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**Self-affirmation and performance enhancement substance use in
sport and exercise**

**By:
Vasileios Barkoukis**

A thesis submitted in partial fulfilment of the requirements for the degree of
Doctor of Philosophy

The University of Sheffield
Faculty of Psychology
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*To the most important people in my life,
my children, Yannis and Efthimia, and my wife, Despoina*

Table of contents

Table of contents.....	4
List of Tables	9
List of Figures	10
Abstract	11
Chapter 1	11
Chemically-Assisted Performance Enhancement in Sport and Exercise Settings.....	13
Benefits of physical activity and sport participation.....	13
The 'dark side' of sports and exercise: Chemically assisted performance enhancement in competitive and recreational sports	14
Definition of chemically assisted performance enhancement	14
Prevalence of doping use	17
Consequences of doping use.....	19
Nutritional Supplements: basic definitions and consequences from use	22
Existing anti –doping prevention efforts in competitive sports	30
Anti-Doping Interventions for Recreational Athletes.....	35
Anti-doping Message Content and Delivery.....	36
<i>Psychological risk and protective predictors of doping use</i>	38
Motivational predictors of doping use	39
Moral-related predictors of doping use.....	44

Chapter 2	47
Theories of intentional behaviour: Theory of Reasoned Action and Theory of Planned Behaviour	47
Development of the theory of planned behaviour	47
Theory of reasoned action	47
Attitudes towards a behaviour	499
Subjective norms	51
From reasoned action theory to planned behaviour theory: Perceived behavioural control	53
<i>Doping research using theory of planned behaviour</i>	55
<i>A need to extend planned behaviour theory: Emergence of integrated models of intention-formation</i>	58
 Chapter 3	 63
<i>The self-affirmation theory</i>	63
Overview of the self-affirmation theory	63
Self-affirmation theory: Fundamental assumptions	67
 Chapter 4	 73
Rationale for investigating self-affirmation in the context of chemically assisted performance enhancement in sport and exercise settings	73

Chapter 5	80
Study 1: Self-affirmation and use of nutritional supplements	80
<i>Chemically-assisted performance enhancement in exercise settings</i>	80
Method	83
<i>Participants</i>	83
Measures	84
Design	86
Procedure	88
Results	88
Descriptive statistics	88
Effect of self-affirmation on doping intentions and related social cognitive variables	90
Discussion	92
 Chapter 6	 97
Study 2: Self-affirmation and doping use	97
<i>Self-serving biases in doping use</i>	97
<i>The present study</i>	97
Method	99
<i>Participants</i>	99
Measures	100
Design	101
Procedure	102
Results	103
Descriptive statistics	103

Effect of self-affirmation on doping intentions and related social cognitive variables	104
Indirect effects of self-affirmation on doping intentions	105
Discussion	107
Chapter 7	114
Study 3: Self-affirmation, message acceptance and mental construal in dope users.	114
<i>The present study</i>	117
Method	118
Participants.....	118
Measures	118
Design	119
Procedure	120
Results.....	120
Descriptive statistics	120
Effect of self-affirmation on doping intentions and related social cognitive variables	121
Discussion	123
Chapter 8	130
General Discussion	130
Effect of self-affirmation on doping use intentions	131
Effect of self-affirmation on doping use related cognition	134
Usefulness of self-affirmation in anti-doping interventions	136
Limitations of the studies and future directions.....	140

<i>Conclusions</i>	148
References	150
APPENDICES	196
APPENDIX 1 – Consent form.....	196
APPENDIX 2 - Survey of Study 1 and Study 2– Self-affirmation manipulation .	197
APPENDIX 3 – Survey of Study 1 and Study 2– Control condition	203
APPENDIX 4 – Survey of Study 3 – Self-affirmation manipulation.....	209
APPENDIX 5 – Survey of Study 3 – Control condition	216
APPENDIX 6 – Health risk message.....	223
APPENDIX 7 – Moral message	225
APPENDIX 8 – List of publications and presentations arising from the thesis	227

List of Tables

Table 1: Descriptive Statistics of the Present Study's Variables for Both Groups.....	89
Table 2: Correlation Coefficients Among the Present Study's Variables	90
Table 3: Effect of Self-Affirmation on the Decision-Making Process.....	92
Table 4: Means and Standard Deviations of This Study's Variables	103
Table 5: Correlation Coefficients Among the Study's Variables	104
Table 6: Effect of Self-Affirmation on the Decision-Making Process.....	106
Table 7: Means and Standard Deviations of the Study's Variables	121
Table 8: Correlation Coefficients Among the Study's Variables	122
Table 9: Effect of Self-Affirmation on the Decision-Making Process.....	124

List of Figures

Figure 1. Effects of Self-Affirmation and Social Cognition on Doping Intentions.. 111

Abstract

Doping use is among the most important threats of modern competitive and amateur sports, with increasingly more competitive and recreational athletes using performance and image enhancing drugs. Over the last decade, a large body of evidence has shown that social-cognitive theories can be usefully applied to better understand the psychological processes underlying doping use, and researchers in this area have called for behaviour change interventions. Health risk communication represents an important area for intervention and is especially pertinent to the moral and health risk associated with doping use, and self-affirmation theory presents a relevant framework for communicating health and moral messages against doping use. The present thesis examined, for the first time, the effectiveness of self-affirmation manipulations in changing key social cognitive variables that have been associated with doping use in competitive and recreational sports.

For that purpose, three experimental studies were conducted. Study 1 investigated the effects of a self-affirmation intervention on the decision making process towards doping use among 60 exercisers who self-reported nutritional supplement use - a known risk factor for doping use. Participants in the intervention group engaged in a kindness affirmation task and control participants were asked to respond to questions on a range of unrelated issues. Both groups completed a set of social cognitive variables derived from the theory of planned behaviour. Independent samples t-tests showed significant differences between the experimental and control groups in moral norms, descriptive norms, and anticipated regret. Situational temptation and anticipated regret significantly predicted doping use intentions.

Study 2 was designed to test the effect of self-affirmation on the decision making process towards doping use among 60 elite athletes privately admitting doping use.

The same manipulation with study 1 was used. After the manipulation participants read a message about the health and moral hazards of doping use, and completed measures of intentions and attitudes towards doping use, social and moral norms, self-efficacy beliefs, and anticipated regret. The results of the analyses showed that self-affirmed athletes reported weaker intentions and situational temptation scores as compared to non-affirmed participants. In addition, the self-affirmation manipulation demonstrated a significant effect on doping use intentions over and above the effect of the social-cognitive variables.

Study 3 investigated whether self-affirmation induces message acceptance through mental construal in recreational exercisers who admitted doping use. Participants were exposed to the same manipulation and message used in study 1. After reading the message they completed the Construal Level Identification Form, a measure of message acceptance, and the measures of social-cognitive variables assessed in study 1. The results of the analyses did not indicate statistically significant effects.

It was concluded that the effect of self-affirmation manipulation and social cognition on doping use intentions varies to a notable extent implying a different mechanism associated with the formation of doping use intentions among dopers and non-dopers, as well as among competitive athletes and exercisers. These findings have important theoretical and practical implications for doping-related prevention interventions.

Chapter 1

Chemically-Assisted Performance Enhancement in Sport and Exercise Settings

Benefits of physical activity and sport participation

The benefits of physical activity and exercise among adolescents and young people are well documented in the international literature, and evidenced in world-wide initiatives to promote sports in youth (Erwin, Fedewa & Ahn, 2013; Janssen & LeBlanc, 2010; Metcalf, Henley, & Wilkin, 2012). More specifically, adolescents and young adults who exercise are less likely to be obese, have fewer chances of suffering from diabetes, enjoy better health (skeletal and cardiovascular), show better executive functions, and there is also evidence for moderate but significant associations with on reducing depressive symptoms (Biddle & Asare, 2011; Brown, Pearson, Braithwaite, Brown, & Biddle, 2013; Strong et al., 2005; Verburgh et al., 2013). Importantly, several meta-analyses have shown that exercise has been associated with better health outcomes in adolescents and adults and is also beneficial for healthy and active ageing (Chou, Hwang, & Wu, 2012; Hindin & Zelinski, 2012). More specifically, Nikander et al. (2010) reported that exercise optimizes bone strength in children, and Erwin, Fedewa and Ahn (2013) and Sibley and Etnier (2003) demonstrated that exercise, and especially aerobic exercise, positively influenced students' achievement and cognitive outcomes. In addition, Sherrington, Tiedemann, Fairhall, Close, and Lord (2011) showed that exercise can assist in preventing falls in older adults indicated that exercise, and Heyn, Abreu, and Ottenbacher (2004) reported positive effects on fitness, physical function, cognitive function, and positive exercise behaviour in people with dementia and related cognitive impairments. Also, Colcombe and Kramer (2003) demonstrated positive effects on the cognition of adults. Exercise has also

been found to have positive effect on psychological constructs, such as depression and anxiety disorders (Conn, 2010; Craft & Perna, 2004; Lawlor & Hopker, 2001; Ströhle, 2009) and overall psychological well-being (Netz, Wu, Becker, & Tenenbaum, 2005). Finally, Samitz, Egger and Zwahlen (2011) revealed that moderate to vigorous exercise was associated with reduced all-cause mortality.

The 'dark side' of sports and exercise: Chemically assisted performance enhancement in competitive and recreational sports

Definition of chemically assisted performance enhancement

Yet, aside from the positive effects of sports and exercise, there also exists a 'dark side' that requires the attention of researchers, policy makers and stakeholders in this area: the use of prescribed medication (without any medical cause) and prohibited substances, for the enhancement of appearance, physique, and/or sporting performance. The term 'doping'¹ has been largely used as an umbrella term for the use of such substances. With respect to competitive sport, refers to a number of violations related to the use of the prohibited substances (e.g., anabolic steroids) and methods (e.g., blood doping). More specifically, according to WADA 'Doping is defined as the occurrence of one or more of the anti-doping rule violations set forth in Article 2.1 through Article 2.10 of the Code' (World Anti-Doping Code, 2015, p. 18). These violations include:

1. Presence of a Prohibited Substance or its Metabolites or Markers in an Athlete's Sample. WADA launches every year a list with the substances that are prohibited to

¹ The term 'doping' will be used throughout the text to describe the act of chemically assisted performance enhancement in both competitive and recreational sport.

use. Presence of one or more of these substances in the athlete's body constitutes an anti-doping rule violation.

2. Use or Attempted Use by an Athlete of a Prohibited Substance or a Prohibited Method. In addition to substances there are also methods, such as blood doping, that are also prohibited for use by athletes. Use of any of these methods constitutes an anti-doping rule violation.

3. Evading, Refusing or Failing to Submit to Sample Collection. Athletes are obliged to be tested whenever they are asked to do so. Failure to provide a sample constitutes an anti-doping rule violation.

4. Whereabouts Failures. Athletes included in the Registered Testing Pool are obliged to be at the place they have declared. Three missed tests and/or filing failures, within a twelve-month period constitutes an anti-doping rule violation.

5. Tampering or Attempted Tampering with any part of Doping Control. Any attempt to interfere with the doping control procedures constitutes an anti-doping rule violation.

6. Possession of a Prohibited Substance or a Prohibited Method. It is not only presence in the body or attempt to use a prohibited substance or method, but also the possession of a prohibited substance or method that constitutes an anti-doping rule violation.

7. Trafficking or Attempted Trafficking in any Prohibited Substance or Prohibited Method.

8. Administration or Attempted Administration to any Athlete In-Competition of any Prohibited Substance or Prohibited Method, or Administration or Attempted Administration to any Athlete Out-of-Competition of any Prohibited Substance or any Prohibited Method that is prohibited Out-of-Competition

9. Complicity. Assisting, encouraging, aiding, abetting, conspiring, covering up or any other type of intentional complicity involving an anti-doping rule violation constitutes an anti-doping rule violation.

10. Prohibited Association. Association with a person or organization that has committed an anti-doping rule violation constitutes an anti-doping rule violation.

Thus, for regulatory authorities doping involves a set of violations of the Anti-Doping Code. In research, however, substance use has been more often used as an index of doping behaviour (Ntoumanis, Ng, Barkoukis & Backhouse, 2014). Therefore, doping is usually defined as the use of performance and appearance enhancement substances and methods that are prohibited by the World Anti-Doping Agency (WADA), the body responsible for anti-doping world-wide, such as synthetic forms of human growth hormone, testosterone and related derivatives, masking agents, stimulants and other drugs that were originally designed to treat diseases in humans and/or animals, as well as synthetic drugs that have been developed to improve athletic performance (Baron Martin, & Magd, 2007; Lazuras & Barkoukis, 2015). Although doping use can take many forms, from blood transfusion (blood doping) to DNA alterations/corrections (gene doping), the use of prohibited appearance-and-performance-enhancing drugs (PAES) is the most common doping method (Thevis et al., 2008). In competitive sports the WADA determines the "legality" of PAESs and issues an annual list of prohibited substances. PAESs are deemed prohibited when two of the following criteria are met: a) the substance has the potential to improve athletic performance; b) it poses health risks to the user; and c) it violates the spirit of sports (Anti-Doping Code). Currently, the prohibited PAESs in sports include androgenic anabolic steroids (AAS), which are typically synthetic forms of testosterone, human growth hormone and growth factor, stimulants,

diuretics, beta blockers, and substances with similar to the above chemical structure (Baron et al., 2007; Lazuras & Barkoukis, 2015, WADA Code, 2015).

Unlike competitive and professional sports, the regulatory framework around PAESs use in non-competitive/amateur sports and fitness is more ill-defined. For instance, according to the UK Law (Misuse of Drugs Act, 1971), anabolic steroids are Class C drugs and their possession (and use) does not constitute criminal offense. It is, however, illegal to manufacture, supply, and sell steroids. In most European countries the rules and regulations against the use of steroids and other prohibited PAESs is less stringent than it is in competitive and elite sports. The only country that applies a comprehensive ban on prohibited PAESs use inside and outside competitive sports is Denmark (European Union, 2014). As such, the use of prohibited PAESs seems more like a "tale of two cities" depending on the context: if used by a professional, elite or competitive athlete whose sport falls under the remit of WADA or national anti-doping agencies, then the use of PAESs constitutes a criminal offense that is followed by severe sanctions, such as career termination and legal prosecution. If, however, PAESs, such as anabolic steroids, are used by the typical gym-goer or an amateur athlete whose sport is not regulated by WADA or national anti-doping agencies (e.g., CrossFit), then PAESs becomes largely a personal choice with negative health side effects but no legal or moral implications. The "legality" of doping, therefore, shapes in a very profound way how PAESs are promoted and used among different populations.

Prevalence of doping use

Official blood and urine testing run by WADA-approved laboratories indicate that 1-2% of athletes use prohibited PAESs. However, studies using direct and

indirect self-report measures provide different estimates. A recent literature review showed that between 14% and 39% of elite athletes intentionally use doping substances (de Hon, Kuipers, & van Bottenburg, 2015; Laure, 1997). Another study in a large sample of elite athletes in two international sporting events showed that doping prevalence was between 43.6% and 57.1% (Ulrich et al., 2017). A large body of evidence demonstrates that the abuse of performance enhancers, like anabolic steroids (AS), is evidenced in amateur and grassroots sports and is likely to affect people as young as 10 years old (Dunn & White, 2011; Kuehn, 2009; Nicholls et al., 2017). In fact, the use of AS comes second to psychotropic drugs in substance use research in adolescence (Dodge & Hoagland, 2011). Accordingly, Lazuras et al. (2017a) showed that, on average, 1 out of 5 amateur athletes and exercisers aged between 16-25 years have used doping substances at least once in their lifetime, with higher prevalence rates being reported in South-East European countries like Greece (27.6%) and Cyprus (28.9%), and lower prevalence rates in Germany (17%) and the UK (14.6%). Also, Müller-Platz, Boos, and Müller (2006) reported that in Germany 40% of bodybuilders were using doping substances. Simon, Striegel, Aust, Dietz, and Ulrich (2006) also found that 12.5% of exercisers in gyms and fitness centers were using doping substances both for aesthetic and performance enhancement purposes.

In the general population of exercisers and non-competitive athletes, Pope et al. (2014) found that about 2.9–4 million Americans aged between 19 and 50 years had used AAS at least once in their lifetime, and that a quarter of them initiated AAS use before the age of 20. A survey-based study in five European countries showed that roughly 20% of amateur athletes and exercisers aged between 16 and 25 years self-reported use of prohibited PAESs. Other studies show that AAS use can be initiated before the age of 12 in amateur and grassroots sports (Dunn & White, 2011; Kuehn,

2009; Nicholls et al., 2017). The most commonly reported reasons for using prohibited PAES among non-competitive athletes and exercisers include faster results in recovery and muscle growth; curiosity; and the belief that PAESs use is common in exercise and amateur sports and is part of a regular training regime. Overall, while competitive athletes use performance enhancers to improve performance, recreational athletes and exercisers are mostly driven by aesthetic reasons, such as increased muscularity, lean muscle mass and reduced body fat (Olivardia, Pope, Borowiecki, & Cohane, 2004; Petroczi & Aidman, 2008; Petroczi & Naughton, 2011). Also, recreational athletes reported achieving the desired results faster; pushing the self to its physical limits; and recovering faster after training as important reasons for using performance and appearance enhancing substances (Lazuras et al., 2017a).

Consequences of doping use

A lot of studies provide evidence about the adverse health effects of doping use, especially anabolic steroid use (Angell, Chester, Somauroo, Whyte, & George, 2012; Goulet, Valois, Buist, & Cote, 2010; Simon et al., 2006; Striegel, Ulrich, & Simon, 2010). The non-medical and uncontrolled use of prohibited PAESs has been associated with an early onset of preventable morbidity, including depression, anxiety, mood and body image disturbances, suicidal thoughts and attempts, kidney and liver damage, and elevated blood pressure (Hartgens & Kuipers, 2004; Darke Torok, & Duflou, 2014; Lindqvist et al., 2013). Other studies have shown that the use of prohibited PAESs is associated with sudden and early death (Darke et al., 2014; Frati, Busardo, Cipolloni, De Dominicis, & Fineschi, 2015), and that the health effects of PAESs use are more pronounced among younger people (Quaglio et al., 2009). From the aforementioned evidence about the prevalence and health effects of

prohibited PAESs use, it is sensible to argue that this behaviour is not only of concern to the sporting community but has broader societal significance, presenting an emerging public health challenge (Christiansen & Bojsen-Møller, 2012; Henning & Dimeo, 2017; van de Ven, 2016).

Doping use may have irreversible health effects on users' physical and mental health. Although the effect of using doping substances for performance or appearance enhancement reasons has not been directly tested, there is substantial evidence suggesting that the use of substances that are prohibited by WADA and constitute doping use may pose a threat to the athlete's health. Importantly, doping substances are administered by non-specialized professionals, thus, increasing the health hazards of use. The side effects of these prohibited substances may vary from simple reactions of the body to the substance to permanent failure of several organs and sudden death. In general, the most common health side effects of doping use include sexual dysfunction and hormonal imbalance (Finkelstein et al., 2013), mood fluctuations, anxiety and aggressive behaviour (Birzniece, 2015), as well as potentially lethal heart and kidney dysfunction, especially among younger users (Christou et al., 2017; Hartgens & Kuipers, 2004; Frati et al., 2015). There have also been identified mild-to-severe side effects on hepatic function, function of the reproductive system, endocrine effects, cardiovascular function, musculo-skeletal effects, psychological disturbances, and even increased mortality. Finally, steroid use has been associated with hypertension, myocardial ischemia, and sudden cardiac death (Birzniece, 2015; Fieschi et al., 2001; Meichert et al., 1995; Sullivan et al., 1998; Parssinen et al., 2002; Wight & Salem, 1995).

Similarly, severe side effects have been reported as a result of steroid use with respect to hepatic function. More specifically, evidence showed an association of

steroids use with hepatotoxicity, jaundice, neoplasm and fatty liver diseases (Schwingel et al., 2011). Side effects have been also reported at the reproductive-endocrine system side effects and include: a) libido changes, subfertility, decreased luteinizing hormone and follicle-stimulating hormone, b) increased aggressiveness and sexual appetite, sometimes resulting in aberrant sexual and criminal behaviour, c) impotence with chronic or repeated use, testicular shrinkage (atrophy), breast enlargement (gynecomastia), prostatic enlargement, reduction of sperm production, premature baldness (in males only). d) masculinization/hirsutism, excessive hair growth on the face & body, deepening of the voice, enlargement of clitoris, abnormal menstrual cycles (suppression of ovarian function and menstruation), reduced breast size, polycystic ovarian syndrome (in females only), e) premature epiphyseal closure of the growth centre of long bones (in adolescents) which may result stunted growth, premature puberty among female child (in children).

