (Goulet et al., 2010). Pressure from coaches was associated with positive doping attitudes among athletes (Madigan, Stoeber, & Passfield, 2016). Athletes with a lowered capacity or confidence to resist social pressures were more likely to report higher intentions to dope (Lucidi et al., 2008; Zelli, Mallia, & Lucidi, 2010). Laure et al. (2004) reported that of the high school athletes (M_{age} = 16.6 years) who doped, using substances like stimulants and narcotics, the

substances were mainly supplied from friends, health professionals, trainers, or parents. At younger ages, athletes relied on information about doping from teachers and parents, and at older ages (17 to 18 years old), athletes began to rely more on friends, coaches, and trainers (Hoffman et al., 2008).

(8) Nutritional supplements. Athlete's use of nutritional supplements, such as creatine, protein powder, and amino acids, are all positively associated with doping. A stronger association was found between nutritional supplements and doping among young males, especially those who took supplements for increased strength or body mass (Hoffman et al., 2008). Athletes who used nutritional supplements were more likely to report intentions to dope and positive attitudes towards doping than athletes who did not use nutritional supplements (Barkoukis, Lazuras, & Harris, 2015). Lorang et al. (2011) reported that athletes who used supplements were eight times more likely to use steroids, compared to those who were not supplement users.

(9) Health harming behaviours. Health harming behaviours, including alcohol abuse, illegal substance abuse, drinking and driving, numerous sexual partners, and not wearing a seatbelt, have been positively associated with doping behaviours (Dunn & White, 2011; Elliot et al., 2007). In a sample of adolescent male athletes (M_{age} = 14.8 years), those who used steroids were more likely to have an eating disorder, binge eat, or abuse substances like tobacco, alcohol, and marijuana, compared to male non-steroid users (Irving et al., 2002). Female steroid users (in grades 9 to 12) were more likely to have smoked cigarettes, drank, used marijuana or cocaine, had sexual intercourse prior to age 13, carried a weapon, taken substances to lose weight, and attempted suicide, compared to female non-steroid users (Elliot et al., 2007). Both males and

females who have reported doping are marked by an increase in numerous health harming behaviours.

The risk factors that lead to doping initiation among young athletes have been well documented, although it is likely that more determinants may emerge over time (Nicholls et al., 2017). In a study of older elite athletes reflecting back on when they initiated doping, they reported it began early in their career, but there was no single event or critical incident that was the starting point (Engelberg, Moston, & Skinner, 2014). Rather, it was a series of events and risk factors that led to doping initiation (Hauw & Bilard, 2012). Identifying these events or determinants that influence a young athlete's decision to dope or not is an essential step in preventing doping among adolescents. If doping prevention programs can address these risk factors prior to adolescents initiating doping, it could ultimately reduce the number of young athletes who report doping (Bahrke, 2012).

Doping Prevention

The WADA was created with the goal of establishing consistent anti-doping policies and regulations for sport organizations across the world, with a focus on scientific research, education, development of anti-doping capacities, and monitoring anti-doping policies in all sports in all countries (WADA, 2018b). The goal of the World Anti-Doping Code and the World Anti-Doping Program is to protect athletes' right to participate in a doping-free sport and to coordinate national and international anti-doping programs with regard to detection, deterrence, and prevention of doping (WADA, 2015).

Secondary Prevention. Until recently, doping prevention efforts mainly focused on secondary prevention, or a detection-deterrence approach. The underlying assumption of detection-deterrence is that if athletes perceive there is a high likelihood of detection and severe

consequences, it will deter them from doping (Moston, Engelberg, & Skinner, 2015). However, the detection-deterrence approach is limited by cost and the technical inability to detect certain substances or methods. Athletes also report perceptions that the likelihood of testing is low, and doping control is unsystematic, uncommon, or even non-existent at lower levels of sport (Backhouse et al., 2016). Adolescent athletes may not even be subjected to testing at their current age or competition level, for example, doping control is not required among high school athletes.

In order to test whether the detection-deterrence approach could be an effective strategy to deter young athletes from doping, the Student Athlete Testing Using Random Notification (SATURN) program was developed (Goldberg et al., 2007). In a 2-year prospective randomized controlled trial, five schools implemented a drug and alcohol testing policy and six schools had a deferred testing policy, serving as a control condition. Athletes enrolled in schools with the drug and alcohol testing were at risk for being randomly selected for testing over a 2-year period. If an athlete tested positive, parents or guardians were informed and athletes attended mandatory counselling (Goldberg et al., 2007). At the beginning and end of each school year, athletes in all schools reported their use of illicit drugs and alcohol in the past month and the past year. Results indicated the athletes from the experimental and control schools did not differ in their reported use of drugs or alcohol in the past month at any of the four follow-up assessments. Athletes in the random drug and alcohol testing schools were less convinced of the benefits of testing and reported testing was not a deterrent to dope (Goldberg et al., 2007). The risk of testing appeared to have little effect on athletes' use of illicit drugs or alcohol, and appears to have called into question high school athletes' views of the legitimacy of drug testing policies.

Not only is the detection-deterrence approach irrelevant to adolescents who are not tested, but secondary prevention also represents a strategy that is inherently "too late" as athletes

may have already doped by the time detection can occur. In light of the limitations of secondary prevention with the detection-deterrence approach, there has been a shift towards primary prevention efforts (i.e., intervening prior to doping initiation; Backhouse et al., 2016). Adolescence represents a developmental period when adolescents are most likely to begin engaging in risk behaviours, such as substance abuse (Dodge & Hoagland, 2011), representing a critical time to intervene and prevent athletes from initiating doping. Adolescence also represents an ideal time to implement primary doping prevention education and initiatives as adolescents are still forming their attitudes, values, and decision-making skills (Steinberg, 2007).

Primary prevention. The focus of current doping prevention efforts is primary prevention, meaning the goal is to intervene prior to the initiation of a risky behaviour in order to prevent that behaviour. In 2015, the WADA published an updated World Anti-Doping Code with a new strategic direction emphasizing primary prevention through educational anti-doping programs. Article 18 of the Code states the programs should address: prohibited substances and methods, anti-doping rule violations, consequences of doping, doping control procedures, athletes' rights, therapeutic use exemptions, managing the risk of nutritional supplements, promote the spirit of sport, and applicable whereabouts requirements. Educational programs should also be values-based and primarily directed at young people (WADA, 2015). However, primary prevention represents a complex approach that requires sophisticated prevention strategies that go above and beyond programs that focus on doping controls, the prohibited list, and sanctions. The WADA identified the need to determine effective prevention strategies that could be used to develop primary doping prevention programs (Backhouse et al., 2009).

Effective prevention strategies. In 2009, a WADA-funded literature review by Backhouse, McKenna, and Patterson identified the most effective prevention strategies used, to date, within primary prevention programs for bullying, alcohol, tobacco, and social drug use with the supposition that effective strategies from these fields could be refined and applied to the design and development of future anti-doping programs. Given primary doping prevention is a relatively new field, relying on a long history of research and evaluation of prevention programs from other social domains can provide valuable insight into the development of prevention programs (Backhouse et al., 2009). Conclusions were drawn from systematic reviews, meta-analyses, and a review of primary studies. Based on the findings from the literature, intervention programs should: (1) intervene among young people and adolescents, (2) target the content for the appropriate audience, (3) emphasize active participation, (4) be derived from social influence approaches and focused on developing life skills, (5) be delivered by well-trained individuals and monitored to ensure fidelity, and (6) include booster sessions (Backhouse et al., 2009).

(1) Intervene among young people and adolescents. Interventions across the four domains were most effective when implemented among youth and adolescents, typically between the ages of 11 and 14 years old (Backhouse et al., 2009). Adolescence represents a phase when young people are vulnerable to try drugs for the first time or initiate substance abuse (Dodge & Hoagland, 2011). Therefore, prevention programs should intervene at this critical age, prior to adolescents developing and establishing patterns of problematic behaviour (Roe & Becker, 2005).