Anabolic steroid substance use has been identified as an etiologic factor for some cancers including hepatic tumor, renal cell carcinoma, testicular tumor and prostatic cancer (Bryden, 1995; Froehner et al., 1999; Heikkila et al., 1999; Martorana et al., 1999; Nakao et al. 2000; Parssinen et al., 2002), whereas the risk of mortality among chronic androgenic anabolic steroid users is reported to be 4.6 times higher than non users (Parssinen et al., 2000). Finally, psychological and behavioural side effects have been reported following androgenic anabolic steroid use that include a) mood swings, aggression, mania, depression, withdrawal, and dependence, b) substantial disturbances in personality profiles and c) significantly less in control of their aggression than non users (Cooper, Noakes, Dunne, Lambert, & Rochford, 1996; Midgley, Heather, & Davies, 2001). Notably, the majority of these side effects are

reversible following a short period of use (Mougios, 2015), however, there is no evidence with respect to prolonged use.

Taken together, the health effects of doping use and the increasing number of young people involved in this behaviour suggest that the uncontrolled use of doping substances represents an emerging public health concern that may affect a substantial proportion of young people unless preventive action is taken (Christiansen & Bojsen-Møller, 2012; Henning & Dimeo, 2017; van de Ven, 2016).

In addition to being a health-threatening behaviour, doping use also has important moral implications, especially in competitive sports. According to sport authorities, sports are based on a set of fundamental values that are typically referred to as the 'spirit of sport' (WADC, 2015). The 'spirit of sport' reflects 'the essence of Olympism, the pursuit of human excellence through the dedicated perfection of each person's natural talents. According to WADA, doping use is against the 'spirit of sport' (WADC, 2015). In fact, violation of the spirit of sport is among the three criteria that define whether a substance will be prohibited or not (Mazanov & Huybers, 2015; WADC, 2015). Therefore, doping use is considered as cheating, and therefore as an immoral behaviour.

Nutritional Supplements: basic definitions and consequences from use

Nutritional supplements consist of herbal or other natural substances that are used to supplement daily dietary needs in vitamins, amino-acids and protein, and minerals. In the context of sports and exercise, nutritional supplements are promoted as legal performance and appearance enhancement aids (also called ergogenic aids) and are assumed to assist recover after training, help build muscle mass, and facilitate weight loss and fat burning. Commonly used nutritional supplements in sport and

exercise contexts include protein (and protein blends and shakes), herbal-based products, creatine, and amino-acids, stimulants (e.g., caffeine), multivitamins, and diet pills (de Hon & Coumans, 2007; Lazuras & Barkoukis, 2014; Lucidi, Grano, Leone, Lombardo & Pesce, 2004). Several studies have shown that more than 65% of elite and amateur non-competitive athletes and exercisers use nutritional supplements routinely as a performance enhancement aid or to improve/maintain good health (Braun et al., 2009; Dietz et al., 2014; Malik & Malik, 2010). Another strand of evidence suggests that the prevalence of nutritional supplement (NS) use can be as high as 88% in collegiate sports (Burns et al., 2004), and 71% in adolescent athletes (Hofmann et al., 2008). Most commonly reported reasons for using nutritional supplements include maintaining and improving health and fitness, and improving physique and athletic performance (Bailey, Gahche, & Miller, 2013; Lazuras & Barkoukis, 2014). Furthermore, factors associated with supplement use among people who exercise catalogued as perceived body weight below the ideal, exercising for more than 6 months or longer, spending more than 2 hours at the gym and training at the moderate or higher level - in summary, being serious about gym routine (Lacerda Carvalho, Hortegal, Cabral, & Veloso, 2015). Regarding young people, a recent survey of the Canadian Centre for Ethics in Sport revealed that whilst the majority of Canadian youth do not use performance enhancing substances, use is associated with being male, athletic and having awareness of nutritional supplement use through social channels (CCES, 2014). Encouragement from friends, believing the it is a 'one off' try often used to legitimize the behavioural choice of using PAES.

Although nutritional supplements are supposed to be natural products without any health side effects, there are different ways in which nutritional supplements use can become an unhealthy dietary practice and, in fact, even increase the risk for

doping use. Firstly, the composition and ingredients of the marketed nutritional supplements are often unclear (e.g., hidden under the generic term "proprietary blend") or tainted with toxic substances (e.g., heavy metals) (Backhouse, Whitaker & Petroczi, 2013), substances that are not licensed for human consumption due to their acute toxicity (e.g., overdose with 2,4-dinitrophenol can result in hyperthermia, tachycardia, diaphoresis and tachypnea, that can eventually lead to death; Grundlingh, Dargan, El-Zanfaly, & Wood, 2011), and/or with prohibited PAESs (e.g., stimulants and anabolic steroids; Geyer et al., 2008; Hildebrandt, Harty, & Langenbucher 2012; van Thuyne, Eenoo, & Delbeke, 2006). Potential health risks from dietary supplements may equally arise from (1) contamination, (2) inappropriate use of licensed supplements, (3) use of unregulated nutritional supplements and (4) substances not licensed for human consumption (Cohen, 2009; Petroczi, Taylor, & 2011). With respect to contamination, Maughan (2013) argued that risks include the absence of active ingredients, the presence of harmful substances (including microbiological agents and foreign objects), the presence of toxic agents, and the presence of potentially dangerous prescription-only pharmaceuticals. This may result in an increase risk to health, including a small number of fatalities, as a result of supplement use.

In most countries, the marketing, promotion, and use of nutritional supplements is not monitored or regulated by the respective Food and Drug Administration authorities, and the tainted products are only recalled following user complaints of unwanted (and sometimes lethal) health effects. More specifically, there is no regulatory framework and regulatory authorities to test for the ingredients and the quality of nutritional and dietary supplements. Therefore, these substances are not subjected to any testing and control by official regulatory authorities. In several

instances, this resulted in evidence showing nutritional and dietary supplements being contaminated with chemical substances that are included in WADA's list of prohibited substances, such as anabolic steroids and heavy metals. There have been several occasions where athletes have been tested positive for doping use as a result of nutritional supplement use. Notably, a test on commercially available protein supplements demonstrated that 31% of tested products did not meet quality assurance criteria (ConsumerLab, 2012; ConsumerReport.org, 2012; Maughan, 2013). The tested products were found to have only small portions of the stated ingredients, or higher portions of other ingredients, and were contaminated with heavy metals, such as arsenic, cadmium, lead, and mercury; in some instances, the levels of heavy metals were above the level recommended by national authorities' safety levels. Similarly, Geyer et al. (2004) reported that almost 15% of non-hormonal nutritional supplements included anabolic androgenic steroids, such as nandrolone, not declared on the label. Also, there are studies showing that the labels of prohormone supplements did not describe their true content. For instance, products including prohormones included concentrations different from those declared on the labels (Geyer et al., 2008; Green, Catlin, & Starcevic, 2001; Kamber, Baume, Saugy, & Rivier, 2001). In addition, there are studies and reports showing that there are nutritional supplements' products including a wide range of prohibited substances (Kamber, Baume, Saugy & Rivier, 2001; Maughan, 2013; Pipe & Ayotte, 2002). Product contamination has been attributed to accidents during the manufacturing, processing, packaging, poor quality control, and in some cases deliberate adulteration in order to increase the effectiveness of the product (Geyer et al., 2008; Maughan, 2013).

Secondly, official reports reveal that elite athletes tend to abuse nutritional supplements, by using several different types of supplements at the same time, a

pattern also known as 'stacking' (Radimer et al., 2004). Nutritional supplement websites even promote this practice by delivering "stacking guides" for all sorts of performance and physique enhancement goals (e.g., build lean muscle; "bulk up" muscle; lose weight, etc.; Canter & Ernst, 2012; Petroczi, Mazanov, Nepusz, Backhouse, & Naughton, 2008; Petroczi & Naughton, 2008). Furthermore, nutritional supplements tend to be used (or misused) without any medical or professional advice, and there is little evidence that the "stacking" patterns are indeed useful or if they simply overload the body with large amounts of substances. In fact, stacking can be potentially dangerous if the consumed supplements are contaminated, because interactions between toxic substances and body organs (e.g., liver, kidneys) from prolonged use or misuse may be health-threatening (Bunchorntavakul & Reddy, 2013).

Importantly, a growing body of research, nutritional supplements may be precursors to the use of other substances that are of uncertain compositions (e.g., exotic herbal supplements), not licensed for human consumption (e.g., 2,4-dinitrophenol) or controlled such as anabolic steroids (Backhouse et al., 2013; Hildebrandt et al., 2012). According to this evidence, NS use can serve as a 'gateway' to the use of doping substances. This hypothesis was largely based on previous evidence in substance abuse indicating that in the general population certain drugs serve as a gateway for the use of other substances (Kandel & Kandel, 2015). For instance, nicotine can serve as a gateway to cocaine through a complex psychobiological process (see Kandel & Kandel, 2015 for a review). Although there has been some support for this hypothesis (Kirby & Barry, 2012), there are also arguments against it, suggesting for example that it is rather a co-occurrence of the substances rather than a cause and effect relationship (Agrawal, Budney & Lynskey,

2012; Vanyukov et al., 2012). For instance, Agrawal et al. indicated that cannabis and tobacco use are influenced by common genetic and environmental factors and they urged for more research on the topic. In addition, Van Gundy and Rebellion (2010) suggested that stress and life-course variables are more important predictors of substance use as compared to other 'gateway' substances.

Despite the controversy in the literature, there are studies in doping-related research suggesting the existence of a behavioural mechanism whereby the more frequent use of NS is associated with higher self-reported use of doping (Backhouse et al., 2013; Dodge & Jaccard, 2006). A longitudinal study with adolescent amateur athletes showed that NS use at baseline significantly predicted use of steroids after a few months (Lucidi et al., 2008). Exercisers and amateur athletes using nutritional supplements can be 3.5 times more likely to engage in doping use in the future (Backhouse et al., 2013; Dodge & Jaccard, 2006). Another study (Barkoukis et al., 2015) revealed that amateur athletes who consumed nutritional supplements (but not doping substances) reported stronger intentions to engage in doping in the near future, and perceived doping use more favorably, as compared to amateur athletes who did not consume nutritional supplements. Building on previous work, Petroczi (2014) theorized that the use of doping substances grows out from sustained involvement in assisted performance enhancing practices, which includes the functional use of dietary supplements for performance enhancement.

Past research evidence has showed a significant relationship nutritional supplement use, such as protein, creatine, glutamine etc, and doping use intentions and actual doping use (Barkoukis et al., 2015; Dodge and Jaccard, 2006; Hoffman et al., 2008; Lucidi et al., 2004, 2008; Rees Zarco, & Lewis, 2008). Lucidi et al. (2008) in a longitudinal study of Italian school students demonstrated that supplement use

was strongly correlated with doping use. Besides the association between supplement and doping use cognition and behaviour, Barkoukis et al. (2015) noted that nutritional supplement users reported stronger doping use intention and more favorable attitudes towards doping use, did not perceive supplement use as a gateway to doping use, and in general more positive beliefs about using performance enhancing substances, as compared to athletes not using nutritional supplements. Barkoukis et al. suggested that these findings indicate that supplement users are more familiar with chemically assisted performance enhancement methods and may share a common social representation with doping users. This explanation was perceived by Barkoukis et al. as a possible index of a gateway hypothesis as it was interpreted as the development of a mindset that gradually lead athletes to move from supplement use to doping use.

However, later in this paper Barkoukis et al. (2015) showed that only one out of ten nutritional supplement users use doping substances. These findings suggest that only a small percentage of nutritional supplement users moves to doping use as a result of using of nutritional supplements, whereas most continue using nutritional supplements. In this sense, the high association between nutritional supplement and doping use found in the literature is probably a result of co-occurrence of nutritional supplements and doping use. This was further corroborated by Parent (2016) who criticized the gateway hypothesis as applied to doping use and suggested that demonstrated that the majority of exercisers using nutritional supplements, such as protein, will never use anabolic steroids. That is, doping users also use nutritional supplements either when they are on a doping use cycle or before and after the cycle. This is line with real practice and research evidence supporting the co-occurrence of medication substances and nutritional supplements by athletes (Suzic Lazic et al., 2009).

Overall, the research evidence on the gateway hypothesis is still limited and inconclusive mainly due to methodological and measurement limitations. Specifically, all the studies on this topic were correlational in nature and no causal inferences can be made. So far, there is no research evidence suggesting that the use of nutritional supplements will lead an athlete to doping use. On the other hand, there is evidence that athletes using nutritional supplements and doping substances share a common performance enhancement mentality (Parent, 2016). This, however, may also imply that nutritional supplements serve as safe alternatives to doping use. That is, athletes who are eager to improve their performance and appearance and adopt such a performance enhancement mentality try to achieve this objective through nutritional supplements and not through prohibited substances' use. In this sense, nutritional supplements may not be an absolute risk factor in itself, but rather interact with other risk factors in influencing doping risk. If this is the case, it is important to look into other psychological predictors of doping use and accordingly present evidence whereby nutritional supplement use interact with psychological risk factors to predict doping related cognition and behaviour (Lazuras et al, 2017b; Parent, 2016).

Taken together the evidence pertaining to both doping and nutritional supplement use it is shown that a) the use of doping substances is on the rise in both competitive and recreational sports, even during adolescence, and b) the use of legal performance enhancement substances (e.g., dietary supplements) is part of a mentality for chemically-assisted performance enhancement. Although they may not be illegal or prohibited by some anti-doping regulatory body for sport, the use of unlicensed substances (e.g., as fat burners) and hormonal boosting herbal supplements are also adding to the concerns over the growing trend of chemically-assisted enhancements. These findings highlight an emerging public health problem that should be effectively

investigated by the research community and addressed by policy makers and health education specialists: the lurking danger of doping use in amateur and fitness sports, especially among adolescent and young athletes, can offset the health benefits and scope of physical activity and exercise. In this respect anti-doping prevention efforts have been developed.

Existing anti-doping prevention efforts in competitive sports

WADA has developed several awareness raising campaigns with the aim of informing athletes about the doping control procedures and the health side effects of doping use. Furthermore, these campaigns have been expanded to include also athletes' entourage (i.e., coaches, doctors etc) with the aim of increasing awareness of all people involved in competitive sports about doping control procedures, anti-doping regulations and doping sanctions (see The PLAY TRUE GENERATION PROGRAM, ADeL). However, there is no scientific evidence testing its effectiveness in preventing or reducing doping use, or its effect in influencing doping-related cognition.

Another group of interventions was developed in order to tackle doping use based on a health education perspective. In this set of interventions, the program developed by Laure and Lecerf (1999, 2002) is included. This intervention program focused on the health side effects and the moral implications of doping use. The results of these studies indicated that after a follow-up three months later the athletes participating in the intervention condition reported significantly weaker intentions to use doping substances, and higher self-efficacy to resist pressure, in comparison to athletes participating in the control group. These findings are in line with previous evaluations of education based and awareness raising campaigns with respect to

doping use. More specifically, Goldberg, Bents, Bosworth, Trevisan and Elliot (1990) argued that education based interventions are more effective in informing athletes about the risks and the health side effects of doping use in comparison to campaigns focusing on raising athletes awareness about these issues.

The Adolescents Training and Learning to Avoid Steroids (ATLAS) and Athletes Targeting Healthy Exercise and Nutrition Alternatives (ATHENA) are among the most usually implemented in the literature education based programs (Elliot et al., 2008; Goldberg & Elliot, 2005; MacKinnon et al., 2001). They have been designed to target different psychological variables in male (i.e., ATLAS program) and female (i.e., ATHENA program) adolescents (Elliot et al., 2004, 2008; Goldberg et al., 1996a; Goldberg et al., 2000).

Studies implementing ATLAS demonstrated significant short-term and long-term effects on doping use and related cognition. With respect to the short term effects, participants in the intervention, i.e., ATLAS, condition demonstrated lower interest in using steroids under peer pressure, more negative beliefs about steroids in general, improved knowledge about nutritional supplements' use and positive beliefs towards using them, and improved body image in comparison with the control condition (Goldberg et al., 1996a). Important long term effects have also been observed. More specifically, Goldberg et al. (1996b, 2000) found that participants in the ATLAS intervention showed higher awareness of the negative side effects of steroids use, higher perceptions of health risks associated with steroids use, increased self-efficacy to resist doping use following pressure, less trust to messages promoting steroid, higher perceived physical ability and actual healthy behaviour, and more negative attitudes towards doping users, and lower intentions to use steroids as compared to control group participants, who attended an awareness raising campaign

about the health side effects and moral concerns of doping use. Importantly, the effect of the intervention in most of the variables was retained even for 9 and 12 months after the end of the intervention. The intervention was not able to change self-reported steroid use, but influenced adolescent athletes' lifestyle behaviour and resulted in a more positive lifestyle. Furthermore, MacKinnon et al. (2001) showed that ATLAS positively influenced team norms in athletes attending the program. In addition, perceived severity of the side effects of steroid and reasons for using steroids positively influenced intentions to use steroids in the 1-year follow-up.

Research evidence implementing ATHENA in high school team sport athletes showed a reduction in participants' self-reported substance use (e.g., diet pills, steroids and nutritional supplements) and health-harming behaviours (e.g., fasten seat belt, safe sex), and enhancing healthy nutrition. Furthermore, the intervention positively influenced intentions in a wide range of unhealthy behaviours (e.g., tobacco use, diet pills; Elliot, et al., 2004, 2006). The long-term effects of the ATHENA intervention were further investigated by Elliot et al. (2008). The results of this 3-year longitudinal study showed that the application of ATHENA resulted in a healthier lifestyle (e.g. less use of alcohol, tobacco and marijuana).

Despite the positive results presented in the relevant literature, a recent meta-analysis (Ntoumanis et al., 2014) showed that the implementation of ATLAS and ATHENA was actually modestly effective in improving athletes' beliefs and attitudes towards doping use. Ntoumanis et al. attributed this finding to the fact that ATLAS and ATHENA were developed with the aim to reduce harm and promote health, but not as a program aiming solely to combat doping use in sport. However, research evidence on doping related decision-making processes (Barkoukis et al., 2013; Lazuras et al., 2010; Lucidi et al., 2008) have shown that knowledge and attitudes are

only two in a complex system of psychological processes that shape the doping decision-making process, such as social and personal norms, moral disengagement, and self-efficacy. In addition, when the interventions were designed the available research on doping use was rather limited, and therefore the interventions did not address the range of risk factors that emerged in recent research. Furthermore, participants' acceptance of the messages was not tested, nor the manner the messages were delivered. Therefore, it cannot be evaluated whether it was the provided messages during the intervention that influenced athletes' beliefs about healthy lifestyle or this emerged as a result of participating in the intervention about healthy lifestyle and/or their interactions.

This type of education-based interventions, such as ATLAS and ATHENA, focused mainly on the health side effects of doping use and the doping control procedures. On the other hand, Barkoukis, Kartali, Lazuras and Tsorbatzoudis (2016) developed an intervention about forming an anti-doping culture in adolescents. The program was found effective in lowering participants' attitudes towards using nutritional supplements, and increasing norm salience with respect to nutritional supplement and doping use in sports, when implemented in high school students (Barkoukis et al., 2016). Also, the intervention effectively changed participants' evaluations of the values included in the Spirit of Sport statement and identified harms of sport (Connor, Huybers, & Mazanov, 2011) promoting health as the most important value of sport and doping as the most important threat of sport.

Furthermore, Melzer, Elbe and Brand (2010) developed and implemented an intervention placing emphasis on the second important pillar of the fights against anti-doping; i.e., morality. The comparison of this program with a typical increasing awareness intervention including information about doping use, did not confirm its

effectiveness in changing athletes' attitudes towards doping use (see Elbe & Brand, 2015). Yet, several features of this intervention, such as the online delivery of the program and the ethical decision-making training, could be incorporated into other interventions and provide a more holistic approach in prevention efforts against doping use. One of the reasons for the failure of the intervention was that athletes did not fully understand and endorse the content of the moral dilemmas (Elbe & Brand, 2015).