(2) Target the content to the appropriate audience. Given young people are the target of most primary prevention programs, the programs must be designed with consideration of the current age group. Efforts will only be effective if the content and delivery of the program

resonates with adolescents, engages them, and addresses their specific needs, values, and social contexts (Backhouse et al., 2009). A 'one size fits all' approach is inappropriate, and program developers must consider the following needs: empirically supported content, developmentally appropriate, meaningful, enjoyable, engaging, culturally sensitive, and provides a long term perspective (McGrath, Sumnall, McVeigh, & Bellis, 2006).

(3) Emphasize active participation. Across all domains, there is strong evidence to support that interactive interventions are the most successful compared to passive interventions (Backhouse et al., 2009). Participants need to be active in both delivery and receiving of the program (McGrath et al., 2006), relying on methods such as role-playing, debate, active modelling, simulations, discussions, and audiovisual elements.

(4) Derived from social influence approaches and focused on developing life skills. The underlying assumption of social influence approaches is that behaviour is influenced by persuasive messages (e.g., media and peers) that convince people to engage in unhealthy behaviours. Theory posits that people engage in unhealthy behaviours due to a lack of social skills or necessary knowledge to resist social pressure (Bandura, 1986). Therefore, a program derived from social influence approaches should incorporate basic information on the unwanted behaviour, resistance skills training, and normative information (Backhouse et al., 2009). This aligns with also developing and focusing on life skills training within prevention programs, such as personal self-management skills, social skills, cognitive skills, and adaptive coping strategies (Roe & Becker, 2005).

***(5) Delivered by well-trained individuals and monitored to ensure fidelity*.** There is evidence to support the amount of training given to those delivering the intervention can impact the efficacy of the programs. As a result, interventionist training should be a fundamental

component of all prevention programs (Backhouse et al., 2009). Additionally, treatment fidelity (i.e., whether the intervention was delivered as it was designed or intended to be) has been reported as an important mediator of program effectiveness (e.g., McGrath et al., 2006).

***(6) Include booster sessions*.** Upon completion of intervention delivery, booster sessions can be used over a number of weeks, months, or years to reinforce and build upon the program messages (Backhouse et al., 2009). Given adolescents' rapid development, booster sessions can be used as a refresher on the main program content, but also emphasize content that may be more suitable for the audience as they are maturing. Backhouse et al. (2009) noted a number of programs failed to incorporate booster sessions, but those that did appeared more effective. Although booster sessions appear to be effective, there is no conclusive evidence with regard to the optimal dose or timing.

The findings from this review have provided an evidence-based list of effective preventative approaches from four social domains. The transferability of these strategies to doping prevention research emanates from the idea that many social and health issues are linked and rooted within similar factors (Backhouse et al., 2009). However, it is important to recognize doping has unique characteristics and the findings from this review should be used as a foundation to build anti-doping programs and should not be limited to only these strategies.

Primary prevention programs. There is currently a growing number of educational prevention programs targeting adolescent and high school athletes to improve doping knowledge and attitudes, and reduce intentions to dope, with the overall goal of preventing doping in sport. The Athletes Training and Learning to Avoid Steroids (ATLAS) and the Athletes Targeting Healthy Exercise and Nutrition Alternatives (ATHENA) are two prominent prevention programs, both gender-specific, with multiple sessions, and designed to be led by coaches and

peers (Elliot et al., 2004; Goldberg et al., 2000). ATLAS is designed specifically for young males with the goal of reducing the rates of new anabolic steroid users, but also addresses other risky behaviours such as alcohol and other illicit drug use, sports supplements use, and drinking and driving (Goldberg et al., 2000). The ATHENA program targets young females to reduce recreational substance abuse (e.g., alcohol, tobacco, marijuana), and eating disorder related habits to discourage the use of body altering substances. It also includes a small focus on amphetamines, anabolic steroids, and muscle-building supplements (Elliot et al., 2004). Both programs have been tested with randomized controlled trials, comparing the programs to a control group of athletes receiving commercially available pamphlets on anti-steroid use. The results of these studies showed that immediately post-intervention, both programs were effective in reducing the males' intentions to take steroids and creatine and the actual use of the substances, and the females' intentions to use or actual use of body shaping substances (including steroids). However, at long term follow-up there were no intervention effects on substance use behaviour (Elliot et al., 2008).

ATLAS and ATHENA currently represent the most thoroughly developed prevention programs in the literature and are the most researched programs to date. However, their effectiveness has only been demonstrated within the United States and only among athletes competing in team sports (Backhouse et al., 2016). A meta-analysis by Ntoumanis, Ng, Barkoukis, and Backhouse (2014) reported that the effect sizes for the tests of ATLAS and ATHENA against control conditions on reducing doping intentions were very small, but significant, and there were no effects of the interventions on doping behaviour. Floor effects may have been observed, whereby the sample of athletes included so many non-users there was little room for improvement, which makes it difficult to assess intervention effects (Ntoumanis et al.,

2014). Given the goal of primary prevention programs is to intervene *prior* to athletes initiating doping, changes (or a decrease) in doping behaviour may not be expected.

Although ATLAS and ATHENA are the most rigorously tested programs, other models of primary prevention education have been established. Elbe, Brand, Schlegel, and Melzer (2012) created a doping prevention program for adolescents that targets ethical reasoning and the resulting decision-making process. The purpose of the program is to enhance ethical competencies, moral judgment abilities, and attitudes towards doping. A sample of 69 young athletes (M_{age} = 15.5 years) were recruited for this study and were allocated to one of three groups: ethical training group (n = 30), standard education/knowledge transfer group (n = 22), and a control group (n = 17). The ethical training program was delivered online and athletes worked through six different dilemma situations for six 30-minutes sessions. For each situation, the athletes had to create, evaluate, and rank arguments both for and against the decision to dope (Elbe et al., 2012). Through this process, the athletes learned decision-making skills with issues related to doping, and theoretically prepared them for similar situations they may face in the future. The moral judgment abilities and doping attitudes of all three groups were measured. Results showed the ethical training program significantly changed athletes' doping attitudes, with no change observed in the other two groups. However, the change in athletes' attitudes was a positive increase in attitudes, meaning athletes had more favourable attitudes towards doping, contrary to what was expected (Elbe et al., 2012).

Elbe and Brand (2016) further investigated the increase in positive attitudes towards doping to better understand the effects of the ethical training program. Some possible explanations include the fact that at baseline the athletes' attitudes towards doping were already very low, making it very difficult to lower the scores even more. Despite the increase in

attitudes, the athletes overall had low scores and renounced doping. While working through the ethical scenarios, the athletes may have become aware that decisions around doping are not black and white, but many factors are taken into consideration. The athletes may not have had a lot of prior knowledge about doping, and through the intervention, became more aware of doping situations, changing their stereotypical views and beliefs towards doping (Elbe & Brand, 2016); however, no baseline assessment of adolescents' prior doping knowledge was measured. Another limitation of this study was the lack of long-term follow-up to assess how athletes doping attitudes may have changed (Elbe & Brand, 2016). Despite the unexpected change in attitudes, the athletes may be better prepared when faced with an ethical dilemma or the decision to dope given they are now aware doping encompasses a combination of thought processes and situational circumstances (Elbe & Brand, 2016).

A brief educational doping program was developed, incorporating self-assertion skills to teach athletes how to express their thoughts, feelings, and values about a situation openly and directly (Laure, Favre, Binsinger, & Mangin, 2009). Low self-assertion skills have been associated with risk behaviours, like drug use and eating disorders, whereas self-assertion based campaigns have showed positive effects in reducing the use and abuse of psychoactive substances such as alcohol or tobacco (e.g., Trudeau, Spoth, Lillehoj, Redmond, & Wickrama, 2003). Seven hundred and sixty athletes (aged 10 to 16 years old) were randomized to a control group or to attend two 2-hour sessions that included information on anti-doping laws and self-medication, and building self-assertion skills (Laure et al., 2009). Role play was used to build self-assertion skills by learning how to say no in social situations involving banned substances, how to openly express a point of view with the consideration of others' feelings, and accepting a compliment from peers without feeling ashamed. Results indicated both groups significantly

increased their self-assertion skills from baseline to post-intervention (3 months later), but the increase was more significant in the experimental group (Laure et al., 2009). Within the educational group, athletes between the ages of 10 and 11 years and athletes who practiced sport more than 10 hours a week indicated a higher increase in self-assertion skills. Findings from this study indicate a brief intervention can improve athletes' self-assertion skills (Laure et al., 2009); however, no doping outcomes were measured to determine the effect of self-assertion skills on doping related outcomes.

Strengths of doping prevention programs. A review of current anti-doping programs among adolescents has been conducted to identify the effective strategies that led to changes in doping attitudes, intentions, or behaviour (Backhouse et al., 2016). First, interventions that were delivered over longer periods of time (ranging from 2-10 weeks) with several educational sessions were more efficacious than those delivered at one point in time. Second, programs that incorporated a range of topics around the issue of doping, such as drug and alcohol issues, healthy alternatives to using banned substances like nutrition and training, and media or pressure resistance, had more promising outcomes. Third, interventions that involved athlete participation and ownership, such as peer-led teaching, were more effective (Backhouse et al., 2016). The conclusions drawn from effective strategies within doping prevention programs reinforce the efficacious practices identified in other social domains by Backhouse et al. (2009).

Limitations of doping prevention programs. There are several limitations of current doping prevention programs and research examining program effectiveness is scarce (Backhouse et al., 2016). In a 2007 WADA-funded literature review, Backhouse and colleagues identified limitations of doping prevention programs at the time. First, a number of programs effectively modified doping attitudes or intentions, but were less successful in reducing doping behaviours.

Second, the majority of studies failed to conduct long-term follow-ups to evaluate intervention effects over time. Third, all of the studies administered self-report measures, compromising the validity of findings and may lead to under- or over-reporting of doping related outcomes. Fourth, research has mainly focused on the prevention of steroids, and less so on other commonly used banned substances like recreational drugs, human growth hormone, or amphetamines (Backhouse, McKenna, Robinson, & Atkin, 2007). In an updated review published in 2016, Backhouse and colleagues acknowledged the limitations identified in their 2007 review are still relevant, indicating minimal improvements have been made in doping education. They identified additional limitations including sizeable attrition rates from intervention programs and low levels of baseline misuse making it difficult to evaluate the effectiveness of such programs. The main limitation still remains that interventions are successfully modifying attitudes or intentions to dope, but there is little evidence that this leads to reductions in doping uptake. The overall conclusions made by Backhouse et al. (2016) highlight the 'absence of evidence' with regard to anti-doping programs' design, development, and evaluation. Within the last decade, only six novel doping prevention interventions, have been disseminated into the academic community, two of which focus on recreational gym users (Backhouse et al., 2016). In comparison, in 2012 alone, 14 studies were published assessing the efficacy of sexual violence perpetration prevention programs among adolescents and young adults (M_{age} = 18.4 years, *SD* = 3.9; DeGue et al., 2014), demonstrating a disappointing effort towards eliminating doping in sport among youth and adolescents. This suggests there is a need to develop new doping prevention interventions that can further efforts toward eliminating doping from sport.

Athlete Perceptions of Doping Prevention Programs

To date, several reviews have been conducted to determine the current best practices for prevention research, and the current strengths and limitations of doping prevention research (Backhouse et al., 2009, 2007, 2016). Although these effective practices have been identified from empirically-based evidence, few studies have explored athletes' perceptions of current doping prevention efforts and education, and only elite athletes' opinions have been investigated (e.g., Johnson, Butryn, & Masucci, 2013; Kim et al., 2011; Thomas, Dunn, Swift, & Burns, 2011). A group of elite triathletes (aged 18 to 28 years), from Canada and the United States, reported their doping knowledge and doping prevention initiatives were fragmented and incomplete. Most education was delivered through workshops or online tutorials and focused on avoiding prohibited substances. Overall, the athletes reported their educational experiences contributed minimally to doping deterrence (Johnson et al., 2013). Suggestions for doping education included having a venue for athletes to openly discuss the complexities of the issue of doping, including information on the positive and negative effects of banned substances on health and performance, and a clearer explanation of sanctions and career implications of doping infractions (Johnson et al., 2013). In a survey of 974 elite Australian athletes (above 18 years of age), they spoke about the stigma associated with seeking information about doping within a sport organization or club, calling for more credible information on the internet (Thomas et al., 2011). Athletes preferred format for learning included mainly a presentation (38.8%) or a pamphlet (38.2%), and to a lesser extent, a workshop (16.8%), a book (13.6%), or the Internet (9.0%). They called for specific information, reflecting current drug trends, and information presented in a brief and straight-forward manner (Thomas et al., 2011).

Rationale and Purpose

The current focus of anti-doping efforts is to implement primary prevention programs among young athletes, given this vulnerable developmental phase when athletes are at risk of initiation doping. WADA and empirically-based reviews have suggested several strategies and components to be included in the design and delivery of doping prevention programs among adolescent athletes (Backhouse et al., 2009, 2007, 2016). However, no study, to date, has explored athletes' views of the current doping education for adolescents and the athletes' opinions on the delivery and content of prevention programs. In order to build effective interventions for young athletes, exploring their doping knowledge, their experiences with doping and doping education, and their preferred methods for learning about doping could help to ensure that new primary prevention interventions are maximally engaging and impactful. Therefore, the purpose of my thesis was to explore young athletes' experiences with doping education and their insight into developing doping prevention programs that are maximally efficacious for adolescent athletes.

MANUSCRIPT

Title:

A qualitative exploration of athletes' past experiences with doping prevention education

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Abstract

The purpose of this study was to explore athletes' experiences with doping education and their recommendations to improve current education to create more effective doping prevention interventions. Following a constructivist approach, interviews were conducted with 21 athletes and analyzed inductively with thematic analysis. Six themes were identified relating to athletes' experiences with doping education and recommendations for improving it. Athletes commonly described receiving insufficient doping education during adolescence, highlighting the need for increased doping prevention efforts. Recommendations for future educational programs include addressing doping prevention collaboratively, implementing education at younger ages, and assuring the programs are engaging and interactive.

Keywords: athlete, adolescent, doping prevention, doping education, qualitative methods

Introduction

Doping is commonly reported among professional and amateur athletes, with research reporting that the prevalence of doping ranges from 10-35% of elite athletes (Backhouse et al., 2016). Not only is doping prevalent among elite athletes, but adolescents and high school athletes are doping as well. Athletes as young as 10 years old have reported doping (Nicholls et al., 2017), with the incidence of doping rising with increasing age and competition level (Mallia et al., 2013). Doping rates among adolescent athletes have been reported to range between 1% and 5% (Backhouse et al., 2016); however, other researchers have reported a higher prevalence of doping among adolescent athletes. For example, in a study of 3,573 male and female athletes (M_{age} = 15.5 years), more than 25% of the athletes reported using one or more banned substance in the past year (Goulet et al., 2010). Doping among adolescent athletes presents a threat to the ethics of sport and athletes' health, highlighting the need for prevention.

To date, doping prevention efforts have mainly focused on a detection-deterrence approach whereby the threat of getting caught is meant to prevent athletes from doping (Backhouse et al., 2016). This approach, however, is limited by cost, the technical inability to detect certain substances or methods, and athletes' perceptions that the likelihood of testing is low given the unsystematic and uncommon doping controls at lower levels of sport (Backhouse et al., 2016). For example, in Canada, athletes have a higher risk of getting tested if they compete at the national and/or international level, compete in a sport with a higher risk of doping (e.g., football, athletics, cycling), and receive funding from Sport Canada (Canadian Centre for Ethics in Sport, 2017) . Therefore, adolescent athletes who do not fall into one of these categories are most likely not tested, making the detection-deterrence approach inadequate. This secondary prevention approach also represents a strategy that is inherently "too late" as athletes may have

already doped by the time detection can occur. In light of the limitations of secondary prevention, there has been a shift towards primary prevention, whereby prevention through education is the most promising strategy to prevent doping in sport (Backhouse et al., 2016).

Adolescence is not only the developmental period when doping is often initiated, but also represents the ideal phase for primary doping prevention initiatives because adolescents are still developing their attitudes, values, and decision-making skills (Steinberg, 2007). Doping prevention programs have been designed to specifically target adolescent and high school athletes. However, research examining program efficacy and effectiveness is scarce. Elbe and Brand (2016) developed an ethical decision-making training program where elite adolescent athletes worked through 18 ethical dilemmas related to doping through six 30-minute online sessions. The results of a quasi-experimental test of this program showed that athletes who completed the ethical training program reported significantly more positive attitudes towards doping after the training, contrary to what would be expected (Elbe & Brand, 2016). In a brief educational doping program, 760 athletes (aged 10 to 16 years old) were randomized to a control group or to attend two 2-hour sessions that included information on anti-doping laws and self-medication, and a series of activities to build self-assertion skills. Results indicated both groups significantly increased their self-assertion skills, and the increase was more significant in the experimental group (Laure et al., 2009).