Overall, there is evidence that education based anti-doping interventions can be moderately effective in changing adolescents' beliefs about doping use and actual doping behaviour, and assist in the development of a healthier lifestyle. The disadvantages of these interventions include high requirements on time (i.e., many sessions involving athletes and coaches) and need for specialized personnel (i.e., personnel capable in delivering peer-led interventions). In this sense, these interventions are difficult to implement in competitive sport settings. Furthermore, the features of these interventions should be adapted to suit the time and space constraints posed by competitive sports. Also, future research should examine if the education-based interventions reported above can work equally effectively with recreational and competitive athletes across age and gender groups. To address these disadvantages, especially the need for more time and trained personnel, it seems to be important to deliver the messages of these interventions in a manner that makes easy to understand and absorb. In this respect, the delivery of the interventions' messages becomes an important cornerstone of effective anti-doping interventions.

Anti-Doping Interventions for Recreational Athletes

As discussed above, doping use is not evident only in competitive sports. Evidence suggests that there is a growing trend of doping use in recreational sports (Bojsen-Møller, & Christiansen, 2010; Sjöqvist, Garle, & Rane, 2008). So far, however, anti-doping preventive efforts in recreational sports have been limited. Similar to competitive sports, the first intervention developed to combat doping use in recreational sports put emphasis on increasing awareness and included information and messages about healthy nutrition as alternatives to doping use. James, Naughton, and Petróczi (2010) investigated the effect of a single exposure to information about using healthy nutrition as a safe alternative to doping, and found that participants in the intervention group displayed increased knowledge about healthy nutrition, and more positive attitudes towards healthy nutrition.

Recent evidence has also suggested that interventions aiming to prevent the use of doping substances in recreational sports should focus on the psychosocial risk factors for doping use (i.e., the intra- and inter-personal, and environmental variables that increase the risk to engage in doping) (Lazuras et al., 2017a). Targeting psychosocial risk factors has been proliferated and successfully used for the prevention of other types of substance use in adolescents and young people (DiClemente, Crosby, & Kegler, 2009). Especially, with respect to substance use, such as doping, empirical evidence suggested that young people often engage in social comparison, and are preoccupied with their physical attractiveness and the way they look to others (Davison & McCabe, 2006). Recent evidence showed that fitness center and gym exercisers who had distorted self-perceptions of the body (e.g., muscular athletes perceiving themselves as skinny and weak), as well as those adopting the cultural standards about beauty and physical attractiveness reported

higher steroid use intentions (Parent & Moradi, 2011). Similarly, Zelli, Mallia & Lucidi (2010) in study with adolescent Italian athletes demonstrated that drive for muscularity in males, and drive for thinness in females significantly predicted intentions and actual use of doping substances. Therefore, recreational athletes are also at risk at risk of using doping substances engaging in the use of doping substances in order to improve their physical appearance and/or athletic performance.

For prevention interventions to be effective they should address the need and driving forces that result in doping use and not simply provide information about the health consequences of using doping substances to improve appearance and performance. Recently, as part of a European-funded project (Project SAFE YOU; www.safeyou.eu), a prevention intervention was developed to combat doping use in recreational sports. This intervention was developed based on sound research evidence but has not been tested for its effectiveness yet. In addition, no efforts have been made in this intervention to increase message acceptance by the participants and/or decrease their defensiveness and made them actively participate in interventions dealing with a sensitive issue for sport, such as doping use.

Anti-doping Message Content and Delivery

In this respect, the content of anti-doping messages and the method of message delivery can be important aspects of persuasive appeals in the context of anti-doping education. With respect to doping use, research evidence under the lens of elaboration likelihood model (ELM; Petty & Cacioppo, 1986) has been used to assess the effects of a persuasive appeal on athlete's attitudes towards doping (Horcajo & De la Vega, 2014). According to the elaboration likelihood model, a message can be persuasive and lead to attitude change by using either low cognitive

elaboration/peripheral cues (e.g., emotion-laden cues, heuristics), or high cognitive elaboration/central cues (e.g., evidence-based arguments; Petty, Barden, & Wheeler, 2009). Horcajo and De la Vega (2014) tested this model and demonstrated that a single exposure to a personally relevant anti-doping message decreased athletes' attitudes towards doping use. Such a personally relevant message that promoted high cognitive elaboration change was more stable and persistent in changing athletes' attitudes, as compared to a message associated with low elaboration. This study is among the first studies to apply a well-established theory of persuasion in the context of doping prevention, and indicated that the message content can impact athletes' doping attitudes. Self-affirmation theory is another persuasion theory that has been found effective in increasing message acceptance in several behavioural domains (Harris & Epton, 2009). According to the theory, reminding people of their core values or their self-worth helps them maintain or restore their self-integrity, which is associated with more adaptive behaviours (Steele, 1988). Yet, the effectiveness of the theory in predicting doping behaviour and doping related cognition and its usefulness in anti-doping education interventions has not been investigated.

Another important issue concerning message content regards the level of threat of the message. According to self-affirmation theory people are motivated to maintain a positive self-image and may process personally relevant and threatening information, such as warning labels about the negative health effects of tobacco use in a self-serving and defensive manner (Harris & Epton, 2009; Steele, 1988). Self-affirming (i.e., by reminding people of their core values or their self-worth) is likely to restore self-integrity and, accordingly, reduce defensive processing of health messages (Harris & Epton, 2009). For instance, self-affirming an athlete's personal

value of being compassionate may make him less defensive in a doping related message.

Psychological risk and protective predictors of doping use

The above mentioned evidence suggests that nutritional supplement and doping use are commonly used practices in sporting populations to increase their performance with, however, severe side effects for their health. Therefore, it is important to investigate the psychological mechanisms underpinning competitive and recreational athletes' decision to use these supplements and substances. This is important in order to develop appropriate prevention interventions to tackle doping use in sports. Importantly, the evidence presented above clearly demonstrates that the existing anti-doping prevention efforts did not take into account the psychological correlates of doping use. With respect to competitive sports a detection and punishment model has been largely used so far, which, however, has been effective in reducing doping use in sports. Educational approaches to date have largely provided information on the anti-doping system and doping control procedures, neglecting to target the key risk factors associated with doping use or the empowerment of the respective protective factors. On the other hand, there are practically no tested interventions in the context of recreational sports. Finally, the role of message content and delivery is rather understudied with respect to doping use in sports. Recently, scholars called for more evidence-based preventive education, and more research on the psychological drivers of doping on both competitive and recreational sports (Barkoukis, 2015; Tsorbatzoudis, Lazuras & Barkoukis, 2015). Thus, the remainder of the first chapter will present an overview of risk and protective factors for doping use in competitive and recreational settings.

Following a systematic review of 51 studies, Nicholls et al. (2017) identified nine key risk factors for doping use among young athletes aged between 10-21 years: age, gender, participation in sports, sport type, beliefs/behaviours of coaches and athlete's entourage, as well as psychological variables, and use of nutritional supplements. Clearly, not all of these variables are amenable to interventions against doping use, but there are a lot of psychological and social aspects of doping use that can be directly targeted by tailor-made educational interventions. Lazuras et al. (2017a) also showed that an urgency to seek for immediate performance and appearance benefits, and to recover quickly from heavy trainings or injuries during training were among the top five reasons for doping use in young amateur athletes and exercisers.

Motivational predictors of doping use

Another line of research has highlighted the psychological and social factors that act protectively against doping use, that is the factors that can be targeted by educational interventions in order to strengthen the protective factors against doping use, and empower athletes to "stay clean" even in the face of internal (e.g., performance anxiety and stress) or external pressures and temptations (e.g., peer pressure, coach pressure). These protective factors include health beliefs and awareness of the adverse health consequences of doping use; factual knowledge about the actual and alleged effects of doping use on athletic performance (and on physical appearance where exercisers are concerned); self-regulation and resilience to social pressures; and a "self-determined" approach to exercise and sport participation, whereby athletes are motivated to participate in sports for the sake of participation and intrinsic motivation and not for external rewards and the need to outperform

others (Chan et al., 2015a; Chan et al., 2015b; Erickson McKenna, & Backhouse, 2015; Mohamed, Bilard, & Hauw, 2013).

More specifically, in the existing doping literature doping use predictors have been mostly derived from achievement goal and self-determination theories. According to achievement goal theory individuals in achievement contexts hold two independent achievement goals, namely, a task and an ego goal orientation. Individuals high in task orientation engage in an achievement activity to achieve mastery and personal improvement and they use self-referenced criteria to judge their ability. Individuals high in ego orientation engage in an activity to outperform others and demonstrate superior ability (Nicholls, 1989). These individuals use normative or comparative criteria to judge their perceived ability. Task orientation has been found to relate to more adaptive motivational outcomes such as greater effort and persistence, fair play, greater enjoyment, and lower anxiety (Duda & Hall, 2001, van Yperen, Blaga, & Postmes, 2014). Elliot (1997), Elliot and Church (1997) and Elliot and McGregor (2001) further extended this approach by suggesting a 2 X 2 achievement goal model including four achievement goals, mastery-approach, mastery-avoidance performance-approach and performance-avoidance goals. Research evidence with the 2 X 2 model indicated that mastery-avoidance goals were associated with negative responses suggesting that they construe an avoidance orientation (Cury, Elliot, Da Fonseca & Moller, 2006; Elliot & McGregor, 2001).

Research evidence has consistently supported a positive effect of mastery goals on doping use intentions and behaviour. More specifically, Sas-Nowosielski and Swiatkowska (2008) indicated that specific task and ego orientation negatively and positively related to attitudes towards doping respectively. However, combinations of goal orientations had a different effect on attitudes towards doping. Athletes

endorsing a high task/low ego profile reported the most negative attitudes, whereas those endorsing a low task/high ego oriented showed the most positive attitudes towards doping use. Similarly, Barkoukis, Lazuras, Tsorbatzoudis and Rodafinos (2011) reported that mastery oriented athletes revealed significantly lower scores on past doping use and intentions to future use compared to athletes being performance oriented.

Furthermore, Allen, Taylor, Dimeo, Dixon, and Robinson (2015) indicated that task orientation negatively predicted attitudes towards doping use, whereas ego orientation positively. Barkoukis et al. (2013) utilized the 2 X 2 achievement goal approach and demonstrated that performance avoidance was a positive predictor and mastery approach goals a negative predictor of doping use intentions in non dopers. In doping users mastery avoidance goals were revealed as a positive predictor of doping use intentions. Similarly, a study with adolescent athletes showed that mastery approach goals negatively predicted doping use intentions whereas performance approach goals were found to be negative predictors (Lazuras et al., 2015).

The second theoretical approach used to identify predictors of doping use intentions and actual behaviour is self-determination theory. Central to this theory is the distinction between intrinsic and extrinsic motivation (Deci & Ryan, 1985). The experience of intrinsic motivation is characterized by interest, enjoyment, satisfaction and a sense of choice. Intrinsically motivated behaviours are performed spontaneously and without extrinsic reinforcements. On the other hand, extrinsic motivation refers to the involvement in an activity to obtain a reward or other external contingency. Several meta-analyses have illustrated that intrinsic motivation is associated with more adaptive responses during sport and exercise participants, such as increased effort, persistence, and satisfaction among individuals engaging in tasks in

comparison with extrinsic motivation (Ng et al., 2012; Plotnikoff, Costigan, Karunamuni, & Lubans, 2013).

One of the first studies to investigate the effects of self-determination on doping use intentions and actual use was conducted by Barkoukis et al. (2011). In this study differences in doping use intentions and past doping use among athletes endorsing different types of self-determination were tested. The results of the study demonstrated that intrinsically motivated athletes reported significantly lower future doping use intentions and lower past doping use in comparison to extrinsically motivated and amotivated athletes. These findings imply a significant effect of self-determination on doping use intentions and behaviour. However, later Barkoukis et al. (2013) and Lazuras et al. (2015) did not find a significant effect of self-determination or motivational regulations on doping use intentions.

This evidence has been contradicted by Hodge, Hargreaves, Gerrard and Lonsdale (2013) who reported that a low self-determination, i.e., controlled motivation, was positively associated with doping use attitudes and susceptibility. On the other hand, no effect of self-determined, i.e., intrinsic motivation, was found on doping use attitudes and susceptibility. Similar findings were also reported by Vajjala, Epuran, Stanescu, Potzaichim and Berbecaru (2010). In addition, Zucchetti, Candela and Villosio (2015) demonstrated that extrinsic motivation was positively associated with attitudes towards doping use. No clear explanation can be found for the discrepancy between these studies on the effect of self-determination on doping use intentions and behaviour. Clearly, more research is needed.

Another line of research within the self-determination theory tradition investigated the effect of social-contextual variables, i.e., motivational climate, on doping use attitudes and intentions. More specifically, Allen et al. (2015) showed that

autonomy supportive motivational climate negatively influences doping use attitudes. In this line, Hodge et al. (2013) reported a positive effect of controlling motivational climate on doping use attitudes and susceptibility. Similarly, Ntoumanis, Barkoukis, Gucciardi and Chan (2017) demonstrated that motivational climate significantly predicted Greek and Australian athletes' doping use intentions. Autonomy supportive climates demonstrated a negative association with doping use intentions, whereas controlling climates negatively predicted intentions. In this study, the role of basic psychological needs was also highlighted. Satisfaction of needs was associated with negative doping use intentions, whereas need thwarting had a positive effect. Thus, research evidence on motivational climate has consistently supported the adaptive effect of autonomy supportive climate and the maladaptive effect of controlling climate on doping use intentions.

Lastly, Chan and his associates investigated the effect of self-determination on doping avoidance behaviours. Chan et al. (2015a, 2015b) demonstrated that self-determined motivation and autonomous motivation in sport positively predicted the corresponding motivational regulations towards avoiding doping use. In line with this, athletes adopting controlled reasons to avoid doping use reported higher adherence to behaviours related to avoiding and monitoring substance use, whilst those endorsing self-determined reasons were more willing to check the ingredients of a product for prohibited substances (Chan et al., 2014). Overall, self-determination theory provides useful information on the risk and protective factors towards doping use intentions and behaviour.

Taken together, these findings indicate the reasons and motivations that would "push" athletes into 'the dark side' of performance enhancement (i.e., doping use), as well as the factors that would act protectively to prevent doping use. This evidence

can be utilized to inform, design and evaluate tailored anti-doping educational interventions. However, all these studies investigated the effect of athletes' individual differences and dispositions on doping use intentions and actual behaviour. The results of these studies, although they confirmed the effect these variables have on doping use intentions and actual behaviour, showed that the effect of these distal variables was mediated by more proximal variables related to the decision making process towards doping use. Hence, it is important to identify which variables form this process and how they influence doping use intentions and actual behaviour, in order to be able to intervene and tackle doping use. In this respect reasoned action relevant theoretical approaches have been found useful.

Moral-related predictors of doping use

Several studies have also investigated morality with respect to doping use. More specifically, Melzer, Elbe, and Brand (2010) showed that moral reasoning and related values in sport serve as protective factors against doping use. In addition, Barkoukis et al. (2013) and Lazuras et al. (2015) demonstrated that sportspersonship beliefs negatively predicted doping use intentions, especially in non-doped athletes. In the study of morality about doping use, a lot of attention has been devoted to moral disengagement. Moral disengagement is a fundamental concept of the social cognitive theory of moral thought and action (Bandura 1986, 1991). According to the theory, people develop moral standards that regulate their behaviour (Bandura, 1986). Still, people often morally disengage from these standards and do not act in a manner conforming to them. In the theory there have been identified eight psychological mechanisms that explain how people disengage from their moral standards. These mechanisms include moral justification, euphemistic labelling, advantageous

comparison, displacement of responsibility, diffusion of responsibility, disregarding or misrepresenting injurious consequences, and dehumanization. The meta-analysis by Gini, Pozzoli and Hymel (2014) suggested that moral disengagement is a significant predictor of maladaptive behaviours, such as aggression.

Kavussanu (2015) suggested that moral disengagement may be a significant predictor of doping use intentions and behaviour. In this line, Boardley, Grix and Dewar (2014) and Boardley, Grix and Harkin (2015) in qualitative studies with doping users provided evidence for the existence of seven of the mechanisms of moral disengagement. Dehumanization was the only moral disengagement mechanism not evident in the athletes when discussing about doping use. Furthermore, a set of studies tested the effect of moral disengagement on variables related to doping use. More specifically, Lucidi et al. (2004), Lucidi et al. (2008) and Lucidi, Zelli and Mallia (2013) demonstrated that moral disengagement was positively related to both doping use intentions and actual doping use. Similarly, Hodge et al. (2013) indicated that moral disengagement significantly predicted attitudes towards doping.

Importantly, moral disengagement has been found useful in understanding recreational exercisers doping use intentions and behaviour. Boardley and Grix (2014) found evidence for the six out of eight moral disengagement mechanisms (i.e., moral justification, euphemistic labelling, advantageous comparison, displacement of responsibility, diffusion of responsibility and distortion of consequences) in bodybuilders. These findings were further replicated by Boardley, Grix and Dewar (2014) with bodybuilders experienced with doping use and suggested that athletes morally disengage to circumvent health- and morality-based information about doping.

Overall, the moral aspects of doping use largely rely on the antithesis of using doping practices with the Spirit of Sport and the ideal of Olympics. In addition, doping use is against the regulations of authorities governing sport (e.g. International Olympic Committee; IOC) and, hence, reflects a cheating behaviour. These restrictions do not exist in recreational sports where people participate in physical activities without any sense of competition (Cleret, 2015). Thus, at the moment, doping use in recreational settings has not been considered as an unethical and immoral behaviour and there is only limited research evidence about moral related variables and doping use in recreational sports.

Chapter 2

Theories of intentional behaviour: Theory of Reasoned Action and Theory of Planned Behaviour

A recent meta-analysis of 63 independent studies on doping behaviour in adolescent and adult athletes showed that doping behaviour is better understood as a goal-directed, intentional process, and that variables such as attitudes, self-efficacy, and perceived social norms (e.g., social approval from referent others such as fellow athletes and coaches; perceived prevalence of doping among referent others) directly predicted athletes' intentions to use doping substances in the near future (Ntoumanis et al., 2014). This meta-analysis showed that the TPB (Ajzen, 1991) was the most commonly used theoretical framework in understanding the decision making process towards doping use. Thus, the discussion on theories of intentional behaviour will be devoted mostly on TPB as more relevant to doping research.

Development of the theory of planned behaviour

Theory of reasoned action

The theory of planned behaviour (TPB) is a social-cognitive theory thought to adequately explain intentional behaviour (Ajzen, 1991). It is an extension of the theory of reasoned action (TRA; Fishbein, 1967) which was developed to help understand the way attitudes and intentions influence behaviour (Montano, & Kasprzyk, 2015). The theory of reasoned action was originally developed to address the small effect of attitudes on behaviour found in the literature. In this respect, Fishbein (1967) differentiated the attitudes towards an object (for instance attitudes

towards health, from the attitudes towards the behaviour that result in this object (for instance, attitudes towards exercise that promotes health) (see Montano, & Kasprzyk, 2015). This distinction significantly improved the prediction of behaviour and supported the need for a correspondence in the measurement of beliefs and behaviours (Fishbein & Ajzen, 2010). Ajzen and Fishbein (1980) supported this proposition by showing that attitudes predicted behaviour more strongly when measured at the same level of generality with the behaviour. Overall, a high correspondence of attitudes with the behaviour in terms of action the target of the behaviour, the context where the behaviour is performed and the timeframe to engage in the behaviour results in better prediction of behaviour (Montano & Kasprzyk, 2015).

Furthermore, Fishbein (1967) defined the beliefs that are important in the prediction of behaviour. According to reasoned action theory, intention to perform a behaviour at a specific time point is the strongest predictor of this behaviour. Intention is thought to be the variable that will determine whether an individual will manifest or not a behaviour. An individual holding high intentions to perform a behaviour is more likely to actually engage in this behaviour (Fishbein & Ajzen, 1977). In the theory of reasoned action conceptualization, for intention to effectively predict behaviour they should be as specific as possible describing the context and the timeframe of the behaviour at hand (Ajzen, 2002; Fishbein & Ajzen, 2010). Intention is influenced by attitudes toward behaviour and subjective norms. Individuals hold high intentions towards a behaviour when they positively evaluate the behaviour and believe that the behaviour is acceptable by significant others.

Attitudes towards a behaviour

Stanley, Phelps, and Banaji (2008) argued that attitudes serve an adaptive function, guiding approach and avoidance behavioural tendencies in humans. Attitudes represent core evaluations of objects, people, and even ideas, and may exist independently of people's conscious awareness that they have attitudes (Eiser, 1990; Thompson, Kruglanski, & Spiegel, 2000). Olson and Fazio (2001) argued that attitudes are formed through classical conditioning, namely the pairing of attitude objects with positively or negatively evaluated stimuli, outside of conscious awareness. In two experiments, they showed that conditioned stimuli (e.g., neutral Pokemon cartoon characters) were evaluated more positively following pairings with positive unconditioned stimuli (e.g., the word 'excellent' and images of puppies). Accordingly, Pokemon cartoons associated with negative unconditioned stimuli, such as words with negative meaning and threatening images, were evaluated more negatively. Participants in these experiments were not aware of making these evaluative judgments based on mere association (i.e., classical conditioning). The automatic formation of attitudes has been also supported by another line of research on the effects of mere exposure on preferences. When university students were asked to rate whether unfamiliar words in a different language meant something positive or negative, students rated the more frequently presented words as more positive in meaning, as compared to the less frequently presented words – a finding that has been replicated a lot of times (Zajonc, 1968; Zajonc, 2001).

On the other hand, the expectancy-value model suggests that attitudes are formed on the basis of general beliefs about a target object, person, or behaviour (Ajzen, 2001). This perspective implies that people choose a course of action by firstly weighing the pros and cons of that action. This logic served as the theoretical

foundation of the theories of reasoned action (TRA; Ajzen & Fishbein, 1980) and planned behaviour (TPB; Ajzen, 1991). Both theories posit that attitudes represent the interaction between expected outcomes (our attributes) and evaluations of those outcomes (outcome expectancy \times valence of the expected outcome). In his foundational article about the development of the TPB, Ajzen (1991) noted that “Since the attributes that come to be linked to the behaviour are already valued positively or negatively, we automatically and simultaneously acquire an attitude toward the behaviour” (p. 191). The algebraic formula that depicts the structure of attitudes according the reasoned action paradigm is the following:

$$A \propto \sum b_i e_i$$

where A stands for attitude, b stands for the strength of the belief that a certain outcome i will occur, and e stands for the subjective evaluation of the outcome i . The symbol \propto is used to denote that an attitude is directly proportional to the summative belief index (Ajzen, 1991; Fishbein & Ajzen, 1975). The reasoned action perspective further posits that people hold different beliefs towards an object, but only the beliefs that are more salient (readily accessible in memory) will influence attitude formation (Ajzen, 2001).

Attitudes reflect the individual’s positive and negative personal beliefs about a target behaviour. They reflect behavioural beliefs describing an outcome belief and an outcome evaluation. The outcome belief corresponds to the belief about the likelihood to obtain a particular outcome, whereas outcome evaluation reflects the importance of the behaviour’s outcome for the individual (Armitage & Christian, 2003; Fishbein, 1967). The evaluation of the outcome can be either instrumental describing the usefulness of the behaviour, or the quality of the experiences corresponding to perceptions and feelings while engaging in the behaviour (Fishbein & Ajzen, 2011;

Knabe, 2012). In this respect, two main types of attitudes have been identified, namely cognitive and affective attitudes. Recent research suggested that these types of attitudes differentially influence behaviour. More specifically, Lawton, Conner, & McEachan (2009) demonstrated that affective attitudes were stronger predictors of intentions and actual behaviour as compared to cognitive attitudes. Conner, Godin, Sheeran and Gernain (2013) advocated in investigating different types of attitudes for the better prediction of behaviour. Overall, attitudes represent a central component of decision-making processes in different life domains, and have been considered among the most influential variables in predicting behavioural intentions and behaviour (Ajzen, 2001; Fishbein & Ajzen, 2011).

Subjective norms

The second component of theory of reasoned action involves subjective norms that typically refer to perceived social acceptance of a behaviour and the perceived social pressure to engage in the behaviour. More specifically, subjective norms describe the beliefs of people important to the individual about the behaviour and the motivation of the individual to comply with these beliefs (Ajzen, 1988, 2001). As shown in the following equation, according to Ajzen (1988, 2006) the strength of individual's normative belief (n) is multiplied by his/her motivation to comply (m) with the referent in question, and the products are aggregated [i.e., subjective norm (SN) is directly proportional to the sum of the products across the n salient references]

$$SN \propto \sum_{i=1}^n n_i m_i$$

Ajzen (1988) admitted that in several instances motivation to comply does not add predictive power to the model and suppressed the correlations among the variables. Deletion of motivation to comply resulted in more optimal correlations.

Also, Ajzen (2002) suggested measuring both injunctive and descriptive norms to better capture individual's normative beliefs. Injunctive norms describe individual's perceptions about significant others opinion towards a behaviour, that is whether they would approve or disapprove engaging with the behaviour. In this sense, they reflect what ought to be done and form a motivation to act because of the social rewards obtained from engaging in the behaviour or the punishments related to not engaging. On the other hand, descriptive norms correspond to beliefs about whether other people engage with the specific behaviour. They reflect what it is done and motivates behaviour by demonstrating effectiveness and adaptiveness in a specific context (Kallgren, Reno, & Cialdini, 2000; Manning, 2009; Reno, Cialdini, & Kallgren, 1993; Ravis & Sheeran, 2003; Smith et al., 2012). Injunctive and descriptive norms reflect different sources of motivation and they have independent effects on intentions and behaviour. Importantly, a conflict between injunctive and descriptive norms may lead to reduced intentions towards engaging in a behaviour (Kallgren, Reno, & Cialdini, 2000; Ravis & Sheeran, 2003; Smith et al., 2012). The contribution of injunctive and descriptive norms has been shown repeatedly. Research evidence has supported their positive effect on numerous behaviours, including, pro-environmental behaviours (Cialdini et al., 2006; Goldstein, Cialdini, & Griskevicius, 2008; Gockeritz et al., 2010; Nolan et al., 2008; Schultz, Khazian, & Zaleski, 2008), volunteerism (Smith & Masser, 2012), bystanding behaviour in bullying (Pozzoli, Gini, & Vieno, 2012), physical activity and healthy nutrition (Burger et al., 2010; Lally, Bartle, & Wardle, 2011; Priebe & Spink, 2012), and alcohol consumption (Pearson & Hustad, 2014). In the original conceptualizations of theory of reasoned action and planned behaviour theory injunctive norms were mainly described. However, later on the importance of descriptive norms in increasing the prediction of behaviour and better understanding

normative influence was revealed. More specifically, Ravis and Sheeran (2003) in a meta-analysis on the effect of descriptive norms demonstrated that their inclusion can increase the prediction of intention by 5% on top of the effect of attitudes, subjective norm and perceived behavioural control.

From reasoned action theory to planned behaviour theory: Perceived behavioural control

Fishbein and Ajzen (1975) provided evidence on the utility of the theory of reasoned action to predict behaviour. However, the theory of reasoned action assumed that behaviour is intentional and thus, can be predicted by intentions alone, without taking into consideration people's beliefs about the resources and opportunities to engage with the target behaviour. In addition, past behaviour was shown to be an important determinant of future behaviour and was not taken into account in the theory of reasoned action. To overcome these limitations, Ajzen (1991) introduced the concept of perceived behavioural control, which refers to the individual's perception about his/her ability to perform the behaviour, and established the TPB. Perceived behavioural control reflects the perceived ease or difficulty in performing the behaviour. Essentially, perceived behavioural control describes perceptions of self-efficacy, i.e., beliefs about the person's capability to execute a certain course of action, and captures the instances when an individual may not have control (i.e., high difficulty) of performing a behaviour. It is expected that individuals who believe they have the resources and opportunities to engage in a behaviour they will report higher levels of perceived behavioural control. High perceived behavioural control is expected to result in greater intention to engage in the behaviour and actual behaviour manifestation (Ajzen, 1991, 2002, 2006). Perceived behavioural control is determined

by the beliefs about the resources and the opportunities. More specifically, a control belief (c) is multiplied by the perceived power (p) of this specific belief and the end-products are aggregated across n salient factors to form perceived behaviour control as shown in the following equation (Ajzen, 1991):

$$\text{PBC} \propto \sum_{i=1}^n c_i p_i$$

Madden, Ellen and Ajzen (1992) compared theories of planned behaviour and reasoned action for 10 different behaviours requiring different levels of behavioural control. The results of the analyses suggested that the inclusion of perceived behavioural control improved the prediction of behavioural intention and behaviour and supported the effectiveness of TPB over reasoned action theory in predicting behaviour in several domains. This evidence was further corroborated by further studies demonstrating the utility of perceived behavioural control in predicting intentions and actual behaviour in numerous behavioural domains such as diet and healthy nutrition (Sparks, Guthrie & Shepherd, 1997), consumer intentions to use e-coupons and consumers' purchase intentions (Chiou, 1998; Kang, Hahn, Fortin, Hyun, & Eom, 2006), drivers' speeding intentions (Cestac, Paran, & Delhomme, 2011), physicians' willingness to vaccinate girls against HPV (Askelson et al., 2010), career planning (Hsu, 2012), blood donation (France et al., 2014) and doping use intentions (Ntoumanis et al., 2014).

Overall, the basic tenets of the TPB have been supported in a large number of behavioural domains (Armitage & Conner, 2001; Durantini, Albarracin, Mitchell, Earl, & Gillette, 2006; McEachan, Conner, Taylor, & Lawton, 2011; Prestwich et al., 2014; Rise, Sheeran, & Hukkelberg, 2010), including exercise and physical activity (Hagger, Chatzisarantis, & Biddle, 2002). The TPB has also been useful in the scientific enquiry of substance use in different age groups (Conner, Sandberg,

McMillan, & Higgins, 2006). Still, recently TPB has received criticism as focusing on rational thinking, excluding unconscious influences on behaviour and emotions, not taking into account habit, self-control, and associative learning, and emotional processing not being valid and useful (Sniehotta, Pesseau & Araujo-Soares, 2014; Trafimow, 2015; West, 2006).

In this respect, several efforts have been made to better understand the decision making processes and inform behaviour change interventions. One such approach is the behaviour change wheel (Michie & Johnston, 2012; Michie et al., 2013; Michie, van Stralen & West, 2011) developed to characterize behaviour change interventions and better understand their influence on behaviour change. This model comprises three levels, the sources of behaviour, the intervention functions and the policy categories (Michie, Van Stralen, & West, 2011). The sources of behaviour level is the core level of the model describing the proxy processes determining behaviour and behaviour change. These processes are influenced by the functions of the implemented interventions (middle level of the model) and ultimately by the policies about the behaviour at hand (outer level of the model). The main sources of behaviour described in the model are categorized in terms of capability, motivation and opportunity to manifest the behaviour at hand. Psychological, social and physical factors have been identified as crucial determinants of the behaviour (Michie et al., 2011).

Interestingly, the categories and factors used in the model to describe the sources of behaviour resemble those presented in TPB and its extensions, such as the integrative model (Fishbein, 2009). For instance, the capability and opportunity categories including psychological, social and physical factors refer to the norms and self-efficacy constructs described in TPB. In addition, the motivation category largely

refers to the attitudes construct included in TPB. Therefore, it seems that several TPB premises have been embodied in this model. This echoes the rebuttal to the criticism of TPB. More specifically, Armitage (2015) argued in favor of TPB as a useful theoretical model in understanding human action and as a benchmark for future approaches. Still, he asked for more experimental studies of the TPB. Golwitzer and Oettingen (2014) further corroborated that TPB is a model that significantly contributed to the understanding of human action and agreed that can effectively be integrated into future approaches of human behaviour. In this line, Conner (2014) also suggested that it would be more beneficial to capitalise on the contribution of TPB, build on the existing evidence, and further extend it to improve the understanding the behaviour and behaviour change. Overall, the majority of the research community has adopted it because it is a parsimonious theory, easy to understand and adapt for testing in various settings, and the theory's premises have received substantial support in several behavioural domains (Ajzen, 2011; Armitage & Conner, 2004; Fishbein & Ajzen, 2010).

Doping research using theory of planned behaviour

As stated above the Theory of Planned Behaviour is the most commonly used theoretical approach in doping research (Ntoumanis et al., 2014). However, in most cases the theory has been complemented with additional variables that have been proposed in the literature to effectively and theoretically soundly extend and broaden the theory and lead to a better understanding of the psychological processes underlying the decision-making processes leading to doping use. Lucidi et al. (2004) in a study with Italian high school students demonstrated that all TPB variables significantly predicted doping use intentions in the expected direction. Lucidi et al.

(2008) confirmed that attitudes and subjective norms were significant predictors of doping use intentions. In this study, the effect of perceived behavioural control on both intentions and actual doping behaviour was not confirmed. Instead, self-regulatory efficacy was found to have significant negative effect on doping use intentions. In addition, moral disengagement significantly and positively predicted intentions and actual doping use. Using a longitudinal design, Zelli, Mallia and Lucidi (2010) replicated these findings with high school students and showed that doping use intentions positively predicted doping use four to five months later. The TPB variables and moral disengagement predicted doping use intentions in Time 1, but not doping use in Time 2.

In a similar line of research, Lazuras et al. (2010) demonstrated that past and current use, attitudes, subjective norms and perceived behavioural control significantly predicted doping use intentions in a sample of elite competitive athletes. Furthermore, they showed that descriptive norms were also a significant predictor of doping use intentions. However, the stronger predictor of intentions in this study that mediated the effect of the TPB variables was situational temptation, a variable corresponding to athletes' perceived efficacy to refrain from doping.

Similar findings have been reported in recreational sports. More specifically, attitudes towards doping use, subjective norms, and perceived behavioural control significantly predicted intentions to use anabolic androgenic steroids (63% of the variance explained) in gym users (Allahverdipour, Jalilian, & Shaghghi, 2012). In addition, Wiefferink, Detmar, Coumans, Vogels, and Paulussen (2008) suggested that TPB variables were associated with intentions to use performance enhancement drugs in gym exercisers involved in bodybuilding, fitness, power lifting and combat sports.

Among the tested variables, personal and descriptive norms were the stronger predictors of intentions.

A need to extend planned behaviour theory: Emergence of integrated models of intention-formation

Many researchers have called for expanded TPB models. According to Perugini and Bagozzi (2001), one way to advance the knowledge base in scientific research, is by broadening and/or deepening existing theoretical accounts. Furthering this view, broadening is defined in terms of adding new variable(s) within an existing model, and deepening concerns the study of the mediating effects and function of these newly added variable(s). For instance, the original TPB model conceptualizes normative beliefs only in terms of subjective pressures to conform (i.e., what would significant others think if I ...). This approach to normative influence has been criticized, however, and researchers have called for amendments to the TPB to include broader measures of perceived norms, like perceptions of and actual prevalence of the behaviour in question (Vries, Backbier, Kok, & Dijkstra, 1995).

Cialdini, Reno, and Kallgren (1990) identified descriptive norms as conceptually and functionally different normative elements from the traditional subjective norm measures. Whereas subjective norms refer to what *ought to be*, descriptive norms define what *is* happening, or, in broader terms, the perceived commonness of the behaviour in question. Still, research corroborating descriptive norms within the TPB model has been scarce and limited in specific behavioural domains (e.g., adolescent smoking; see Wilkinson & Abraham, 2004). Nonetheless, Rimal and Real (2005) recently developed the Theory of Normative Social Behaviour (TNSB) on the assumptions of the TPB, and provided an in-depth account on the use

of descriptive norms in the prediction of behavioural intentions. The proposed study will use TNSB's assumptions regarding the influence of descriptive norms on intentions, and integrate the relevant constructs within the traditional TPB model. This will help identifying both the intrinsic and motivational risk factors for doping, and features of the social context wherein doping use is encouraged. To date, such an approach has not been reported in the existing literature, and this is mostly the case in doping behaviour research.

Furthermore, current evidence suggests that the expansion of existing components of the theory and the inclusion of new variables will increase the effectiveness of the theory in predicting behaviour. For instance, Conner and Armitage (1998) and Ajzen (2001) suggested an expansion of the theory including new variables such as belief salience, past behaviours, habits, moral norms, reconstructing perceived behavioural control, self-identity, and affective beliefs. Furthermore, Armitage and Conner (2001) argued for a need to expand the normative component of the theory. Ravis and Sheeran (2003) further supported the expansion of the normative component suggesting the need to include descriptive norms. In their meta-analysis suggested that descriptive norms can increase the variance explained in intentions predicted by attitudes, subjective norms and perceived behavioural control. Similarly, the meta-analysis by Ravis, Sheeran and Armitage (2009) demonstrated that the inclusion of anticipated regret and moral norms can increase the variance explained in intentions over the effect of attitudes, subjective norms and perceived behavioural control.

This research evidence suggests that research in this field continues to grow, and as Ajzen (2011) noted new models may add theory-relevant variables to better understand domain-specific behaviours/intentions. According to Ajzen (2011) the

majority of the added variables and processes used in the literature can be integrated within the theory and expand and enrich the psychological processes underlying human social behaviour (Ajzen, 2011). In this respect, integrative models have been developed in order to accommodate the expansion of the TPB. The most relevant models include the Integrative Model (Fishbein, 2000, 2009) and the Theory of Triadic Influence (Flay, 1999; Flay, Snyder & Petraitis, 2009; Flay, Petraitis, & Hu, 1995).

The Integrative Model is a synthesis of theory of reasoned action and theory of planned behaviour in combination with other theoretical developments. The model suggests that intentions, skills and abilities and environmental constraints are the stronger predictors of behaviour. Intentions are influenced by attitudes, perceived normative pressure and self-efficacy beliefs, as described in the TPB. Each one of these predictors is determined by more distal influences; behavioural beliefs and outcome evaluations influence attitudes, injunctive and descriptive normative beliefs influence perceived normative pressure, and efficacy beliefs determine behaviour specific self-efficacy. These three distal influences are determined by background influences, such as past behaviour, demographics and culture, attitudes towards targets, personality, moods and emotions, and other individual difference variables (Fishbein, 2000, 2009; Frosch, Légaré, Fishbein, & Elwyn, 2009; Rhodes, Stein, Fishbein, Goldstein, & Rotheram-Borus, 2007).

A similar conceptualization of the determinants of human behaviour is made by the Theory of Triadic Influence (Flay, 1999; Flay, Snyder & Petraitis, 2009; Flay & Petraitis, 1994; Flay, Petraitis, & Hu, 1995). This theory integrates variables and processes from several theoretical approaches. It distinguishes between distal and proximal predictors of behaviours. The first level of distal predictors of behaviour

include variables related to the social-personal nexus and correspond to the quality and quantity of the interaction between people and their sociocultural environment, social situations and personality. At the second level of distal predictors affective and cognitive variables reflecting general values, behaviour-specific evaluations, knowledge, and beliefs that result from the interaction with the environment are included. These influences are labeled evaluations and expectancies and are thought to be closer to behaviour at hand and modifiable. Lastly, proximal predictors of the theory include the core variables of the TPB, namely attitudes, social normative beliefs and self-efficacy beliefs. These proximal variables influence behavioural intentions, which in turn determine behaviour, as described in the TPB. The effect of distal variables is organized in three streams, each one leading to one of the proximal variables derived from TPB. For example, biology and personality (first level of distal predictors) influence social competences, sense of the self, social skills and self-determination (second level of distal predictors), which in turn influence self-efficacy beliefs such as perceived behavioural control (proximal predictors) (Flay, 1999; Flay & Petraitis, 1994; Flay et al., 2009; Flay et al., 1995).

Overall, these integrative approaches have been tested in health related behaviours and provide evidence on the proposed links among distal and proximal predictors and behaviour (Flay & Petraitis, 1994; Flay et al., 1995; Frosch et al., 2009; Rhodes et al., 2007). This evidence supports the mediating role of proximal variables on the distal variables – behaviour relationship, and provides theoretical support in the inclusion of additional variables in the TPB, such as situational temptation, self-efficacy and anticipated regret. Furthermore, they explain how the TPB variables can be formulated. Ultimately, these approaches provide a theoretical basis for the extension of the TPB.