Athletes Training and Learning to Avoid Steroids (ATLAS) and Athletes Targeting Healthy Exercise and Nutrition Alternatives (ATHENA) are the two most researched and monitored doping prevention programs to date (Backhouse et al., 2016; Elliot et al., 2004; Goldberg et al., 2000). ATLAS and ATHENA are implemented in high schools and sport training settings for young athletes (M_{age} = 15 to 16 years old). The programs are both gender-

specific, with multiple sessions, designed to be led by coaches and peers, and incorporate strategies like group-discussions and practicing refusal skills to increase prevention efforts (Elliot et al., 2004; Goldberg et al., 2000). Despite the primary prevention approach of ATLAS and ATHENA, they have not been widely implemented, have only been tested within the United States and among team sports, and show a very small, yet significant, effect in reducing doping intentions, but no changes in doping behaviour (Backhouse et al., 2016; Ntoumanis et al., 2014).

The breadth of doping prevention programs needs to be expanded and innovative educational approaches need to be developed to improve current doping prevention initiatives. In the last decade, only six novel interventions have been developed and disseminated in the academic community (Backhouse et al., 2016), a disappointing effort towards advancing doping prevention. Given the importance of delivering doping education for adolescents, developing a program that resonates with adolescent athletes could help to ensure the efficacy of new primary prevention interventions. Therefore, exploring adolescent athletes' doping knowledge, their experiences with doping and doping education, and their preferred methods for learning about doping could help to ensure that new primary prevention interventions are maximally engaging and impactful. Rebner, Hallward, and Duncan (2015) conducted four focus groups with sixteen Canadian adolescent athletes (n = 7 males and n = 9 females), in grades 7 through 11, representing a variety of sports. The adolescent athletes reported knowing very little about doping, did not see doping as a relevant issue for their age or competition level, and did not discuss doping with teammates or coaches (Rebner et al., 2015). Given the adolescents' limited experiences with doping or doping education, they did not provide sufficient insight about their preferred methods for learning about doping and could not provide meaningful information for the development of an educational prevention program for adolescents. Older athletes may be

better suited to reflect on their past experiences with doping and describe the doping prevention education they received as an adolescent athlete. Young adult athletes can reflect on their relatively recent experiences during adolescence and can provide a more valuable and mature perspective on the issue of doping. Therefore, with young adult athletes reflecting on their adolescence, the purpose of this study was to (1) explore their experiences with doping education as an adolescent athlete, and (2) seek recommendations to improve future doping education for adolescent athletes.

Methods

Participants and Procedures

Through convenience and purposive sampling, 21 young adult athletes (n = 10 males and n = 11 females) were recruited for an interview upon approval from the university research ethics board. Athletes were eligible if they (a) were above 18 years of age, and (b) had competed in any sport at the provincial level or higher during their adolescence. The study was advertised online in a varsity athlete forum accessible to all varsity athletes within one Canadian university. The varsity forum was used as this provided a sample of participants who likely had a competitive sporting history, came from a wide variety of sports, and were likely to meet eligibility criteria. Athletes contacted the research team via email if they were interested in participating. A conscious effort was made to recruit a diverse sample of participants with a somewhat even distribution of males and females from different sports, competition levels, and athletic backgrounds in order to capture a range of experiences, perspectives, and opinions. The researchers monitored the sample with regard to sport type and level of competition, and used direct email methods to purposefully recruit participants from sports or competitive levels that were not yet represented.

The young adult athletes recruited had a mean age of 22.24 years (*SD* = 1.84, range = 19 to 25). At the time of the interview, 13 participants were current university varsity athletes, three were competing in sports outside the university, and five had retired from sport. The current varsity athletes competed in U SPORTS or in an equivalent league particular to their sport. During the athletes' adolescence, they represented and competed in 13 sports: football (*n* = 4), track (*n* = 4), water polo (*n* = 3), badminton (*n* = 2), baseball (*n* = 2), gymnastics (*n* = 2), synchronized swimming (*n* = 2), volleyball (*n* = 2), basketball (*n* = 1), hockey (*n* = 1), rugby (*n* = 1), soccer (*n* = 1), and wrestling (*n* = 1). In some cases, the athletes competed in multiple sports and relied on experiences from several sports. A descriptive table of the athlete's pseudonym, gender, main sport(s) played, and any additional relevant information are presented in Table 1.

Data Collection

All aspects of this study were guided by the assumptions of ontological relativism (i.e., reality is multiple, created, and mind-dependent) and epistemological constructivism (i.e., knowledge is constructed and subjective). Semi-structured one-on-one interviews were conducted with young adult athletes to gain a detailed, in depth understanding of athletes' experiences with doping and doping education. Doping can be considered a controversial topic that can come with stigma, and athletes may not have felt comfortable to disclose experiences with doping among other athletes or teammates. In order to create a safe and comfortable environment for the athletes to discuss their experiences with doping and doping education in one-on-one interviews, the interviewer took several steps to help build rapport with the participants (Rubin & Rubin, 2012). All interviews were conducted by the first author at a convenient time for the athletes, and interviews were held in a private room in the university's athletics building. The interviewer began by describing the purpose of the study, the logistics of

the interview, and how valuable the participants are to this study. The interviewer obtained permission from the athletes to record the interview and assured them all answers were anonymous and confidential. The interview began with a broad, non-threatening question ("Can you start by giving me a history of your athletic career?") to get to know the athletes and their athletic history. The open-ended questions and the semi-structured nature of the interviews encouraged a conversational style and were an informal means to build rapport and allow new themes to emerge through the discussions (Lincoln & Guba, 1985).

No theories were drawn upon for the data collection or data analysis phases of this study as there are currently no theories that have been accepted as a valid explanation for doping behaviour or doping prevention (Backhouse et al., 2016). As Chan et al. (2014) have reported, "previous theory-driven studies did not develop the sets of beliefs derived from in-depth interviews with athletes" (p. 251). Qualitative studies that are more data-driven exploratory investigations, guided by the epistemological approach to knowledge acquisition, may provide a better understanding of athletes' experiences, rather than using a pre-determined theory (Backhouse et al., 2016). Therefore, this study was driven by a constructivist epistemology, relying on the co-construction of knowledge between interviewer and interviewee.

The semi-structured interview guide was developed by two authors who conduct doping research, and one of these authors has 18 years of experience coaching youth and varsity athletes. The interview guide included questions to explore the athletes' sporting history, general views on doping, and their experiences with doping and doping education. Sample questions from the interview guide included:

> Over the course of your sporting career, who has talked with you about doping? In what context? Who do you think should be responsible for talking to athletes about doping? In

your opinion, what would be the most effective approach for preventing doping among young athletes?

The interviews were on average 35 minutes (*SD* = 7.25), and were audio recorded, transcribed verbatim, and stored and analyzed using NVivo software. All potentially identifying information was modified or removed from the transcripts to protect participants' confidentiality. The athletes' quotations were accompanied with pseudonyms, to protect their identity, along with their gender and sport (e.g., Mitchell, M, football; Hannah, F, volleyball).

Data Analysis

The transcripts were inductively thematically analyzed using the six steps outlined by Braun and Clarke (2006), including familiarization, coding, and creating and categorizing themes. Both authors began by familiarizing themselves with the data by reading the transcripts several times; first to get a general overview of the ideas discussed by the athletes, then for deeper understanding. Initial thoughts and perceptions of the data were noted. Five transcripts were initially coded as they covered a breadth of ideas and experiences, and the authors came together to review and discuss the initial list of codes. The remaining transcripts were then analyzed using similar codes as the first five transcripts, but also allowing for the identification of new codes. The list of codes from all 21 transcripts was reviewed and discussed amongst the authors until a final list of codes was agreed upon. Common codes were grouped together to create a list of themes. Given the analysis was not a linear, but recursive process (Braun & Clarke, 2006), the authors continuously reviewed the themes to combine, refine, separate, or discard them as the data dictated. A final list of themes and sub-themes was agreed upon that the authors felt accurately represented the data extracts within each theme.