These integrative approaches have been preliminary tested with respect to doping use. More specifically, Barkoukis et al. (2013) in a preliminary test of the Integrative Model showed that background variables, such as achievement goals and sportpersonship beliefs, influenced doping use intentions but their effect was mediated by proximal variables such as attitudes, perceived behavioural control and situational temptation. Importantly, this study showed that specific background variables were mediated by specific proximal variables indicating specific streams in the influence of doping use intentions. For instance, the effect of achievement goals was mediated by situational temptation, whereas the effect of sportpersonship beliefs by attitudes, perceived behavioural control and situational temptation. Extending this work, Lazuras et al. (2015) investigated specific streams proposed by the Theory of Triadic Influence. The results of this study demonstrated that in line with Theory of Triadic Influence a stream exists linking personality and dispositional traits, such as achievement goals, with self-efficacy beliefs, and another stream linking cultural environment, such sportpersonship beliefs, with attitudes towards the behaviour and anticipated regret. Furthermore, these studies highlighted the importance of extending the typical TPB by incorporating new variables such descriptive norms, situational temptation and anticipated regret. Finally, Chan et al. (2014) demonstrated that the TPB variables predicted intention to avoid doping use and were predicted by modal salient beliefs including behavioural, normative and control beliefs.

Chapter 3

The self-affirmation theory

The literature reviewed in previous chapters provided evidence about the psychological risk factors associated with doping use. This chapter focuses on psychological interventions that have been found to influence decision making processes and accordingly enable behavior change. More specifically, the present chapter presents an overview of self-affirmation theory and the following chapter discusses the relevance of self-affirmation application in the context of doping use behaviour. Primarily, self-affirmation theory is concerned with the ways people perceive and respond to threats to their self-integrity, as well as optimizing message communication in order to reduce defensive processing and initiate behavior change processes.

Overview of the self-affirmation theory

People in contemporary society face numerous failures and threats of self-esteem and self-worth. These threats may include information challenging the validity of long-held beliefs, rejection in a romantic relationship, poor performance in a field of interest, physical and mental illness, frustrated goals or aspirations, failure in sports or other competitive fields such as work, real and perceived social slights, negative feedback at work or in school, interpersonal and intergroup conflict, the loss of a loved one, the misbehaviour of one's child etc (Sherman & Cohen, 2006; Steele, 1988). During a day there are limitless occasions that people's perceptions about their 'moral and adaptive adequacy' (Steele, 1988), which refers to their sense of

themselves as good, virtuous, successful, and able to control important life outcomes, can be threatened. As Sherman and Cohen (2006) noted typically these incidents are more likely to occur and exceed the small number of events that affirm people's perceptions about their adequacy. A major challenge for most people is to maintain self-integrity when faced with the inevitable difficulties, problems and disappointments of daily life. A key question is how do individuals adapt and deal with such threats and sustain their self-integrity?

The theory of self-affirmation aiming to address this question was initially proposed by Steele (1988). According to the theory the ultimate goal of individuals is to protect their image of self-integrity and their perception of themselves as morally and adaptively adequate. A fundamental tenet of self-affirmation theory (Aronson, Cohen & Nail, 1999; Sherman & Cohen, 2002; Steele, 1988) is that individuals want to feel morally and adaptive adequate. In order to achieve this they strive for sustaining their self-integrity. Integrity can be defined as the individual's sense that, on the whole, he/she is a good and appropriate person. The term 'appropriate' has been used in cultural anthropology to describe the behaviour that fits or suits the given cultural norms and the salient demands that culture places on people. Thus, the criteria for the characteristics of a good and appropriate person vary across different cultures, groups of people within a culture, and situations (e.g., Heine, 2005). These criteria of integrity can include aspects of the self such as the importance of being independent and autonomous, rational, intelligent, and being able to control important outcomes. In addition, criteria of integrity can also be attributes related to social interaction such as the importance of maintaining close and intimate relationships with other people and being a good member of a team or a group.

Therefore, a threat in one of these criteria may pose a threat to a person's self-integrity. Notably, these threats will reflect individuals' perceptions about their failure in meeting the standards and criteria posed by a specific culture or group of people that the person is part of (Leary & Baumeister, 2000). This is especially true when they do not meet these criteria and engage in relevant behaviour, whereas individuals who meet these criteria do not feel threatened and rejecting the information is an adaptive act. In this sense, individuals try to avoid events and information that can threaten their self-integrity, both in their own eyes and in the eyes of others. If they perceive their self-integrity to be threatened, then people are motivated to restore or reevaluate the integrity of the self.

Hence, the need to protect self-integrity is apparent and motivates behaviour mainly when self-integrity is threatened (Steele, 1988). Sherman and Cohen (2006) describe three types of responses that people typically use to deal with threats of self-integrity. The first one involves the accommodation of the threat through the acceptance of failure or the threatening information. This serves as the basis and the motivation to change attitudes and behaviour. However, it should be noted that if the threat involves an important part of the person's identity, the need to maintain self-integrity is very strong and may hinder the acceptance of the threatening information and the subsequent change of attitudes or behaviour. The second type of response that people typically use to deal with threats to self-integrity corresponds to the use of direct psychological adaptations to ameliorate the threat. In this respect two main types of psychological adaptations have been identified. Some adaptations directly aim to preserve the fundamental value of the provided information and accordingly change the person's construal of the behaviour (e.g., interpreting a failure as an opportunity to learn; Dweck & Leggett, 1988), whereas some other

psychological adaptations are defensive in nature making the person trying to find ways to reject, dismiss, deny, or avoid the threatening information in some way. Sherman and Cohen (2002) defined these responses as defensive biases. These defensive biases are effective in restoring self-integrity, however, the fact the person rejects the threatening information and does not endorse its content lowers the probability that the person will learn from the potentially important information. The third psychological adaptation involves actions that facilitate both the restoration of self-integrity and adaptive behaviour change. This adaptation is proposed by self-affirmation theory as an alternative and more adaptive type proposes of psychological adaptation (Steele, 1988). According to this adaptation, individuals can deal with threats to their self-integrity by using self-affirmation on other domains important to the person that are not related with the domain of the threatening information. This serves as an indirect psychological adaptation that involves reflection on important aspects of one's life irrelevant to the threat, or engaging in an activity that makes salient important values unconnected to the threatening event (Sherman & Cohen, 2006). The difference between these psychological adaptations is that defensive psychological adaptations aim to directly address the threatening information and lower the threat, whereas self-affirmation aims to deal the threat by placing emphasis on important for the self domains of self-integrity that are not related to the threatening information. Using such indirect psychological adaptations helps people understand that the threatening situation does not hinder or diminishes their overall self-worth. Thus, they do not need to distort the threatening information and can respond to it in a more open minded way (Sherman & Cohen, 2006).

Self-affirmation theory: Fundamental assumptions

Based on the above mentioned theorizing, self-affirmation theory proposes four fundamental assumptions through which health-related messages can be effectively communicated and initiate behavior change processes (Sherman & Cohen, 2006). More specifically:

a) People are Motivated to Protect the Perceived Self-Integrity and Self-Worth

According to Steele (1988) the fundamental assumption of self affirmation theory (Steele, 1988) is that people are motivated to protect the perceived integrity and worth of the self. In Steele's own words, the purpose of the self-system is to 'maintain a phenomenal experience of the self . . . as adaptively and morally adequate, that is, competent, good, coherent, unitary, stable, capable of free choice, capable of controlling important outcomes . . . (p. 262).' These self-conceptions and images making up the self-system can be thought of as the different domains that are important to an individual, or the different contingencies of a person's self-worth (Crocker & Wolfe, 2001; Sherman & Cohen, 2006).

The self is composed of different domains, which include an individual's roles, such as being a student or a parent; values, such as being religious or having a sense of humor; social identities, such as membership in groups or organizations and in racial, cultural, and gender groups; and belief systems, such as political ideologies. The self is also composed of people's goals, such as the value of being healthy or succeeding in school (Sherman, & Cohen, 2006; Steele, 1988).

When a person experiences a threat to an important self-conception or image, i.e., an important domain, this self-system is activated to respond as a challenge is posed to a desired self-conception. Thus, getting a low grade or bad feedback could

threaten a student's identity as a good student, and negative health information could threaten a person's image as a healthful individual (Lerner, 1980). All these experiences can be considered as threatening because they challenge a person's overall perception of his/her self and question his/her moral and adaptive adequacy, i.e., self-integrity (Sherman & Cohen, 2006).

b) People Use Defensive Responses in order to Protect their Self-Integrity

When people experience threats of their self-integrity, they are motivated to restore their self-worth. In order to achieve this, they adopt defensive responses. These defensive responses, at a first glance, seem to be rational and defensible. However, as Aronson (1968) pointed out these responses are in fact 'rationalizing' rather than 'rational'. For instance, doped athletes claiming that they do not have an advantage over others (Boardley, Grix, & Harkin, 2015) demonstrates an effort to rationalize their decision to dope without being rational (i.e., a clean athlete may be frustrated from losing and withdraw from sports). Kunda (1990) and Pyszczynski and Greenberg (1987) further suggested that these defensive responses are used to diminish the threat and consequently, restore the perceived integrity of the self. They can be automatic and even unconscious in nature. Sherman and Cohen (2006) argued that the automatic and immediate manifestation of these defensive responses denote how important they are for maintaining and restoring self-integrity.

c. The Self-System is Flexible

An important mechanism people typically use to maintain and restore self-integrity is to compensate for failures in one aspect of their lives by emphasizing successes in other domains. This idea of compensation has been acknowledged and

largely supported in personality research. Theorists, such as Allport (1961) and Murphy (1947), acknowledged compensation as an important defensive mechanism (Brown & Smart, 1991). Self-affirmation predictions about how people restore their self-integrity, when threatened, are in accordance with this idea. The ultimate objective of the self-system is on maintaining and restoring the overall worth and of the self as morally and adaptively adequate. In order to achieve this, individuals deal with threats in one domain by affirming the self in another and different domain. In fact, people use different sources of self-integrity in order to maintain their self-worth. For instance, doping users can maintain a perception of worth and integrity despite the potentially threatening information that doping is an immoral and unhealthy behaviour, and by using these substances they act in a maladaptive, harmful, and irrational way (Steele, 1988). Affirmations reduce the defensive psychological adaptations people typically use to ameliorate a specific provoking threat and satisfy the individuals' need to sustain their self-integrity and self-worth (Sherman & Cohen, 2006).

d. Reminders of Cherished Values Enable Self-Affirmation

Self-affirmation can be achieved by reflecting on qualities that are important to how individuals perceive themselves. Such qualities can include reflection on important people such as friends and family, or reflections on important for the person activities such as a charity, the attendance of religious rituals, making art, music, or sport. In a threatening situation, reflection on these core qualities can provide people with perspective on their core psychological attributes and behaviour, that is to strengthen their sense of 'who they are' and, as a result, strengthen their sense of self-integrity in the face of threat. In these situations self-affirmation is effective in

making these important core qualities or sources of identity apparent and salient to the person. The person can rely on these qualities in order to feel worthy and adequate (Sherman & Cohen, 2006). Operationally, self-affirmations are typically ideographic, in that people first report an important value or life domain, and then they have the opportunity either to write an essay about it or to complete a scale or exercise that allows them to assert its importance (McQueen & Klein, 2005).

The benefit of self-affirmations is that they establish a global perception of self-integrity. In this case, the level of the threat experienced when a threatening event or information are presented is much lower and the person can more easily deal with it. This is due to the fact that the person views and interprets an isolated event as part of a broader, larger view of the self, and importantly, a moral and adaptive adequate self. In this sense, self-affirmed people do not feel more secure about their self-worth, they do not feel that they have to defend themselves and are more open to the message. As a result, people do not focus on defending their self-integrity against the information and protect their ego, but rather on the actual message provided (Sherman & Cohen, 2006).

How Self-Affirmation Enables Message Acceptance and Behaviour Change

Self-affirmation theory (Steele, 1988) presents a useful framework for the understanding of defensive processing of personally relevant messages and can facilitate the design of more effective and persuasive messages for behaviour modification (see Harris & Epton, 2009, for a review). The theory posits that people are motivated to maintain a positive self-image and may process in a self-serving and defensive manner any personally relevant information that is perceived as a threat to their self-image. This explains, for instance, why high risk groups (e.g., smokers) may

react defensively to warning labels reminding them of the health risks of smoking and subsequently denigrate or reject the health message (Harris, Mayle, Mabbott, & Napper, 2007). According to self-affirmation theory, the self-image is flexible and global, so when people are allowed to affirm one domain of their self-image, then they become more open-minded and process personally relevant (and threatening) messages in a non-biased manner (Cohen, Aronson, & Steele, 2000; Sherman & Cohen, 2006). This process is automatic, without requiring any personal reflection or awareness of the defensive processing (Harris & Epton, 2009; Sherman et al., 2009).

Self-affirmation researchers have developed experimental manipulations to bolster self-integrity (e.g., to see oneself as caring, compassionate, and good person) and improve message acceptance by reflecting upon cherished values, actions, or attributes (Reed & Aspinwall, 1998; Napper, Harris, & Epton, 2009; Sherman, Nelson & Steele, 2000). Self-affirmation has been empirically tested across health-related behaviours, such as smoking (Armitage, Harris, Hepton & Napper, 2008; Harris et al., 2007), condom use (Sherman et al., 2000, Study 2), caffeine consumption (Sherman et al., 2000, Study 1), sunscreen use (Jessop, Simmonds, & Sparks, 2009), alcohol consumption (Harris & Napper, 2005), and diabetes screening (van Koningsbruggen & Das, 2009). The available evidence suggests that self-affirmation changes the ways affirmed individuals think about and respond to health or other personally relevant and allegedly threatening messages. Self-affirmation also bolsters open-mindedness, cognitive flexibility, reduces defensive processing (e.g., less message derogation or message rejection) and increases message acceptance (Cohen et al., 2007; Harris & Epton, 2009).

Nevertheless, reducing self-serving processing of personally relevant messages and increasing message acceptance represents only one part of the behaviour change

process. In order to be effective in changing behaviour self-affirmation should also have an effect on basic motivational and decision-making factors that determine the behaviour in question (Epton et al., 2013; McQueen & Klein, 2006). Several studies have shown that self-affirmation manipulations directly influenced behavioural intentions that were congruent with the presented messages. More specifically, van Koningsbruggen, Das, and Roskos-Ewoldsen (2009) showed that self-affirmed coffee drinkers reported stronger intentions to reduce caffeine consumption in response to a message informing them about the health effects of caffeine. Likewise, affirmed female sunbathers were more likely to ask for a free sample of sunscreen than their non-affirmed counterparts (Jessop et al., 2009). Finally, Armitage et al. (2008) showed that self-affirmed adult smokers reported greater intentions to quit smoking and engaged in information seeking for smoking cessation (e.g., taking an information leaflet), as compared to non-affirmed smokers.

Research on the Theory of Planned Behaviour has shown that intentions are immediate precursors of actual behaviour and are predicted by attitudes, self-efficacy beliefs, and social norms (e.g., perceived approval and/or prevalence of a given behaviour), as well as by anticipated negative emotions or regret, and moral norms (Abraham & Sheeran, 2004; Armitage & Conner, 2001; Godin, Conner, & Sheeran, 2005; Ravis & Sheeran, 2003; Webb & Sheeran, 2006). Therefore, the role of self-affirmation in predicting behaviour change can be discussed within the broader framework of intention formation. As Armitage et al. (2008) argued it is important to identify how self-affirmation influences variables related to decision-making, such as self-efficacy beliefs and behavioural intentions.

Chapter 4

Rationale for investigating self-affirmation in the context of chemically assisted performance enhancement in sport and exercise settings

In the present thesis, an attempt has been made to highlight that chemically assisted performance enhancement such as doping, is a long-standing problem in both competitive and recreational sports. Doping use is considered a problem because it has moral and health implications on the athletes. Athletes who dope tend to adapt their moral reasoning accordingly so that they feel less threatened with their choices – knowing that you breach the rules is a serious threat to your moral integrity and sense of self (Barkoukis et al., 2013; Hodge et al., 2013; Ring & Kavussanu, 2017; Lucidi et al., 2004, 2008). This is especially the case among competitive and elite athletes who have to respect the spirit of sports and commit to the fair play code. Accordingly, athletes who engage in doping tend to underestimate the health risks involved - again this serves as a defense mechanism against a potential threat to self-image. In this sense, there is definitely a need to understand the reasoning and decision-making processes that pushes athletes/exercisers to use dope in order to develop effective combat strategies. If an intervention seeks to be effective in changing/reducing doping behaviour then it should address both decision-making processes (e.g., TPB variables) as well as moral reasoning and health beliefs.

Behavioural science can provide insightful data about such processes and this has already been shown in the last decade of psychological research on doping (Ntoumanis et al., 2014). This evidence clearly demonstrated that doping use is intentional, goal-directed behaviour. Athletes/exercisers who decide to engage in doping do so after considering the relevant pros and cons, their own abilities and

efficacy in getting access to doping substances , as well as normative pressures and information. In this respect, TPB has been widely and successfully applied in the existing doping research and that this model with its extensions dominates most of the psychological studies of doping (Ntoumanis et al., 2014).

Furthermore, the need to move from behavioural prediction to behaviour change is becoming apparent. The decade of research on doping emphasized behavioural prediction a lot (i.e., how to predict doping intentions and behaviour) but did not elaborate on behaviour change. There have been some behaviour change interventions and educational campaigns, yet not all of them are based on sound psychological theory about behaviour change processes. Many programs are largely education that try to alter attitudes to doping, or body image issues for example, but have little empirical and theoretical foundation in psychology/behavioural sciences (see Barkoukis, 2015). For instance, the WADA initiated education programs are focusing on providing knowledge on the consequences of doping use. Similarly, the intervention developed by Laure and Lecerf (1999, 2000) did not targeted on altering specific psychological variables. Even ATLAS and ATHENA that were based on social-cognitive theory did not attest the effect of the intervention on doping-related social-cognitive variables that would enable doping behavior change. This might have resulted in the small effectiveness these interventions showed in changing doping-related cognition and behavior. Therefore, it is important to identify ways that can help anti-doping authorities provide education against doping use that will effectively establish a strong anti-doping stance, and change maladaptive pro-doping cognition and behaviour. Taking into consideration the stigmatization of doping behaviour (Allen, Morris, Dimeo & Robinson, 2017; Barkoukis, Brooke, Ntoumanis, Smith & Gucciardi, under review) these educational efforts should take into account that

athletes may be reluctant in participating in anti-doping education or manifest optimism biased and defensive responses during the education. In this sense, it is important to tackle participants defensiveness with respect to doping-related information. As described in detail in Chapter 3, self-affirmation theory explains how maladaptive and self-destructing behaviours can change, and how this change results from a very simple need: people want to maintain a positive view of the self and protect their sense of self-integrity, even when their choices and behaviours run counter to their self-interests. Self-affirmation theory enables message acceptance and behaviour change by allowing people to maintain their sense of self-worth and self-integrity.

To sum up, based on the abovementioned literature on doping the need to better understand how to influence the decision making process and effectively communicate moral and health risk messages against doping use in competitive and recreational sport athletes is apparent. Past evidence on self-affirmation has revealed that it can assist in influencing the decision making process and more effectively communicate threatening messages in numerous behavioural domains (Epton et al., 2015). Therefore, the present studies were designed to investigate the effect of self-affirmation on the decision making process towards doping use in competitive and recreational sports and test whether self-affirmation can increase message acceptance in doping users. Importantly, these questions were tested in both competitive and recreational sports, in both doping users and non-users.

Toward this end, three studies were designed. More specifically: a) Study 1 - Self-affirmation, health risk communication and the doping decision in recreational sports: This study was set out to investigate the effect of self-affirmation on the decision making process towards doping use in recreational athletes. In this study athletes

using nutritional supplements but not doping substances were provided with a health related message on the effects of doping use. Based on the self-affirmation literature it was predicted that self-affirmed participants will report weaker intention to engage in doping use following exposure to health messages against doping and an adaptive effect of social cognition on doping use intentions will be observed, b) Study 2- Self-affirmation, health and moral risk communication, and the doping decision in elite sports: This study adapted the study 1 design to competitive sport athletes using doping substances. In this study, a message involving the moral implications of doping use was also included alongside the health related message. Again, it was hypothesised that self-affirmed participants will report lower intention to engage in doping use following exposure to health and moral messages against doping and doping related social cognition will positively influence doping use intentions. In these two studies message acceptance was not measured. That is, health and moral messages were provided to athletes and exercisers but the understanding and endorsement of these messages was not assessed. Hence, the effect of the message on the decision making process could not be evaluated, c) Self-affirmation, mental construal and health risk communication in recreational sports: To address the issue arose in the previous study, study 3 investigated the role of message acceptance on the effect of self-affirmation on doping-related cognition in recreational athletes using doping substances. In addition, this study further investigated whether mental construal can influence the decision making process towards doping use. Based on past evidence it was hypothesised that self-affirmed athletes will report weaker intention to engage in doping use following the presentation of a health related message against doping and that the decision making process would be influenced by message acceptance, mental construal and doping-related social cognitions.