Quality Standards

In line with a relativist approach, "quality is both revealed and resides in the research report, placing responsibility for judging quality not only on the researcher but also the reader" (Burke, 2016, p. 337). The following evaluative criteria proposed by Smith and Caddick (2012) were used as they align with the goals of the study and reflect the characteristics of this study: impact, coherence, credibility, and transparency. *Impact* was attained through identifying themes that have implications for future research and actionable steps in order to design and develop future doping prevention programs. *Coherence* was achieved through thematic analysis of the transcripts by considering data across all the participants and developing themes that synthesize the variety of participants' experiences. The data extracts or quotations were reviewed to assure they supported their respective themes. *Credibility* was addressed by building a rapport with participants through conversational-style semi-structured interviews. This allowed the inter viewer to reflect back ideas raised by the participants and follow up on ideas not necessarily in the interview guide, but allowed for further insight into athletes' experiences. Member reflections were also conducted whereby the athletes were provided the opportunity to reflect and comment on the interpretation of the findings with the researchers. Member reflections were not done with the intention of achieving theory-free knowledge, but to provide participants with the opportunity to discuss the believability and appropriateness, and potentially provide richer interpretations of the findings (Smith & McGannon, 2017). Through the process of engaging in member reflections, the results were largely unchanged from the original interpretations. However, one athlete felt their quotation was misinterpreted by the researchers, and clarified it was referring to older (university level) athletes, not adolescent athletes. The researcher and participant came to a consensus to remove the quotation, as it did not accurately reflect the theme

or align with the purpose of this study. *Transparency* was maintained throughout the process with the senior author serving as a 'critical friend' to challenge and question data collection, and assumptions, analyses, and interpretations of the data. For example, the critical friend encouraged further reflection, and alternative explanations and interpretations of the list of themes that resulted in dissolving some themes, more clearly defining current themes, and seeking out more representative quotations for certain themes.

Results

Six themes were identified following the analysis. Athletes described three themes surrounding their past experiences with doping education: "Nobody talked about it", "I don't see how it would be relevant", and "Our education was perfect". The recommendations for improving current doping education included the three themes: "It's a collective effort", "Start as young as possible", and "It doesn't need to be long, you just need to scare them." Within the last theme, two subthemes were identified where athletes spoke about (a) the need for interactive and engaging programs, and (b) the use of scare tactics within doping education.

Experience with Education

The first purpose of this study was to explore the participants' experiences with doping education as adolescent athletes. The data revealed three primary themes aligned with this purpose that reflected three common scenarios the athletes experienced: (1) "Nobody talked about it", (2) "I don't see how it would be relevant", and (3) "Our education was perfect".

"Nobody talked about it". The majority of athletes expressed a lack of doping education as an adolescent athlete. Some athletes explained doping was mentioned briefly, but meaningful discussions were sparse. When Mitchell (M, football) was asked whether doping was discussed amongst his high school football teammates and coaches, he said, "No, nobody talked about it,

and there was no prevention, there was – they just didn't care." Hannah (F, volleyball) had a similar experience, stating, "Even with the national team, we never had a seminar on it. We had a nutrition seminar, sports psych[ology], you name it, we had it. But we never had a doping seminar, anything like that." When Jackie (F, synchronized swimming) was asked who had spoken to her about doping during adolescence, she replied "No one."

Other athletes recall doping was briefly mentioned either by a coach, a physical education teacher, or in a high school class, but the extent of the education was insufficient. Simon (M, track), expressed,

> In Ontario, your high school, 15 to 18 [years old] or something like that, and there's nothing. You don't get tested, nobody talks about it. Your gym teacher might be in one lecture 'Don't take steroids, you'll get acne and 'roid rage' but that's about it.

Malcom (M, baseball) described his limited exposure to doping during high school:

> It was mentioned in my high school wellness class, but it was more like, 'Okay, we will talk about this for 2 days, this stuff is bad for your body, this is what it does to you,' but never really much beyond that.

"I don't see how it would be relevant". Among the athletes who received a doping education, a group of athletes felt doping education was not personally relevant for them. The athletes who felt doping education was less crucial typically competed in sports where they felt doping was less prevalent, such as badminton or volleyball. When Stephanie (F, badminton) was asked about doping in her sport, she said, "For us, [doping] is not an issue at all somehow." She further explained,

> You have to be careful cause you'll be tested for any potential uses of drugs. But on the

> badminton team, it feels like, 'Oh this probably won't happen to us. This usually goes for like football players or other athletes, not usually us.'

Violet (F, volleyball and water polo) expressed a similar thought. When asked about the need for doping education, Violet explained her volleyball teammates had no intentions to dope, and the focus of the doping seminar was targeted to teams where the prevalence of doping was assumed to be higher:

> We were only 400 [athletes], so we did it at the same time and it was more targeted to our football team which wasn't very good but got a lot of money and they were a very scandalous football team. [...] We didn't break the rules, everybody loved us, so for us as a team, it wasn't something we had to discuss after going to this drug information session, but there was kind of talk in the athletic community of the football team.

Violet further expressed why she felt doping education was not an issue for her team:

> But I also want to say that doping wasn't brought up with my volleyball team because we were girls. And that sounds horrible and sexist, but I really think the men's volleyball team would have been more likely to have gotten a talking than we were.

Christina (F, rugby) reported that she did not receive doping education in high school. However, when asked if she would have liked some form of education at the time, she replied, "No. For me I do not think it would have made a huge difference." Christina explained she didn't have the intention to dope at the time, therefore the doping education would not have been pertinent.

"Our education was perfect". Although the majority of athletes did not receive doping education, a few athletes recall an adequate and more formal education during adolescence. These athletes typically competed at the national level or higher, or were in a very sport intensive

high school. Kevin (M, hockey) explained his education from his sport organization while competing on a national junior hockey team:

> We had – I don't know if it would be a half day dedicated to that education and then we had to go off in our own groups and individually go on the computer and complete our testing. They made sure that we were educated and knew very well that this was an important matter, and again, if you had anything that you thought was maybe a banned substance to please just make sure that you contact our trainer immediately before you take anything.

Sarah (F, synchronized swimming and water polo) attended a sport-intensive high school where many athletes competed at a high level of competition. She attended a doping seminar presented by a nurse and her coach. Sarah explained,

> They would come, they would have a PowerPoint presentation. They would go over different kinds of drugs, why we shouldn't be using them, what are the effects on your body. Also it was kind of scary when you're, I mean, what 13 years old? And you're hearing that if you take steroids you'll look like a man. It was like, 'Oh okay, I'm not touching that,' right?

Sarah followed up her statement by saying, "The information that I got was very useful I think." Zack (M, football) even referred to his high school doping education as 'perfect'. He felt that the constant repetition and frequency of doping education year after year conveyed the message clearly:

> I think our education at [my high school] was perfect. Our group never really took doping stuff so I think when you have doping education classes that start in sec 1, 2, and 3 [grade

> 7, 8, 9] and never stop talking about it is how you really remember how the bad effects can hurt you in your life instead of just four years of playing football.

Recommendations for Future Education

After the athletes reflected on their experiences with doping education as an adolescent athlete, the second purpose of this study was to gather athletes' recommendations for improving future doping education. At the time of the interview, all of the athletes had received a doping education and they were asked to rely on their experiences, to date, when discussing ways to improve doping education. The athletes were asked to describe, in their opinion, what would be the most effective doping prevention education for adolescents. They provided input on who, when, and how doping educational programs should be delivered. Three themes emerged: "It's a collective effort", "Start as young as possible", and "It doesn't need to be long, you just need to scare them." The third theme has two subthemes where athletes spoke about the need for (a) interactive and engaging programs, and (b) the use of scare tactics within doping education.

"It's a collective effort". Through discussions about recommendations for improving doping educational programs, the athletes commented on who they felt would be the most suitable person(s) to deliver such programs to adolescent athletes. The athletes mentioned a wide range of people including coaches, administration, team managers, parents, teammates, and athletes self-informing. Most athletes, however, believed it was not the role of just one individual, but doping education requires a collaborative effort of several individuals in the athletes' entourage. Martin (M, football) explained the importance of not relying on teammates for the only source of knowledge:

> I would say educating the full entourage of the athletes, not only just the coaches, the parents, the teammates. Because if one teammate doesn't know what he's taking and he's

> just like, 'Oh, try this one for that,' and he just takes a scoop and turns out illegal substances are inside. Just the whole entourage of the athlete, and at the same time the athlete will be informed afterwards.

Christina (F, rugby) believes the team manager would be the ideal person to deliver doping education, but the athletes, the parents, and the coaches should all be present:

> I think that the team manager should probably be the best person to do it. I think that all coaches should be present for it. And I think that for teenagers, their parents need to be there. […] And they have to have everyone on the same page; the manager, coach, kids, and parents need to reinforce that they have to work together for this stuff.

Brandon (M, baseball) explains the responsibility for doping education does not fall on just one person's shoulders, but it requires a collaborative effort to deliver doping prevention education:

> I think it's a collective effort. I don't think it's anyone's main responsibility, I mean I think it's the coaches, I think it's the parents, I think it's the educators, I think it's the teammates amongst themselves, I don't think you can really give that – I don't think that's anyone's specific job.

"Start as young as possible". The athletes were asked to reflect on when doping education should be delivered for athletes. Most of the athletes felt education at a young age is appropriate, typically referring to late childhood or early adolescence. Josh (M, track) explained why he felt a young age is best:

> When you are young is when you learn best, and also when you are more easily influenced, so you could easily be influenced by a bad coach or something. So I think it is important to talk about it from a young age.

Simon (M, track) spoke about beginning doping education around the time adolescents hit puberty:

> I would say probably in the 12-14 [age] range. I would start doing it for guys kind of that couple years before you really start hitting puberty and start building muscle and all that stuff, right? And I mean girls can even take it back farther than that. I think you want to get it a couple years in before you really start becoming like an elite athlete.

Several athletes spoke about introducing doping prevention before athletes consider doping. Malcolm (M, baseball) explained, "Like I said, by 5th grade there is not much of an attraction to [doping], so if you catch it early they understand the concept of it. Hopefully that is early enough before they have any desire [to dope]."

Brandon (M, baseball) had a similar thought:

> I think probably when they enter middle school so grade 5/6. It's probably the right level. And I don't think they're going to be affected by it at all at that point, but I think it's good to sort of prime them for what's going to come or what may come.

Zack (M, football) spoke about starting young, but highlighted the importance of implementing education each year. He added, "Honestly the sooner the better I would say around 12 years old is good. They all just say, 'No I am never going to take it in my life,' but you have to continue with them every year."

"It doesn't need to be long, you just need to scare them". Many athletes describe the way doping prevention education is currently delivered as boring, repetitive, ineffective, and full of jargon. The athletes were asked to discuss a more effective alternative for delivering doping education and several of them recommended doping education be delivered in (a) an interactive and engaging format, and (b) should use scare tactics.

Interactive and engaging. When asked to discuss what would be a more effective alternative, most athletes were concerned about maintaining adolescents' attention. Gordon (M, badminton) said, "I feel like having some workshop, the kids really won't want to be there." Brandon (M, baseball) suggested avoiding pamphlets, "I don't think a brochure would do anything. As soon as a kid gets it he's going to put it in his lap and sort of stare off into space, maybe toss it when he gets home." As an alternative, some athletes suggested short, engaging, and interactive doping education. Maria (F, wrestling) expressed the importance of a short presentation to keep athletes engaged:

> Make sure it is not long. Because it always ends up being too long, and it is important, but you have to understand that especially teenagers, they are not looking to pay attention for a long time.

Stephanie (F, badminton) highlighted the need for an interactive program:

> I think if you give a group of adolescents something that they don't have to interact with they probably won't absorb much so it would have to be something more interactive. The first thing I thought of was like just have all the info there and give them like a couple worksheets, simple fill in the blank stuff. That would probably do a lot more than just a video or something, or someone talking to them.

Josh (M, track) explained what not to do, and provided a more plausible alternative:

> I think it is important that it is not a video or internet, but person to person, and also if it is either someone they admire, like a celebrity or just a coach, or athletes that are decent or high level who just come in and explains the same reasons I said, like, 'Would you feel good about yourself [if you doped]?' I think that could really work with kids. Kids are

> naturally good, and they could get bad with time, they do not want to be a bad person. So ask them how they would feel and really emphasizing that part.

Simon (M, track) suggested a similar idea by having a famous athlete who was previously caught doping to speak out, as this would be more captivating and impactful for adolescents:

> I think for people that young, being able to tie doping with a real life thing. Do you know what I mean? Like if Carl Lewis came back and went to a track team and gave his spiel on, 'This is where I was as an athlete, this is why I started doping, this is what happened after starting doping, this is why I regret doping.' Like if you could get people who have done it to come back and talk about it, I think that would go way further than just going, 'Don't dope.'

Scare tactics. In terms of the content of educational programs, many athletes felt scare tactics (i.e., information that focused on the negative consequences of doping) would deter adolescents from initiating doping. Stephanie (F, badminton) recalled,

> I remember learning that for people who do commit any sort of infraction or who do tend to do things they are not allowed to do, they do it because they don't think they'll ever get caught. So if you want to increase any sort of punishment for it, it doesn't really deter them as much as it should because they don't think they'll get caught. So I think maybe increasing information about like actual health risks might be a more solid deterrent to say like, 'Hey if you do this you will get sick, this is not an *if* situation anymore, this is going to be bad for you.'

Julia (F, basketball) reflected a similar thought about highlighting the negative health effects:

> You know you can find [banned] doping substances in this [product], so this is dangerous, you make sure that you know what you take and all the effects, the

> consequences that it can have on you since you're young. It will have a bad effect on your body.

Malcolm (M, baseball) spoke about scaring the athletes with the potential sanctions they can incur:

> I think that [prohibited] list would scare them. Like if you showed them they might not understand the perspective of it, but if I saw it maybe even when I was 13 or 14 years old, like, 'All of these drugs are illegal? […] Holy cow what even are these?' And would make you scared or cautious in the future. […] And I think even examples, like if you told a 14-year-old freshman in high school that some senior just got kicked off for taking an illegal substance that would scare him into being like, 'This is real! Not only do they say you could get tested, but people actually get tested and caught!'

Discussion

This study explored young adult athletes' experiences with doping education during adolescence and recommendations to improve future educational programs for adolescent athletes. The athletes described three scenarios encompassing their past experiences: "Nobody talked about it", "I don't see how it would be relevant", and "Our education was perfect". The athletes' recommendations for improving current doping prevention programs included: doping prevention requires "a collective effort", education should "start as young as possible", and the programs do not "need to be long, you just need to scare them." The implications that stem from the findings are not distinct for each theme, but rather stem from a combination of themes; thus, the findings across the six themes will be discussed.

The most common scenario described by many athletes was a lack of doping awareness and education as an adolescent athlete. These findings reflect what is observed in the current

doping education literature where many athletes' lack formal anti-doping education and report insufficient knowledge (Backhouse et al., 2016). The majority of current doping prevention programs are targeting high school athletes or youth at the elite level (Backhouse et al., 2007, 2016), but research is scarce on educational programs implemented among younger athletes or for athletes at lower levels of competition. This represents a missed opportunity to target athletes in late childhood or early adolescence given this vulnerable phase for initiating substance abuse and forming attitudes towards doping, with athletes as young as 10 years old reporting doping (Nicholls et al., 2017). In line with the athletes in this study that felt delivering education "as young as possible" is the optimal time, doping prevention programs need to be implemented even younger than high school aged athletes, prior to adolescents forming stable attitudes or values that could lead them towards doping, and prior to athletes experiencing pressure or temptation to use banned substances.