Recreational and competitive sports were tested separately in different studies because they represent different exercise settings. These settings are different in several respects. Firstly, they reflect a different approach of training, including different aims and goals with respect to sport participation. In competitive sports, either professional or amateur, participation is associated with competition and improvement of performance. On the other hand, in recreational sports people aim in maintaining health and appearance, rather than performance improvement, and there are no competitions aiming at high performance. Recreational athletes may participate in events (e.g., city runs, physical activity events) but the aim of participation is not competing other participants. Secondly, competitive sports require systematic training under supervision and in many cases, depending of the level of the athlete, many people are associated with the athlete (coach, trainer, doctor, nutritionist, physiotherapist, managers etc). These people work together with the athlete in order to improve his/her performance and, thus, interfere with performance enhancement issues. On the other hand, fewer people are involved in the training of a recreational athlete (e.g., personal trainer or gym coach) and their influence on the training regime is much less than for competitive athlete. Importantly, these settings represent different contexts with respect to nutritional supplements and doping use. In competitive sports there is a strict control system with doping controls and sanctions to doping users. On the other hand, doping use is not regulated in recreational sports and it is not prohibited to use doping substances. Therefore, with respect to doping use, these two exercise settings have substantial differences and both should be studied in order to get a comprehensive view of the effect of self-affirmation on doping related decision making in sport contexts.

So far there is only limited evidence about the role of self affirmation in sport settings. Risk communication is important for anti-doping, however, there is little research on how self-affirmation can improve these decision-making processes with respect to doping use. To the author's knowledge there is practically no study to test the effect of self-affirmation on the decision making process towards doping. However, such information is extremely important for doping research. Firstly, doping research has consistently supported the role of social cognition in doping use intentions and actual doping use. However, there is no evidence so far about whether we can influence this decision making process. Self-affirmation research has consistently shown that it is an effective way to alter social cognitive variables towards a more desirable way (Harris & Epton, 2009). This is especially important with respect to doping as several social cognitive variables have been associated with doping use intention and actual doping behaviour. With respect to doping, at the moment there are no interventions aiming to change doping behaviour. All current efforts aim at prevention rather than targeting doping users (Barkoukis, 2015). Thus, there is no evidence so far on how to deliver the content of an anti-doping intervention to doping users. Importantly, clean athletes not using doping substances, and coaches are reluctant to participate in doping-related interventions and even discuss doping issues due to the stigma of doping as an unacceptable behaviour (Barkoukis et al., under review). Therefore, they avoid participation even in preventive campaigns against doping in order not be stigmatized as interesting in this behaviour. Thus, a possible positive effect of self affirmation on reducing athletes', coaches' and other sport personnel's defensiveness towards doping use and increasing message acceptance is expected to enhance the effectiveness of anti-doping interventions. This is of great importance for anti-doping education.

Overall, it is expected that self-affirmation will emerge as an important mechanism influencing social cognitive variables in decision making process towards doping use. If this effect is confirmed important implications can be drawn for doping research. These implications will involve the better understanding of the antecedents of doping behaviour and, more importantly, how to influence them, and the integration of self-affirmation in prevention and harm minimization campaigns in clean athletes not using and athletes using doping substances respectively.

Chapter 5

Study 1: Self-affirmation and use of nutritional supplements

Study 1 was set out to investigate the effect of self-affirmation on the decision making process towards doping use in a sample of exercisers using nutritional supplements. Recreational athletes and fitness exercisers represent the vast majority of physical activity participants. In this population the past 15 years there is a notable increase in the use of nutritional supplements (Bailey et al., 2011) in order to enhance performance. There is evidence suggesting that adolescent recreational athletes using nutritional supplements were almost twice as likely to self-report doping use, and they did not perceive supplement use as a gateway to doping, as compared to their non-user counterparts (Barkoukis et al., 2015). This evidence implies that nutritional supplement users might be a population with a high risk for doping use in the future. Thus, it is important to study the decision making process associated with doping use in this population.

Chemically-assisted performance enhancement in exercise settings

Performance enhancement is a target goal in elite sports. Since the 1960's there have been many documented cases of elite athletes using doping substances to enhance performance. As discussed in chapter 1, large body of evidence has also shown that the abuse of performance enhancers, like anabolic steroids, is evidenced across all levels of sports, and can inflict people as young as 12 years old (Dunn & White, 2011). Instead of trying to improve athletic performance and fitness through training regimes, psychological training (e.g., visual imagery), and healthy eating, a

lot of exercisers and early stage athletes resort to the use of dietary products with presumed ergogenic properties, such as proteins, amino acids, creatine, multivitamins, and a wide range of herbal products (Petroczi, Naughton, Mazanov, Holloway, & Bingham, 2007; Petroczi et al., 2011). The increasing consumption of nutritional supplement comes with certain risks. Firstly, athletes tend to abuse nutritional supplements by taking increased dosages or consume different supplement combinations at the same time ('stacking') without full knowledge of the associated health risks (Lazuras & Barkoukis, 2014). Secondly, a significant proportion of marketed nutritional supplements can be contaminated with prohibited performance enhancers (e.g., AAS, growth hormone agents), or other harmful ingredients, such as heavy metals, that may increase risk of adverse health effects (Geyer et al., 2008; Kohler et al., 2010). Thirdly, recent research showed that using nutritional supplements may 'license' unhealthy lifestyles, such as reduced exercise and preference for unhealthy snacks (Chiou, Yang, & Wan, 2011). Most importantly, as described in chapter 1, a growing body of studies suggests that nutritional supplement use can serve as a 'gateway' to doping use. Specifically, the more frequent use of nutritional supplements is associated with higher self-reported use of illicit PEDs (e.g., Hoffman et al., 2008). This association is evidenced across countries and populations in both cross-sectional (e.g., Backhouse et al., 2013; Papadopoulos et al., 2006; Wiefferink et al., 2008), and longitudinal studies (Lucidi et al., 2008). A recent meta-analysis confirmed that nutritional supplement use is associated with the prediction of doping use intentions and actual doping use (Ntoumanis et al., 2014). Nevertheless, it is not yet clear how the presumed gateway mechanism is influenced by psychosocial processes.

Petroczi et al. (2011) argued that a gateway mechanism can explain transitions from non-doping to doping status among athletes who already consume nutritional supplements. The central tenet of this hypothesis is that nutritional supplement and doping use share the same mental representations in exercisers. Thus, while exercisers experiment with licit performance enhancers, they may display favorable beliefs and biased thinking towards doping use (e.g., false consensus effect; Petroczi et al., 2008), and this can serve as a risk factor that facilitates the transition to doping use.

In light of the evidence supporting the gateway function of nutritional supplements to doping use, the present study aimed to investigate the effect of self-affirmation on supplement users' decision making process towards doping use. The objective of the study was to improve decision making about supplement use, so athletes can be better educated about the use of these supplements and avoid doping use. So far, self-affirmation has been implemented in populations already engaging in an unhealthy behaviour. As discussed in chapter 3, self-affirmation helps in restoring self-integrity and makes people less defensive in threatening messages (Epton et al., 2015; Harris & Epton, 2009, Sherman & Cohen, 2006). In addition, self-affirmation has been found effective in altering social cognition related to an unhealthy behaviour (Epton & Harris, 2008; Epton et al., 2015). Interestingly, self-affirmation does not directly influence intentions or behavior but its effect is often mediated by other variables. For instance, Armitage, Harris, Hepton and Napper (2008) indicated that the effect of self-affirmation on intention to quit smoking was mediated by the effect of message acceptance. With respect to doping, doping-related social cognitive variables have been with doping intentions and actual behavior (Ntoumanis et al., 2014). Following from Armitage et al.'s (2008) study it is possible that self-affirmation has an indirect effect on intentions to use doping substances that is

mediated by doping-related social cognitive variables. Study 1 is the first to assess the effects of self-affirmation on a sample of individuals that have not yet engaged in doping use, but represent a high-risk group for doing so. Past evidence has largely relied on people already engaging in the unhealthy behaviour. However, there is no evidence presented with people being at risk for an unhealthy behaviour. It was hypothesized that: a) self-affirmed exercisers will report weaker intention to engage in doping use following exposure to health messages against doping, and b) the effects of self-affirmation manipulation on doping intentions would be mediated by doping-related social cognitions, such as attitudes towards doping use, social and moral norms, self-efficacy beliefs, and anticipated regret.

Method

Participants

A snowball sampling strategy (chain referral) was used to recruit participants in Study 1. An initial pool of three fitness instructors was approached and assistance in data collection was requested. They all agreed to promote the battery in their fitness centers located in the wider area of the city of Thessaloniki, Greece. Eligibility criteria included systematic participation in training for the past five years and use of nutritional supplements. Overall, the sample consisted of a sample of exercisers ($N = 60$, 43 males) using nutritional supplements. The study was granted ethics approval by the respective committee (UREC) of the University of Sheffield, and participants were informed about their participation rights, and data anonymity and confidentiality. Only their gender was recorded as a demographic variable, as the recording of other demographic characteristics (e.g., age) was perceived by participants as a potential threat to the anonymity of their responses.

Measures

Social cognitions: A brief structured survey was used to assess social cognitions related to doping use. These measures were based on past research on doping (e.g., Barkoukis, et al., 2013; Lazuras et al., 2010) and assessed attitudes towards doping use, social norms (descriptive and subjective norms) and personal norms, perceived behavioural control, situational temptation, and anticipated regret. The studies by Barkoukis and colleagues have attested the face, content, concurrent, and predictive validity of the measures described below. These measures have been developed based on Ajzen's (2002) recommendations and have been found to significantly predict intentions towards doping use. Furthermore, these studies have shown that the following measures had acceptable internal consistency reliability scores (Cronbach's $\alpha > .70$).

Attitudes to doping were measured with the stem proposition 'the use of prohibited substances to enhance my performance this season is...' followed by four semantic differential evaluative adjectives (*bad/good; useless/useful; right/wrong; detrimental/beneficial*) scored on a seven-point scale. Subjective norms were assessed from the mean of three items (e.g., 'most people who are important to me would want me to use prohibited substances to enhance my performance during this season'), scored on a seven-point scale (1 = *strongly disagree*, 7 = *strongly agree*). A composite score was computed with higher scores showing more positive attitudes towards doping use. Descriptive norms were assessed with two open-ended questions on the perceived prevalence of doping use among elite athletes in Greece (perceived prevalence in elite athletes) and athletes perceived to be at participant's performance level (perceived prevalence in fellow athletes; e.g., 'Out of 100%, how many athletes at the same to you level in Greece do you think engage in doping to enhance their

performance?’). This method for assessing descriptive norms has been used effectively in previous studies on substance use and doping (e.g., Lai, Ho, & Lam, 2004; Wiefferink et al., 2008) and doping intentions (Lazuras et al., 2010). Personal norms (also referred to as moral norms which is the term that will be used throughout the following text) were assessed with three items (e.g. ‘Doping use is against my moral principles’). Athletes responded on a 7-point Likert scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). A composite score was computed with higher scores showing a higher moral stance. Although a moral message was not included in this study, the moral norms’ measure was used to assess exercisers’ moral stance with respect to doping.

Self-efficacy over using doping substances was assessed with two measures. The first one reflected personal skills and control (i.e., perceived behavioural control, PBC) over using doping and included three items (e.g., ‘I feel in complete control over whether I will use prohibited substances to enhance my performance during this season’), measured on a seven-point scale (1 = *strongly disagree*, 7 = *strongly agree*). The second measure of self-efficacy involved the ability to resist situational pressures to engage in doping use (i.e., situational temptation). The measure, developed by Lazuras et al. (2010) was used, and included a stem proposition (‘How much would you be tempted to use prohibited doping substances to enhance your performance this season’), followed by five items (‘when your coach suggests so,’ ‘when you believe that most colleagues of yours use prohibited substances,’ ‘when you were told to enhance your performance,’ ‘when you were feeling disadvantaged’, and ‘when you prepare for an important game/competition’). Responses were given on a five-point Likert scale (1 = *not at all tempted*, 5 = *very much tempted*) with higher scores showing weaker self-efficacy. Intentions to use doping during the season were

assessed by the mean of three items (e.g., ‘I intend to use prohibited substances to enhance my performance during this season’), scored on a seven-point scale (1 = *definitely not*, 7 = *definitely yes*). A composite score was computed with higher scores reflecting higher doping use intentions.

Anticipated regret. Anticipated regret was assessed with a stem proposition (“If I use prohibited substances to enhance my performance during this season, I will...”) followed by four items (regret it; be disappointed with myself; feel bad with myself; feel shame), scored on a 7-point Likert scale (1 = *definitely not*, 7 = *definitely yes*) with higher scores indicating higher regret.

Design

Affirmation manipulation. Participants were randomized into a control (control group) and an experimental (intervention group) condition. Participants in the intervention group were exposed to the self-affirmation manipulation. The affirmation manipulation procedure developed by Reed and Aspinwall (1998) was adopted in the present study, and consisted of 10 questions designed to encourage participants to elaborate on their past acts of other-directed kindness, namely to recall and give examples of past acts of kindness, such as “Have you ever forgiven another person when they have hurt you? and “Have you ever been considerate of another person’s feelings? Participants responded on a Yes–No format. Those who responded positively were asked to elaborate further on their experiences by providing more details about their acts of kindness. Writing about such acts has been shown to be more effective in increasing message acceptance when compared to control tasks, such as writing about irrelevant issues or not writing at all (Crocker, Niiya, & Mischkowski, 2008). In the present study an active control group was used. As in

previous studies (e.g., Reed & Aspinwall, 1998) participants randomized to the control condition were given a similar self-reported task but, instead of reporting acts of kindness, they were asked to state their opinions on a range of unrelated issues, such as “I think that chocolate is the best flavor ice cream,” and “I think the beach is the best place to vacation” and to elaborate on those beliefs by providing further details.

Intervention message. A health-related message was developed based on WADA’s anti-doping campaigns and information leaflets about the health aspects of doping use. The health-related threatening message was presented including a general statement on the side effects of doping use on the body (e.g., the reproductive system, cardiovascular function, psychological disturbances) and the relationship between doping use and mortality (e.g., cancer, sudden death). Subsequently the specific side effects on cardiovascular function, on hepatic function and on the reproductive and endocrine systems, the psychological, dermatological and musculo-skeletal side effects, and other health symptoms and long term health effects of doping were described. The display of the side effects of doping on health was accompanied by related research citations in order to more explicitly demonstrate that the stated effects were supported by scientific evidence and that they did not represent lay beliefs or assumptions about the effects of doping use (e.g., the side effects of doping use identified with respect to cardiovascular function include hypertension, myocardial ischemia, and sudden cardiac death (Parssinen & Seppala, 2002).

Procedure

Three fitness instructors were contacted, and the aim and the procedure of the present study were explained. In order to facilitate the data collection process and ensure that ethical issues were not violated, the fitness instructors received brief training. They were given a weblink (URL) and were asked to provide it to exercisers within their fitness centers that were training and using nutritional supplements systematically. All fitness instructors were working in two fitness centers each. The participants were randomly assigned to the experimental and control group by random numbers generated by the system. The co-researchers were continuously recruiting athletes until reaching the critical number of 30 participants with complete data in each group. Data collection lasted approximately six months. Overall, 111 exercisers were approached and agreed to enter the weblink. Of those, 60 provided complete data. Special attention was paid to obtaining athletes' consent for participation, due to the sensitive nature of the behaviour at hand.

Results

Descriptive statistics

The means and standard deviations of the study variables are presented in Table 1. The analysis of correlation revealed moderate to high relationships among the study's variables (Table 2). To check for randomization gender distribution between the intervention and the control groups was compared. The results of a χ^2 test indicated no significant difference in proportions of males and females randomized to the control and experimental groups, $\chi^2(1, N = 60) = 2.62, p = .34$.

Table 1: Descriptive Statistics of the Present Study's Variables for Both Groups

	Experimental group		Control group	
	(n = 30)		(n = 30)	
	M	SD	M	SD
Attitudes	2.06	1.25	2.17	1.12
PBC	5.75	1.40	6.18	.92
Subjective norms	1.41	.75	1.68	.73
Moral norms**	5.40	1.80	4.23	1.93
Knowing doped athletes**	3.00	.94	3.73	1.04
Perceived prevalence (elite)*	5.37	1.32	6.13	1.19
Situational temptation	1.96	.97	2.26	.84
Anticipated regret*	5.10	2.02	3.62	1.78
Intentions	1.63	1.44	1.62	1.02

Note: PBC = Perceived Behavioural Control; higher scores in attitudes, situational temptation, norms and intentions reflect more positive beliefs towards doping, whereas higher scores in anticipated regret show more negative affect towards doping use; * $p < .05$, ** $p < .01$.

Table 2: Correlation Coefficients Among the Present Study's Variables

	2	3	4	5	6	7	8	9
1. Knowing doped athletes	.53**	.08	.13	.18	-.15	.23	-.16	.23
2. Perceived prevalence (elite)		.06	-.01	.15	-.18	.24	-.18	.12
3. Attitudes			.11	.05	-.38**	.31*	-.41**	.26*
4. PBC				-.06	-.14	.19	-.12	.10
5. Subjective norms					-.44**	.05	-.44**	.01
6. Moral norms						-.28*	.67**	-.20
7. Situational temptation							-.35**	.54**
8. Anticipated regret								-.36
9. Intentions								

Note. * = $p < .05$, ** = $p < .01$.

Effect of self-affirmation on doping intentions and related social cognitive variables

Independent samples t-test was used to assess differences in doping intentions and related social cognitions towards doping (attitudes, social and moral norms, self-efficacy beliefs, anticipated regret) between the self-affirmed and the control group (Hypothesis 1). The findings showed that self-affirmed participants reported knowing more exercisers who have used prohibited substances ($t(58) = 2.84, p < .01, \eta^2 = .07$), stronger belief that professional athletes use prohibited substances to improve performance ($t(58) = 2.35, p < .05, \eta^2 = .15$), stronger moral norms ($t(58) = -2.41, p < .05, \eta^2 = .09$), and more anticipated regret ($t(58) = -3.00, p < .01, \eta^2 = .10$) (see

Table 1). The observed effect sizes were low to moderate according to Cohen's criteria (1992; <.20 low effect size, .20-.50 medium effect size and >.50 strong effect size).

Multiple linear regression analyses (Table 3) were used to assess the predictive effects of self-affirmation manipulation and social cognitions (attitudes towards doping, social and moral norms, perceived behavioural control, situational temptation, and anticipated regret) on doping intentions (Hypothesis 2). The analysis was completed in two steps to enable the assessment of the unique effects of the self-affirmation manipulation (coded as a dummy variable, 0 = control group, 1 = self-affirmation, at Step 1), and social cognitions in Step 2. Adding doping-related social cognitive variables in Step 2, also allowed us to examine potential mediation effects (i.e., if the effects of the self-affirmation manipulation on intentions work through effects on doping-related beliefs). A significant overall model emerged ($F(7, 52) = 4.30, p < .001$) predicting 28.2% ($AdjR^2$) of the variance in doping intentions. The analysis showed that the effect of the intervention was not statistically significant in the first step, suggesting that the self-affirmation manipulation did not influence doping use intentions. In step 2, the addition of social cognition significantly increased the predicted variance in intentions by 28.2% ($AdjR^2$; R^2 change = .36, F change = 5.02, $p > .001$). Significant predictors of doping intentions in the second step of the analysis included situational temptation, and anticipated regret.

Table 3: Effect of self-affirmation on the decision-making process

Step	Predictors	β	p	Adj R^2	F
1	Intervention	.005	.973	-.01	.001
2				.28	4.30**
	Intervention	.16	.170		
	Attitudes	.01	.895		
	PBC	.00	.959		
	Subjective norms	-.09	.460		
	Moral norms	.07	.462		
	Situational temptation	.46**	.000		
	Anticipated regret	-.34*	.046		

Note. * $p < .05$; ** $p \leq .001$.

Discussion

Study 1 was designed to investigate the effect of self-affirmation manipulation on supplement users' decision about doping use. The findings revealed significant differences between the experimental and control groups in moral norms, descriptive norms, and anticipated regret. Situational temptation and anticipated regret significantly predicted doping use intentions. However, the self-affirmation manipulation did not significantly influence doping use intentions, which did not support the study's first hypothesis.