In order for primary doping prevention efforts to be effective, the educational programs need to be relevant and impactful for adolescent athletes. A subset of our sample who mainly competed at a high level of competition during adolescence reported receiving sufficient doping education and the issue of doping was formally addressed. The importance of doping education was perhaps more evident for these athletes given their competitive level and the potential for testing at the time. However, a more concerning issue raised in this study was that a group of athletes felt doping education was not relevant and felt doping was not a worthy topic of discussion. These athletes generally had no intentions to dope as an adolescent, or felt doping was not a problem for their team or sport at the time. Nevertheless, all athletes need to understand the importance and relevance of primary doping prevention and should receive education programs for several reasons. First, our data reveal that athletes may underestimate the

extent of doping in sport, given they report doping not being relevant for their age group, sport, or competition level. However, research has documented the alarming rates of doping across age groups, sports, and competitive levels (Backhouse et al., 2016). For athletes to play an active role in preventing doping, they need to be made aware of the issue and prevalence of doping from educational programs. Second, as the participants in this study highlighted, adolescents might not be facing pressure to dope at the time, but through educational programs, athletes can build fundamental refusal and decision-making skills and healthier morals, values, and ethics (Backhouse et al., 2016). Higher self-efficacy to refuse doping and morality have been shown to be the strongest protective factors against doping (Ntoumanis et al., 2014). Third, doping educational programs inform athletes about doping control procedures and anti-doping rule violations whereby athletes can face sanctions for failing to comply with control procedures, regardless if they have taken a banned substance or not. Fourth, athletes are taught doping is not just a risk behaviour, but doping inherently compromises the integrity of sport. Erickson, Backhouse, and Carless (2017) suggest education programs should empower athletes to safely confront doping behaviours and empower individuals to assume responsibility for protecting athletes' right to doping-free sport. Regardless of sex, age, sport, or competition level, all athletes should be provided the opportunity to receive an effective, empirically-based, formal doping education program to prevent the occurrence of doping in sport.

In order to target all athletes and make doping education widely accessible, several steps must be taken. The majority of the athletes were in agreement that doping prevention education needs to be addressed collectively by athletes and the athletes' entire entourage, such as parents, coaches, trainers, doctors, etc. Backhouse et al. (2016) reported that not only are athletes' exposure to formal doping prevention education insufficient, but athlete support personnel report

inadequate knowledge. Researchers have also argued the importance of education and prevention efforts among athletes' social networks as they can have an influence on athletes' doping behaviours (Backhouse et al., 2016; Nicholls et al., 2017). Therefore, collaborative prevention initiatives need to be directed not only towards athletes, but athletes' social networks and support personnel.

The participants in this study expressed the need for more interactive educational programs that are brief but engaging. Athletes report that they would rather have frequent discussions about doping prevention and receive education as an ongoing conversation than as a long program at only one point in time. The athletes also report the need for more engaging educational programs. There currently exists a wide array of doping educational resources online including posters, brochures, and videos (Duncan, Hallward, & Ziavras, 2016); however, the athletes report that these type of resources are not attractive to adolescents. The athletes' desire for more interactive programs corroborate the findings from a World Anti-Doping Agency funded literature review (Backhouse et al., 2009) that highlights the need for interactive programs that include role-playing and simulations, for example.

The athletes recommended using scare tactics (i.e., fear-based messages that describe the negative consequences of doping) to discourage young athletes from doping. Current theory and messaging strategies emphasize that when encouraging prevention behaviours, such as doping, messages that focus on the benefits of avoiding doping would be more persuasive than fear-based messages (Gallagher & Updegraff, 2012; Rothman & Salovey, 1997). Previous research has also indicated that scare tactics are an ineffective approach to prevent doping (Goldberg, Bents, Bosworth, Trevisan, & Elliot, 1991). However, a recent review by Petróczi, Dodge, Backhouse, and Adesanwo (2014) demonstrated there may be a place in current anti-doping

education for scare tactics. In designing the fear-based messages, researchers must consider contextual factors, be theory-based, credible, targeted, and relevant for adolescents (Petróczi et al., 2014). Research has also shown that when encouraging prevention behaviours among adolescents, messages that focus on the negative consequences of a behaviour, such as smoking, are more engaging for adolescents (Latimer et al., 2012; Mays, Hawkins, Bredfeldt, Wolf, & Tercyak, 2017). There appears to be a disconnect between theory and practice, whereby theory dictates the need for positive messages, but current practice-based research indicates fear-based messages may have a place in doping prevention. Future research is needed to examine the effects of fear-based doping prevention messaging among adolescent athletes.

Limitations

The athletes interviewed for this study provided insight into their experiences with doping education, but this study is not without limitations. The young adult athletes were asked to recall their past experiences with doping education during their adolescence from several years ago. Athletes may not completely remember their experiences at the time which can limit the accuracy and details of the experiences. When recalling a memory, it is likely to be different, even very subtly, each time it is recalled as it is strongly influenced by the current context (Brockmeier, 2010). As a result, the participants may view their adolescent experiences through a different lens than before. This changing recall, however, may have had an advantage in this study as the perspective gained by the athletes over time may have provided broader and more mature insights on the issue of doping at the time of the interview. The athletes in this study all consented to face-to-face interviews in their university to discuss doping in sports, which will naturally attract athletes who may advocate for clean sport. None of the athletes reported having doped or been caught doping. Given the use of interviews, participants may not have been fully

transparent with their answers and may have withheld information about their experiences with doping, especially as it related to their university experience. In order to minimize this possibility, the participants were told their responses would be anonymous and any identifying information would be removed. The questions relating to doping began with general questions, such as the prevalence of doping in their sport, which allowed participants to get comfortable discussing the topic and divulge their personal experiences at their own volition. The sample of athletes was relatively homogenous given they were all young adult athletes attending a strong academic Canadian university. The athletes did, however, describe more heterogeneous adolescent experiences as they came from various provinces, states, competition levels, and sports. Regardless of the athletes' sport, doping is an issue that should be discussed with all athletes.

Conclusion

Overall, the athletes interviewed in this study were able to provide insight as they reflected on their various experiences with doping education during their adolescence. Athletes mainly reported a lack of doping education, but a more troublesome finding are the athletes who report they did not value doping education as an adolescent. All athletes should be provided with sufficient doping education in order to prevent doping in sport. The athletes provided direct implications for design and delivery of doping prevention education programs which align with suggestions by the World Anti-Doping Agency (2015). Future doping prevention programs need to inform athletes about the consequences of doping, doping control procedures, and anti-doping rule violations. Education and prevention programs needs to target young athletes and the athletes' entourage collectively, and programs need to be engaging and interactive for young athletes to value the importance of clean sport.

Table 1

Characteristics of Athletes Interviewed

Pseudonym (gender)	Sport(s)	Sport history and relevant facts
Hannah (F)	Volleyball	• Played tennis provincially until age 13 • Trained with the national volleyball team at age 19 • Was a university varsity volleyball athlete
Jackie (F)	Synchronized swimming	• Competed in synchronized swimming between the ages of 7–15 • Restarted synchronized swimming at university
Sarah (F)	Synchronized swimming & water polo	• Competed in synchronized swimming between the ages of 9–14 and again as a university varsity athlete • Competed nationally in water polo for 4 years during adolescence • Played varsity football in CEGEP (college) for 2 years
Stewart (M)	Gymnastics & track	• Played soccer, gymnastics, and football during youth • Narrowed focus to gymnastics and competed provincially • Suffered serious traumatic brain injury, temporarily paralyzed, and fully recovered after 2 years • Current university varsity track athlete
Stephanie (F)	Badminton	• Started badminton at age 9 and competitively at age 12 • Current university varsity badminton athlete
Gordon (M)	Badminton	• Competed in soccer and hockey during adolescence • Played competitive badminton player for past 6 to 7 years • Current university varsity badminton athlete
Tamara (F)	Gymnastics & track	• Competed in gymnastics provincially between the ages of 8–11 and stopped due to injury • Competed in volleyball nationally between the ages of 16–17 • Competed as university varsity track athlete (pole vault)
Annabelle (F)	Water polo	• Water polo athlete for past 12 years • Competed nationally and as a university varsity athlete • Suffered shoulder injury and had surgery causing setbacks
Martin (M)	Football	• Focused training efforts on football for the past 10 years, through high school, CEGEP (college), and currently a university varsity football athlete
Brandon (M)	Baseball	• Played baseball as main sport through high school • Got injured causing setback in career so gave up on dream of scholarships for Division 1 schools • Current university varsity baseball athlete