Taken together, these findings suggest that self-affirmation was not associated with intention towards doping use among exercisers who consume nutritional supplements. A potential explanation can be that exercisers held very weak intentions towards doping at the outset, so the self-affirmation manipulation could not produce significant effects (floor effect). Hence, the intention towards doping use was too low

(i.e., mean scores in both groups were around 1.60 in a 7-point Likert scale) and, it seems, that participants were not in the process of thinking to begin using doping substances (i.e., precontemplation stage). Therefore, the self-affirmation manipulation implemented was not effective in influencing exercisers intentions.

Importantly, the results showed that self-affirmed participants reported lower descriptive norms (believing that doping use is less prevalent in sports and exercise settings) as compared to non self-affirmed participants. Thus, although self-affirmation among exercisers did not produce any significant differences in intentions, it impacted normative beliefs. Evidence showed that normative beliefs are associated with doping use intentions (Lazuras et al., 2013; Ntoumanis et al., 2014). Therefore, changing such beliefs may result, in the long term, in changing intentions too. Furthermore, past research has shown that normative beliefs set the basis for self-serving explanations such as false consensus (believing that one's own behaviour is more prevalent than it actually is). Evidence from nutritional supplement and doping studies have shown that doping users overestimate the use of doping in other athletes and exercisers (Petroczi et al., 2008), and that nutritional supplement users (who do not engage in doping use) also overestimate the use of doping in others; thus, suggesting a more global self-serving process towards chemically assisted performance enhancement in both doping and nutritional supplement users. In the present study, self-affirmation appeared to have reduced the false consensus effect among supplement users. The present study is perhaps the first study to show that self-affirmation can reduce false consensus. If this is the case, this finding has important implications on better comprehending the persuasion process and could effectively be used in future interventions. Nevertheless, more studies are needed to

further explore the impact of self-affirmation manipulations on self-serving biases in the context of doping and nutritional supplement use.

In addition, self-affirmed participants reported stronger moral norms towards doping use (i.e., personal standards against doping use were made salient), as compared to control group participants. These findings are important bearing in mind that no moral message was included. A plausible explanation may lie in the effect of self-affirmation manipulation on participants' self-integrity. A core element of the self-affirmation theory is that self-affirmation restores the domains of self-integrity. Thus, it seems that when self-affirmed participants were reminded explicitly about their values virtues, they restored their self-integrity and scored higher on items pertaining to moral standards, basic principles and core values of the self.

Furthermore, the results of the analysis indicated that self-affirmed participants anticipated greater regret from doping use, as compared to non-affirmed participants. These findings are consistent with past literature on self-affirmation theory (Harris & Epton, 2009) suggesting that self-affirmation induces negative feelings about the unhealthy behaviour. Also, these findings are in line with van Koningsbruggen et al. (2016) who indicated that anticipated regret mediated the effect of self-affirmation on intentions. Indeed, non self-affirmed participants, although not doping users, reported relative low levels of negative affect towards doping use. These findings imply an important mechanism. Self-affirmation can be effective eliciting negative affective reactions towards a behaviour even among those who do not currently engage in that behaviour but are at high risk for doing so. This might imply that behaviour change is still possible even if intentions remained unchanged. Healthy intentions and behaviour can be initiated just by anticipated regret change

that was induced by self-affirmation manipulations (van Koningsbruggen et al. (2016).

This has important practical implications for doping prevention interventions targeting high risk non-users. Anticipated regret is an important predictor of intentions and actual behaviour across studies and behavioural domains (Sandberg & Conner, 2008). According to Brewer, DeFrank, and Gilkey's (2016) meta-analysis anticipated regret has a stronger predictive ability on intentions as compared with other anticipated negative emotions and risk appraisals. Thus, eliciting higher regret towards doping use among high-risk non-users can minimize the possibilities to engage in doping use in the future. Of course, more studies are needed to test for this causal effect, but the present findings suggest that this is one way self-affirmation could assist in the doping prevention struggle.

Finally, regarding the predictors of doping intentions in the present study, situational temptation and anticipated regret were the only significant predictors of doping intentions. Previous evidence suggested that situational temptation is among the most influential predictors of doping use intentions (Barkoukis et al., 2013; Lazuras et al., 2010). Thus, these findings corroborate past evidence and support that situational temptation is an important construct influencing intentions. Anticipated affective reactions are a rather underexplored area in doping research. Anticipated regret significantly predicted doping intentions in Study 1, thus showing that anticipated regret is relevant to the intention-formation process in the context of doping use, both among athletes and leisure time exercisers.

The present study was set out to test the effect of self-affirmation on doping-related cognition in exercisers being at risk for doping use. The lack of effect of self-affirmation on doping use intentions was attributed to the low intentions reported by

the participants. Therefore, in order to better understand the role of self-affirmation in relation to doping behaviour it would be beneficial to test its effect in people with higher scores in the targeted variable. Past evidence showed that doping users hold stronger intentions for future use (Lucidi et al., 2008; Ntoumanis et al., 2014). Thus, the second study was designed to investigate the effect of self-affirmation on doping use intentions in dopers.

Chapter 6

Study 2: Self-affirmation and doping use

Self-serving biases in doping use

Doping users adopt self-serving explanations for their behaviour. Compared to non-dopers, athletes who engage in doping tend to overestimate the prevalence of doping in fellow athletes (Dunn, Thomas, Swift, & Burns, 2012; Petroczi et al., 2008), and expect more benefits from doping use (Hildebrandt, et al., 2012). Projecting one's own behavioural choices to larger social groups in the form of inflated behavioural prevalence estimates is a self-serving mechanism that termed "false consensus effect" in the psychological literature, and is used for self-justification purposes (Ross, Greene, & House, 1977). Such self-serving explanatory styles may reflect a defensive processing mechanism, whereby people are motivated to defend their self-image by interpreting an otherwise self-harming behaviour (e.g., tobacco use, careless driving, unsafe sex, heavy alcohol drinking, and steroid use) or health messages related to this behaviour, in a biased manner (Miller & Ross, 1975).

Research on doping has shown that doping users tend to hold more positive outcome expectancies and attitudes towards doping use as compared to non-user athletes (Backhouse et al., 2013; Hildenbrandt et al., 2012). Accordingly, Petroczi et al. (2008) provided evidence for a false consensus mechanism by demonstrating that bodybuilders using doping substances projected their own choices and behaviour to other bodybuilders, and accordingly overestimated the prevalence of doping use in others. Similar findings were reported in a study of elite athletes (Dunn et al., 2012). Another study found that cyclists who admitted doping use perceived doping as more

socially acceptable and approved in professional cycling (Lentillon-Kaestner & Carstairs, 2010). Overall, these findings show that pro-doping behavioural choices tend to be congruent with related normative beliefs (i.e., prevalence estimates and perceives social approval) and attitudes, and this can be explained in terms of a self-justification process. As Petroczi et al. (2008) noted the overestimation of doping use in other athletes can be diagnostic of one's doping use.

The present study

So far, most of the published self-affirmation studies have focused on risk factors for non-communicable and chronic diseases (e.g., physical activity, healthy nutrition, and tobacco use), as well as condom use, careless driving, diabetes and cancer screening (Harris & Epton, 2009). There is no evidence about the effects of self-affirmation on decision-making processes for behaviours such as doping use in actual users. Doping in sports is an illegal behaviour that is followed by severe legal sanctions in many countries around the world, is unethical because it contradicts fair play and the spirit of sports, and is unhealthy because it can cause severe side effects on the user's psychological and physical health. Therefore the two main pillars of anti-doping education in competitive sport are based on the morality and health hazards of doping use. There are several campaigns (e.g., ATLAS and ATHENA interventions; Play True) in place to prevent the use of chemically-assisted performance enhancement and doping use and there is also growing research on the effects of social cognition and TPB variables on doping intentions and behaviour. For instance, Lucidi et al. (2008), Lazuras et al. (2010), and Barkoukis et al. (2013) indicated that adolescents and adult elite athletes' doping use and intentions were significantly predicted by attitudinal, self-efficacy, and social normative beliefs. Similar findings were also reported in studies with recreational athletes, such as gym

users (Wiefferink et al., 2008). Nevertheless, research on the effects of self-affirmation manipulations on the decision to use doping substances in athletes is still limited.

The present study aims to empirically assess the effects of self-affirmation on decision-making variables (attitudes, social norms, self-efficacy beliefs, and behavioural intentions) towards doping use in two samples: elite athletes and exercisers. This is the first study that will investigate the decision making process towards doping use in doping users. Past evidence has relied on samples of athletes from which only a few were using prohibited substances. Based on past research on self-affirmation (e.g., Armitage et al., 2008; Jessop et al., 2009; van Koningsbruggen et al., 2009) and doping behaviour (e.g., Lazuras et al., 2010; Lucidi et al., 2008) the following hypotheses were formed: a) self-affirmed athletes will report weaker intention to engage in doping use following exposure to health and moral messages against doping b) the effects of self-affirmation manipulation on doping intentions would be mediated by doping-related social cognitions, such as attitudes towards doping use, social and moral norms, self-efficacy beliefs, and anticipated regret.

Method

Participants

Similar to Study 1 a snowball sampling (chain referral) was used to identify dope using athletes utilizing an initial pool of three adult elite athletes that have been using doping substances during their career in sports, and two sport professionals who had also informally admitted promotion of prohibited substances to the author. They all agreed to assist in the collection of data and serve as co-researchers, similar to an

action research methodology. Eligibility criteria included systematic participation in training and professional leagues for the past five years (for athletes engaging in team sports), as well as participation in the finals of the national and/or international championships during the past five years (for athletes engaging in individual sports). Given the sensitive nature of the topic, as well as anonymity and confidentiality issues, participants were asked to complete an online questionnaire about doping use beliefs. Overall, a sample of elite dope using athletes from Greece ($N = 60$, 75% males) took part in the study. The study was granted ethics approval by the respective committee (UREC) of the University of Sheffield, and participants were informed about their participation rights, and data anonymity and confidentiality. Only their gender was recorded as a demographic variable, as the recording of other demographic characteristics (e.g., age) was perceived by participants as a potential threat to the anonymity of their responses.

Measures

Social cognitions: The same survey used in Study 1 was administered to the participants of Study 2. The survey assessed intentions and attitudes towards doping use, social norms (descriptive and subjective norms), moral norms, self-efficacy beliefs (perceived behavioural control and situational temptation), and anticipated regret. The descriptive norms items were adapted to the social context of competitive sport.

Design

Affirmation manipulation. The self-affirmation manipulation was the same as used in Study 1. The Study 1 procedure to randomize participants into control and experimental group was also adopted.

Intervention message. In Study 1 only a health message regarding the damaging effects of dope was presented. In this study an additional moral message was also provided to participants. The messages, as well as the survey, were provided on an electronic form. The health-related message was the same one provided in Study 1. The moral-related message was also presented over five screens, including the presentation of the Spirit of Sport and doping-related dilemmas. In the first screen, the Olympic Creed was presented and the Olympic Spirit was briefly discussed (e.g., the Values of Sport). In Screen 2, the values of sport were presented alongside WADA's position that 'Doping is fundamentally contrary to the spirit of sport.' In Screens 3 to 5, three moral dilemmas based on Melzer, Elbe and Brand's (2010) work on moral decision making were presented. These dilemmas were adjusted to the local cultural context and represented tempting situations that could lead athletes to the decision to dope (e.g., Helen is facing difficulties in improving her performance and she will probably be omitted from the national team. She starts thinking of using prohibited substances to enhance her performance). Following each moral dilemma, a resolution in favour of not using prohibited substances was provided to encourage athletes to develop reasoning that would help them resist doping use in these situations (e.g., Helen decided not to use prohibited substances as it would harm her health, involve lying to her family and coach, and she would feel bad about herself while using these substances).

Procedure

Three athletes and two sport professionals with knowledge on doping use were contacted and served as co-researchers. The aim and the procedure of the present study were explained to them. In order to facilitate the data collection process and ensure that ethical issues were not violated, the co-researchers received brief training. They were given a weblink (URL) and were asked to provide it to other athletes who they knew were doping users. The participants were randomly assigned to the experimental and control group by random numbers generated by the system. The co-researchers were continuously recruiting athletes until reaching the critical number of 30 participants with complete data in each group. Data collection lasted approximately one year. Due to the sensitive nature of the behaviour at hand, special attention was paid to obtaining athletes' consent for participation. Specifically, the first page of the online questionnaire included the informed consent provided by the Research Ethics Committee of the University of Sheffield providing participants information regarding the study's aim, asking them whether they had read and understand the information, informing them that their participation was voluntary and they could withdraw from the study at any time they wished, and that their responses would be confidential and would be treated solely for research purposes. In order to proceed with the questionnaire the participants ticked YES to the question 'I agree to take part in the study'. Of the 109 athletes who agreed to participate, 60 athletes provided complete data; the remainder withdrew during the completion of the questionnaire. Otherwise they were thanked, debriefed and exited the website.

Results

Descriptive statistics

The means and standard deviations of the study variables are presented in Table 4. Gender distribution across the intervention and control groups was checked. The results of a χ^2 test indicated no significant difference in proportions of males and females randomized to the control and experimental groups, $\chi^2(1, N = 60) = 2.22, p = .23$. The correlation analysis revealed moderate to strong associations among the study's variables (Table 5).

Table 4: Means and Standard Deviations of This Study's Variables

	Experimental group (n = 30)		Control group (n = 30)	
	M	SD	M	SD
Attitudes	2.83	1.73	3.50	2.04
PBC	5.53	1.38	5.82	1.15
Subjective norms	1.66	.89	1.82	1.16
Moral norms	3.92	1.27	3.50	1.24
Perceived prevalence (fellow)	56.00	29.77	54.64	30.51
Perceived prevalence (elite)	79.60	20.93	74.07	28.71
Situational temptation	2.48	1.03	3.34	.75
Anticipated regret	3.90	2.31	3.49	2.17
Intentions	2.45	2.00	3.82	2.33

Note: PBC = Perceived Behavioural Control; higher scores in attitudes, situational temptation, norms and intentions reflect more positive beliefs towards doping,

whereas higher scores in anticipated regret show more negative affect towards doping use; * $p < .01$, ** $p < .001$.

Table 5: Correlation Coefficients Among the Study's Variables

	2	3	4	5	6	7	8	9
1. Attitudes	.39**	.47**	-.48**	.44**	.10	.68**	-.78**	.73**
2. PBC		.07	-.31*	.12	.15	.25*	-.41**	.31*
3. Subjective norms			-.21	.36**	-.05	.42**	-.37**	.42**
4. Moral norms				-.39**	-.01	-.41**	.62**	-.20
5. Perceived prevalence (elite)					.25*	.29*	-.46**	.26*
6. Perceived prevalence (fellow)						-.11	-.07	-.07
7. Situational temptation							-.62**	.65**
8. Anticipated regret								-.68**
9. Intentions								

Note. * = $p < .05$, ** = $p < .01$.

Effect of self-affirmation on doping intentions and related social cognitive variables

Differences in doping intentions and related social cognitions towards doping (attitudes, social and moral norms, self-efficacy beliefs, anticipated regret) between the intervention and control groups (Hypothesis 1) were tested through independent samples t-tests. The results of the analysis showed that self-affirmed participants reported lower scores in doping intentions ($t(58) = -2.43, p = .01, \eta^2 = .09$) and higher

scores in situational temptation ($t(58) = -3.71, p < .001, \eta^2 = .19$) as compared to control group participants. Moderate and strong effect sizes respectively emerged (Cohen, 1992). In both cases, participants in the intervention group had lower scores as compared to those in the control condition, indicating lower intentions and less self-efficacy (see Table 4).

The predictive effects of self-affirmation manipulation and social cognitions (attitudes towards doping, social and moral norms, perceived behavioural control, situational temptation, and anticipated regret) on doping intentions (Hypothesis 2) was tested with multiple linear regressions analyses. In order to assess the unique effects of the self-affirmation manipulation (coded as a dummy 'intervention' variable at Step 1), and social cognitions (step 2) variables were entered into two different steps. A significant overall model emerged ($F(9, 57) = 14.41, p < .001$) predicting 67.9% ($\text{Adj}R^2$) of the variance in doping intentions – a large multivariate effect size according to Cohen (1992). At step 1, the effect of the intervention was statistically significant. At step 2, the addition of social cognition improved the overall predicted variance by 63.5%, and the effect of intervention group was reduced but still significant. Significant predictors of doping intentions at this step included attitudes, moral norms, and anticipated regret. The findings from the regression analysis are summarized in Table 6.

Indirect effects of self-affirmation on doping intentions

Multiple mediation modeling was used to assess if the effect of the intervention on doping intentions was mediated by doping-related social cognitions (Hypothesis 2). Preacher and Hayes' (2008) multiple mediation analysis was employed, using bootstrapping (1000 resamples) and confidence intervals set at 95%.

This analysis allows multiple mediators to be examined and the results show the individual effects

Table 6: Effect of self-affirmation on the decision-making process

Step	Predictors	β	p	Adj R^2	F
1	Intervention	.30**	.019	.07	5.86*
2				.67	14.41**
	Intervention	.18*	.043		
	Attitudes	.38*	.004		
	PBC	.00	.943		
	Subjective norms	.08	.371		
	Moral norms	.47**	.000		
	Perceived prevalence (elite)	-.00	.967		
	Perceived prevalence (fellow)	-.05	.553		
	Situational temptation	-.62**	.426		
	Anticipated regret		.000		

Note. * $p < .05$; ** $p \leq .001$.

of each mediator while controlling for the others. Based on the findings from the regression analysis three mediators were tested in the model, namely attitudes, moral norms, and anticipated regret. The findings showed that both direct and total effects of self-affirmation intervention on doping intentions were significant ($\beta_c = 1.366$, $p = .01$, $\beta_c = 1.064$, $p = .002$). Although the total effect was significant, there were no

significant effects from individual mediators, thus not providing support for the hypothesized mediation effects of social cognitions.

Discussion

The present study set out to investigate the effect of self-affirmation on the decision-making process in relation to doping use. Based on past research (Armitage et al., 2008; Jessop et al., 2009; van Koningsbruggen et al., 2009), it was hypothesized that self-affirmed athletes would report weaker intention to engage in doping use as compared to non-affirmed athletes. Also, it was hypothesized that the effects of self-affirmation manipulation on doping intentions would be mediated by doping-related social cognitions. The findings supported the first hypothesis, by showing that self-affirmed athletes reported weaker intentions and situational temptation scores as compared to non-affirmed participants. In addition, the regression analysis showed that the self-affirmation manipulation maintained a significant effect over and above social-cognitive determinants of doping intentions, such as moral norms, attitudes towards doping, and anticipated regret. However, this effect was not mediated by the social-cognitive determinants of doping use and this is in contrast to the second hypothesis of Study 1.

Additionally, the present findings are consistent with past research that demonstrated direct effects of self-affirmation manipulations on behavioural intentions (e.g., Armitage et al., 2008; Jessop et al., 2009; van Koningsbruggen et al., 2009). The present study extends these findings by also showing an effect of self-affirmation on situational temptation (efficacy to resist doping in risk-conducive situations). This is important because situational temptation has been found to be the strongest predictor of doping intentions in previous studies, over and above social

cognitive variables, motivation, and moral beliefs or orientations (Barkoukis et al., 2013; Lazuras et al., 2010). Similar to Barkoukis, Lazuras, and Tsorbatzoudis, (2014) these finding suggests that in some ways situational temptation could reflect intentions under particular. However, within TPB, situational temptation has been conceived as a form of situational self-efficacy resembling perceived behavioural control. Furthermore, situational temptation has been associated with the activation of self-regulatory actions. Therefore, in this sense temptation precedes intentions and taps onto different processes (Kroese, Evers, & Ridder, 2009). Therefore, situational temptation is highly related but conceptually and theoretically distinct from intentions. Still, it may serve as an individual risk factor for doping use with direct effects on behaviour and as an indirect measure of doping susceptibility (Barkoukis et al., 2013).

The present findings show that, after making salient the health (e.g., doping can lead to irreversible health effects) and the moral aspects of doping use (e.g., doping is against the Spirit of Sports and fair play), self-affirmed doping users reported weaker intentions to continue using doping substances, and less temptation to engage in doping under specific risk conducive situations. This is important because no previous studies have assessed the influence of doping-related information (e.g., health and moral aspects of doping use) on doping-related intentions and social cognitions in high-risk groups (i.e., athletes who use doping substances).