Simon (M)	Track	• Played competitive hockey during adolescence, but chose to focus on competitive track to attend university as well • Competed in track at national championships between the ages of 17–19 • Current university varsity track athlete
Violet (F)	Water polo & volleyball	• National water polo player between the ages of 14–16 • Played volleyball as varsity athlete in CEGEP (college)
Julia (F)	Basketball	• Began playing basketball at age 10 • Competed nationally as adolescent and played during CEGEP (college) • Current university varsity basketball athlete, winning national championship titles
Kevin (M)	Hockey	• Played hockey as an adolescent reaching the highest level as a Tier 1 major junior hockey in Canada between the ages of 16–20 • Played university varsity hockey between the ages of 20–25 • Played at FISU, an international level
Mitchell (M)	Football	• Played football in high school, prep school, CEGEP (college) and currently a university varsity football athlete
Lauren (F)	Soccer	• Played variety of sports during youth • Started competitive soccer at age 14 • Current university varsity soccer athlete
Josh (M)	Track	• Played soccer and basketball during youth • Started track in CEGEP (college) • Current university varsity track varsity athlete competing provincially and nationally
Zack (M)	Football	• Played football in high school and CEGEP (college) • Current university varsity football athlete
Malcolm (M)	Baseball	• Played baseball in high school at a national level • Current university varsity baseball athlete
Christina (F)	Rugby	• Played rugby in high school and CEGEP (college), and competed provincially • Current university varsity rugby athlete, but experienced many injuries
Maria (F)	Wrestling	• Competed in elite gymnastics during youth and adolescence, reaching the provincial level, but quit • Started wrestling and playing rugby throughout high school, and stuck with wrestling • Competed internationally

SUMMARY AND CONCLUSIONS

The overall purpose of this thesis was to explore adolescent athletes' experiences with doping education and recommendations for improving doping prevention programs. Given the lack of doping awareness and knowledge among adolescent athletes (Rebner et al., 2015), 21 young adult athletes (n = 11 females and n = 10 males) were interviewed and reflected on their adolescent experiences. The first purpose was to explore the young adult athletes' experiences with doping education during adolescence. The second purpose was to seek their recommendations for improving future doping education and prevention programs among adolescent athletes. The young adult athletes represented both genders, a range of sports and competitive levels, and unique sporting histories in which to draw from during the interviews. Following the analysis of the interviews, six themes emerged, three themes in relation to the first purpose, and three themes relating to the second purpose.

To address the first purpose, athletes described their past experiences with doping education, and the three themes included: "Nobody talked about it", "I don't see how it would be relevant", and "Our education was perfect". Three themes emerged in relation to the second purpose when athletes provided recommendations to improve doping education and prevention: "It's a collective effort", "Start as young as possible", and "It doesn't need to be long, you just need to scare them". Within the last theme, two sub-themes emerged including athletes' suggestions to have interactive and engaging programs and to use scare tactics.

Practical Implications and Future Directions

There are a number of studies and reviews (e.g., Backhouse et al., 2009, 2007, 2016) that have been conducted to determine effective strategies for approaching doping prevention; however, this is the first study that has examined athletes' perspectives on effective or ineffective

doping prevention efforts for young athletes. The athletes in this study have highlighted several improvements that can be used to enhance current anti-doping education, as well as inform the design and development of future doping prevention programs. The input from the athletes in this study corroborate current strategies in the literature (e.g., Backhouse et al., 2009; Johnson et al., 2013; Thomas et al., 2011), such as recommendations to target young athletes, include appropriate content for young athletes, emphasize active participation, keep programs brief, include booster sessions, and include content on the negative consequences of doping.

The athletes interviewed in this study have reinforced the need to implement a number of strategies and components to increase the efficacy of doping prevention initiatives among adolescent athletes. First, there is a demand for more doping education and prevention among young athletes than what is currently accessible or being delivered. The athletes in this study commonly reported a lack of doping education during adolescence. Second, the doping programs must resonate with the athletes and address their current needs. Many athletes in this study felt doping education was irrelevant for them, although it could be argued perhaps the programs included relevant content but were not delivered in a manner appropriate for the athletes' current developmental stage, sport, competitive level, context, etc. or were not delivered with high fidelity. Researchers have called for prevention programs to be monitored and evaluated to ensure high program fidelity (Backhouse et al., 2009). Third, doping education should be delivered to athletes as young as possible. Given doping has been reported to begin as young as 10 years of age (Nicholls et al., 2017), there is a necessity to intervene early and prevent these young athletes from initiating doping. Fourth, educational and prevention programs should remain short to maintain attention, and should emphasize active participation to engage young athletes and enhance the potential of building decision-making and refusal skills. Athletes do not

want to be inundated with long and tedious educational workshops or presentations, calling for more brief programs. In line with recommendations by Backhouse et al. (2009), booster sessions could then be used to help ensure program content is reinforced over time and continue to help athletes resist doping as they may experience new pressure to dope as they mature. Fifth, intervention content should not only focus on developing positive values and morals towards doping, as suggested by WADA, but participants emphasized programs should also include scare tactics by presenting the negative consequences of doping (i.e., health, social, and moral consequences) as some athletes reported it was an impactful doping deterrent. Current and future doping education and prevention programs should incorporate multiple components and strategies, as highlighted in the literature and by the athletes in this study, to improve their efficacy.

Overall, the findings from this study provide practical implications for the development and delivery of primary doping prevention programs for adolescent athletes. Doping is not only prevalent among Olympians and professional athletes, but presents a serious concern among young athletes, given the associated health, social, and moral consequences of doping. Developing efficacious, empirically-based, formal doping programs can help reduce the rates of doping initiation in sport, and help protect athletes' right to fair play and clean sport.

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APPENDIX

Interview Guide

Introduction:

1. Thank you for agreeing to meet with me
2. To get us on the same page, here is the definition of "doping" that we are using for our research:
   'Doping' refers to an athlete's use of prohibited drugs or methods to improve training and sporting results. Steroids are the drugs that often come to mind when we talk about doping, but doping also includes an athlete's use of other forbidden drugs (such as stimulants, hormones, diuretics, narcotics and marijuana), use of forbidden methods (such as blood transfusions or gene doping), and even the refusal to take a drug test or an attempt to tamper with doping controls.
3. We have learned through the first phases of our research that kids in our target population are quite uninformed about doping in sport so we have added a phase to our project where we are asking young adults who were athletes as adolescents, with a particular focus on people who competed at relatively high levels
4. If this applies to you, we are interested in hearing specifics of your own experiences, whether it is teammates using substances or just what you've heard from the rumor mill within your sport.

Questions:

1. Can you start by giving us a brief history of your athletic career?
   a. At what age did you start competing?
   b. What was the highest level you got to?
   c. How old were you when you were at your peak?
2. When you think about doping in sports, what comes to mind first?
3. How prevalent is doping at the highest levels of your sport?
4. How prevalent is doping at lower levels (collegiate, national, provincial) of your sport?
5. When you were competing, how would you have felt if you found out that one of your teammates was doping?
   a. Have you ever been in this situation? What happened?
6. Research has found that 60% of adolescent athletes report the use or abuse of some kind of *legal* performance-enhancing substance – does that surprise you? How? Why?
7. A lot of athletes who have reached the highest levels of their sport say they wish they had learned about doping much earlier… what do you think about that? How do you feel about that?
8. Over the course of your sporting career, who has talked with you about doping? Under what circumstances?
   a. How much did your coaches talk with you about doping?
   b. Representative from your sport organization/ administration?
   c. Trainers? Sport psychologist? Parents?
   d. Did you learn about doping in school?

    e. How old were you when someone talked with you about doping?
9. How much did you talk about doping with the other athletes? What was the nature of these conversations?
10. Who do you think should be responsible for talking to athletes about doping?
11. In your opinion, what would be the most effective approach for preventing doping among young athletes in your sport?
    a. Would an information brochure be enough?
    b. Would a one-time information session be enough?
12. In your sporting career, how much dialogue/conversation was there about ethics, morality, fairness, sportsmanship?
    a. How much did doping play into these conversations?
13. At what age/competitive level do you think athletes should start learning about doping?

Closing Question:

14. Thinking about everything we have discussed, in your opinion, is there anything else about doping that you think we should know?