However, the self-affirmation manipulation did not influence other components of the intention-formation process, such as attitudes, moral norms, and anticipated regret. These findings may be attributed to the fact that doping use is a goal directed behaviour which acts as a means to achieve success or other important goals in the sport domain. A potential explanation of this finding is that the athletes'

beliefs towards doping use and related affective responses might have been established in early stages of doping use, and the brief self-affirmation manipulation employed was not effective in changing them. Self-affirmation was effective in changing well-established beliefs related to behaviours such as smoking and condom use (Epton & Harris, 2009). However, doping use is both an illegal and unethical behaviour and, perhaps, athletes' beliefs are more persistent in order to protect their self-worth.

Another plausible explanation may lie on the content of the messages. The health related message was designed in order to provide information about the health consequences of doping use in various body systems. Although knowledge has been associated with attitudes with respect to doping (Fung & Yuan, 2006), it is possible that this message was not appropriate to change attitudes, or the other variables under study. Similarly, the moral message may be was not appropriate in changing doping related social cognition. This was further corroborated by Elbe and Brand (2015) who reported that these messages could not influence doping use intentions in their sample. Furthermore, the acceptance of the message was not measured. This might imply that the participants did not understand the messages well or did not actually endorse them. In future manipulations the content of the message should be developed along the TPB premises on forming or changing attitudes and other behaviour-related cognitions and measures of message acceptance should be included.

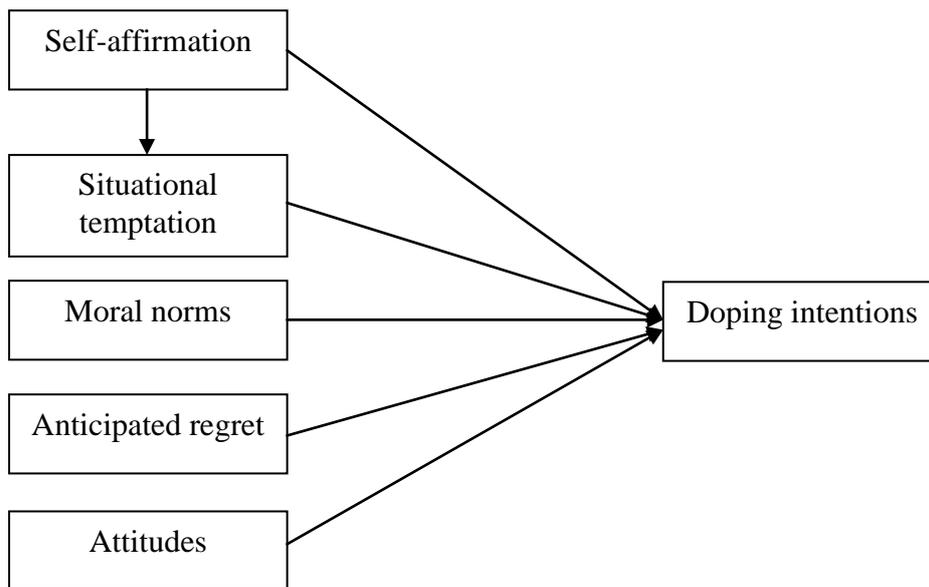
The second hypothesis of the present study related to the unique effect of social cognitions on doping use intentions and the possible mediating role of social cognition on the effect of self-affirmation on intentions. Attitudes, moral norms and anticipated regret emerged as significant predictors of doping use intentions, and this is in agreement with past studies (Barkoukis et al., 2013; Lazuras et al., 2010; Lucidi

et al., 2008). Also, attitudes in the present study predicted doping intentions, over and above the effects of self-affirmation. Furthermore, anticipated regret and moral norms have a well documented association with intentions and actual behaviour in past research (e.g., Abraham & Sheeran, 2004; Armitage & Conner, 2001; Godin et al., 2005) but it is the first time they were assessed in the context of doping use, and their effect on intentions independently of other predictors and self-affirmation should be remarked. It appears that for elite athletes who use doping substances, beliefs that reflect personal moral standards and anticipated negative affect are pertinent to the decision to dope. However, in contrast to the second hypothesis of the study (i.e., social cognition will mediate the effect of self-affirmation on doping use intentions), the findings from mediation analysis did not support a mediation effect. This implies that in the process of intention-formation, self-affirmation exerts a significant influence on doping intentions independently of doping-related beliefs, such as attitudes, moral and social norms, and anticipated regret. Hence, self-affirmation and content of the message can be seen as independent predictors of doping intentions that can exert a significant influence on intentions, on top of other correlates (Figure 1).

The present study is not free of limitations. Firstly, a message acceptance measure was not used to assess the effects of the content of the message on doping intentions and on the decision-making process. Past studies of self-affirmation have used different ways to assess message acceptance, and have shown a significant effect of self-affirmation on this variable (Epton & Harris, 2008; Sherman et al., 2000). Nonetheless, message acceptance can explain only part of the decision-making process and in this study the main focus was on the effects of self-affirmation on intention-formation and on doping-related beliefs among athletes who already engaged in doping. Secondly, the size of the sample was rather small and this could

have an effect on the statistical power of the analyses. Some of the non-significant effects could turn significant with a larger sample of participants and greater statistical power.

Figure 1. Effects of self-affirmation and social cognition on doping intentions



However, getting access to large samples of athletes who use doping substances and openly confess this in self-reported studies is a rather difficult task. Also the present study assessed only the short-term effects of self-affirmation manipulation and there cannot be any safe conclusions about the long-term effects of this manipulation. Accordingly, it cannot be predicted from the findings of the present study whether the observed effects of self-affirmation on the intention-formation process are necessary and sufficient to actually prevent athletes from using doping in the future.

Notwithstanding these limitations the strengths of the study should be also noted. Firstly, this is the first study to assess self-affirmation in the context of doping

use, and this broadens the existing literature about the social cognitive models of doping intentions and behaviour. Secondly, the present study used a high risk group, namely actual doping users, and not non-athletes or college students who engage in sports and have little or no experience in doping use which has been a limitation of previous studies (e.g., Lucidi et al., 2008). This adds value to the doping literature because there are very few studies assessing doping-related beliefs and intentions among elite athletes who dope. Hence, the present findings can have direct implications for preventive interventions in high risk groups. Thirdly, the effects of moral norms and anticipated regret were tested for the first time in relation to doping use, and the present findings show that these variables are highly relevant to doping intentions among elite level athletes who dope. Overall, the present study provides preliminary evidence that the application of self-affirmation manipulations may be useful in future prevention interventions as they have an impact on important predictors of doping use and may influence the decision making processes.

However, similar to study 1, the present study did not measure the acceptance of the provided messages. Still, the content of the message and its acceptance may have influenced the effect of self-affirmation manipulation on athletes' cognition. Therefore, it seems important to include such measures of message acceptance in order to better understand why and how a self-affirmation manipulation can influence the decision making processes towards doping use. Furthermore, the present study did not take into account the extent to which athletes were considering doping use in general. Doping use has been associated with negative side effects in the long term but the immediate effects are rather positive. Therefore, these immediate effects may have biased athletes responses with respect to future doping use. In future

manipulations it would be beneficial to control for the athletes' general stance about doping use.

Chapter 7

Study 3: Self-affirmation, message acceptance and mental construal in dope users

The previous two studies tested the effect of self-affirmation on doping intentions and tested the mediating role of social cognition. However, there is evidence in the self-affirmation theory tradition that the effect of self-affirmation on intentions and behaviours is through an increase in the acceptance of the provided message (Armitage et al., 2008; Harris & Epton, 2009; Harris & Napper, 2005; Sherman, & Cohen, 2002; Sherman, Nelson, & Steele, 2000). With respect to doping behaviour and doping-related cognition there is no evidence about the role of message acceptance on the effects of self-affirmation on the decision-making processes. In addition, mental construal has been suggested as a psychological construct that may influence the decision making processes. Construal has been defined as the process through which individuals perceive, comprehend, and interpret their environment (Trope & Liberman, 2010). It reflects the process through which people organize the information provided by the environment about a specific behaviour. In turn, this information is used to respond in different behaviour related cues. An individual's reaction to an event or behaviour is based on their interpretation of the facts, hence, their mental construal. Mental construal involves predictions, memories and speculations that are not directly related to actual experiences (Trope & Liberman, 2010). Through mental construal individuals can predict their own future and others' reactions and behaviours, bring memories to the present, and make predictions about future behaviours (Trope & Liberman, 2010).

According to Trope and Liberman (2010) perceptions of almost all behaviours are influenced by individuals' mental construal. The influence of mental construal is determined by the psychological distance between the individual and the behaviour (Sodenberg, Callahan, Kocherberger, Amit, & Ledgewood, 2015). Psychological distance relates to different levels of mental construal with more distant behaviours associated with higher construal levels, whereas closer behaviours are construed at a lower level (Trope & Liberman, 2010; Trope, Liberman & Wakslak, 2007). For instance, athletes thinking in a high-level construal (i.e., more distant) will be less likely to have strong intentions to use doping to increase performance for an upcoming competition, while for those thinking in a low-level construal (i.e., more close) is expected to report stronger pro-doping intentions. Athletes with high-level construal perceive and evaluate the long term effects of doping use and, thus, are expected to report lower intentions. On the other hand, athletes with lower-level construal focus on the immediate effects of the behaviour (i.e., the positive effects of doping use on muscle mass) and, therefore, report higher intentions for future doping use. According to mental construal theorists, construals help individuals interpret their environment through the available information, form mental representations and project them when a similar situation arises (Wilson, Wheatley, Meyers, Gilbert, & Axson, 2000). In this sense, the predictions of future experiences would therefore be more schematic than the actual experiences as a result of prediction biases (Gilbert & Wilson, 2007; Kahneman, Krueger, Schkade, Schwarz, & Stone, 2006) and it is expected that high-level construals will more accurately predict distant behaviours than close ones. Eyal, Liberman, Sagristano, and Trope (2004) and Sagristano, Trope, Eyal, and Liberman (2006) supported this conception by showing that high-level

construals, such as general attitudes and values, predicted more strongly intentions for distant future behaviours as compared to close future ones.

The study of mental construal is relevant to doping research as athletes, and especially doping users, form mental representations that may influence their decision to engage in doping practices. More specifically, doping users adopt self-serving explanations for their behaviour. Compared to non-dopers, they overestimate the prevalence of doping in sport (Dunn, Thomas, Swift, & Burns, 2012; Petroczi et al., 2008), have more positive outcome expectancies and attitudes towards doping use (Backhouse et al., 2013), perceive doping as more socially acceptable and approved behaviour (Barkoukis et al., 2015; Lentillon-Kaestner & Carstairs, 2010), and report more benefits from doping use (Hildebrandt et al., 2012). These findings imply that doping users have developed a mindset favorable to doping use. In addition, nutritional supplement users share similar performance enhancement representations with doping users and have developed reasoning patterns in favor of doping use (Lazuras et al., 2015). Such self-serving explanations develop higher-level construals towards doping use which are construed in a biased manner. Hence, it is expected that psychological distance (i.e., concrete or abstract construal) may influence the decision making process towards doping. Past evidence has showed that self-affirmation can influence mental construal. For instance, Smeichel and Vohs (2009) indicated that self-affirmed participants demonstrated higher-level construals as compared with non self-affirmed participants. In this line, Creswell et al. (2007) also reported that self-affirmation buffered stressed and allowed breast cancer patients to perform better in high level construal activities, such as expressive writing about cancer-related thoughts and feelings. Furthermore, Harris, Harris and Miles (2017) demonstrated that self-affirmation improved participants executive functioning. This finding implied

that self-affirmation can influence self-regulatory behaviors that are associated with high mental construal. Overall, this evidence suggests that self-affirmation can elicit high levels of mental construal.

The present study

Based on the above review of message acceptance and mental construal, the present study was designed to investigate the role message acceptance and mental construal may have on the association between self-affirmation and doping related social cognition (attitudes, subjective and descriptive norms, self-efficacy beliefs, and behavioural intentions). Similar to Study 2, this study will investigate the effect of self-affirmation on athletes using doping substances. However, in the present study the athletes of the sample will be involved in recreational physical activities. These athletes do not face legal or time limitations with respect to doping use and can plan doping use either for the short or long term. Thus, it was expected that the role of mental construals could be more easily examined in this population than in competitive level athletes.

Based on Studies 1 and 2 and past research on self-affirmation and message acceptance (e.g., Harris & Epton, 2009; Harris & Napper, 2005), mental construal (Sodenberg et al., 2015; Trope & Liberman, 2010; Trope et al., 2007) and doping behaviour (e.g., Lazuras et al., 2010; Lucidi et al., 2008) it was hypothesised that: a) self-affirmed athletes will report weaker intention to engage in doping use following the presentation of a health related message against doping and b) the effects of self-affirmation manipulation on doping intentions would be mediated by message acceptance, mental construal and doping-related social cognitions.

Method

Participants

Similarly to Study 1 and Study 2 a snowball sampling (chain referral) was used to identify dope using exercisers. An initial pool of five fitness instructors was approached and asked to provide assistance in data collection. All fitness instructors agreed to approach exercisers who had admitted doping use to them and provide them the survey. Eligibility criteria included systematic participation in training for the past five years and use of doping substances. Overall, 68 exercisers (53 males) using doping substances participated in the study. Similar to the previous studies an ethics approval by the respective committee (UREC) of the University of Sheffield was granted. Participants were informed about their participation rights, and data anonymity and confidentiality and signed an informed consent form. Only their gender was recorded as a demographic variable to further ensure the anonymity of participants' responses.

Measures

Mental construal: The Construal Level Identification Form (CLIF) developed by Allard and Griffin (2013) was used to measure the extent to which individuals' mindsets are characterized by psychologically distant or close perspectives. The CLIF consists of fourteen pairs of items. Each pair contains one psychologically close and one psychologically distant item (example pairs are 'Near – Far', 'Friend – Enemy', 'Self – Others' and 'Specific – General'). In each pair, participants were asked to select 'the word that best fits my frame of mind right now'. The psychologically close item was rated with 0 and the psychologically distant item with 1. An average score was produced resulting in a psychological distance index with a range between 0 and

1. Higher scores on the CLIF measure indicate a psychologically distant mindset at the moment of the completion of the measure.

Message acceptance: Acceptance of the provided health message was measured with eight items similar to those used in past research (Harris & Napper, 2005). These items measured participants understanding of the existence of negative side effects of doping use (e.g., ‘There is an association between doping use and negative health side effects’) and their severity (e.g., How threatening did you find the message about the negative health side effects of doping?). Responses were anchored on a 7-point Likert scale ranging from 1 (negative pole) to 7 (positive pole). A composite score was produced with higher scores indicating higher acceptance of the provided message.

Social cognitions: The same survey used in Study 1, with the exception of moral norms, was administered to the participants of Study 3. In this study a paper and pencil survey was used. The survey assessed intentions and attitudes towards doping use, social norms (descriptive and subjective norms), self-efficacy beliefs (perceived behavioural control and situational temptation), and anticipated regret.

Design

Affirmation manipulation. The self-affirmation manipulation was the same as in Study 1. With respect to the randomization of participants into control and experimental group the surveys provided to the fitness instructors into envelopes randomly classified. The fitness instructors were not aware of the existence of a manipulation and were asked just to provide the envelopes to the participants.

Intervention message. Similarly to Study 1 only a health message was presented to participants. The health-related message was the same one provided in Study 1.

Procedure

Five fitness instructors were asked to administer a survey on exercisers using doping substances. The surveys were in envelopes and the fitness instructors were not aware of the manipulation; they were asked to administer the envelopes to the exercisers. The fitness instructors were continuously recruiting exercisers until reaching the critical number of 60 participants with complete data. Data collection lasted approximately one year. Due to the sensitive nature of the behaviour at hand, exercisers provided consent for participation. The first page of the survey included the informed consent provided by the Research Ethics Committee of the University of Sheffield providing participants information regarding the study's aim, asking them whether they had read and understood the information, informing them that their participation was voluntary and they could withdraw from the study at any time they wished, and that their responses would be confidential and would be treated solely for research purposes. In order to proceed with the questionnaire the participants had to sign the consent form.

Results

Descriptive statistics

The means and standard deviations of the study variables are presented in Table 7. The analysis of correlation revealed moderate to high relationships among the study's variables (Table 8).

Effect of self-affirmation on doping intentions and related social cognitive variables

The differences in mental construal, message acceptance and doping related variables (attitudes, subjective and descriptive norms, perceived behavioural control, situational temptation, anticipated regret and intentions) between the intervention and control groups were tested via an independent samples T-tests (Hypothesis 1).

Table 7: Means and Standard Deviations of the Study's Variables

	Experimental group		Control group	
	(n = 31)		(n = 37)	
	M	SD	M	SD
Distance	4.51	2.04	3.86	2.52
Message acceptance	5.00	1.63	5.47	1.17
Attitudes	4.64	1.70	5.04	1.48
PBC	5.65	1.35	5.69	1.28
Subjective norms	2.17	1.49	1.67	.86
Descriptive norm	51.76	20.80	47.20	20.41
Situational temptation	2.69	1.17	2.55	1.09
Anticipated regret	3.13	2.07	3.54	2.07
Intentions	3.21	2.41	2.59	2.18

Note: PBC = Perceived Behavioural Control; higher scores in attitudes, situational temptation, norms and intentions reflect more positive beliefs towards doping, whereas higher scores in anticipated regret show more negative affect towards doping use; * $p < .01$, ** $p < .001$.

The results of the analysis indicated no significant differences between the two groups in all tested variables. With respect to distance ($t(65) = -1.91, p = .059$) and

subjective norm ($t(65) = -1.71, p = .091$) a tendency for statistical significance was found but the results did not reach significance. In both cases, participants in the intervention group had higher scores as compared to those in the control condition (see Table 7).

Table 8: Correlation Coefficients Among the Study's Variables

	2	3	4	5	6	7	8	9
1. Distance	-.18	.04	-.06	.10	.15	-.01	.03	.22
2. Message acceptance		-.58**	-.18	-.77**	-.07	-.47**	.56**	-.52**
3. Attitudes			-.15	-.58**	-.04	-.63**	.38*	-.51**
4. PBC				.21	.25*	.34**	-.32**	.17
5. Subjective norms					.16	.40**	-.52**	.57**
6. Descriptive norm						.20	-.23	.16
7. Situational temptation							-.48**	.70**
8. Anticipated regret								-.51**
9. Intentions								

Note. * = $p < .05$, ** = $p < .01$.

Multiple linear regression analyses were used to assess the predictive effects of self-affirmation manipulation, mental construal, message acceptance and social cognitions (attitudes towards doping, subjective and descriptive norms, perceived behavioural control, situational temptation, and anticipated regret) on doping intentions. The analysis was completed at four steps in order to assess the unique effects of the self-affirmation manipulation (coded as a dummy 'intervention' variable at Step 1), mental construal (step 2), message acceptance (step 3), and social cognitions (step 4). A significant overall model emerged ($F(9, 55) = 10.71, p < .001$)

predicting 57.7% ($AdjR^2$) of the variance in doping intentions – a large multivariate effect size according to Cohen (1992). At step 1, the effect of the intervention was not statistically significant. At step 2, the addition of mental construal did not significantly improve the predicted variance ($R^2_{change} = .10$, $\beta = .10$, $p = .422$). The addition of message acceptance at step 3 improved the overall predicted variance by 21.7% with message acceptance emerging as a significant predictor of doping intentions. The addition of social cognitive variables at step 4 further improved the overall predicted variance ($R^2_{change} = .39$). In this step, the effect of message acceptance became non significant. Significant predictors of doping intentions at this step included subjective norm, and situational temptation. The findings from the regression analysis are summarized in Table 9.

Discussion

Study 3 was designed to extend the previous studies and examine in depth the underlying process through which self-affirmation influences the decision making process. Following the results of Study 1 and 2 with respect to nutritional supplements and doping substances on both competitive and recreational athletes, it was hypothesized that the self-affirmation manipulation will positively influence doping-related cognition and intention in recreational sport doping users. In addition, based on prior evidence (Armitage et al., 2008; Harris & Epton, 2009; Harris & Napper, 2005; Sherman, & Cohen, 2002; Sherman et al., 2000) increased message acceptance was considered as a variable that is influenced by self-affirmation and can influence in turn the decision making process towards doping use. Thus, it was hypothesized that message acceptance would mediate the effect of self-affirmation manipulation on doping-related cognition and intentions. Furthermore, another psychological construct that can influence decision making processes both in the near and distal future is

mental construal. In the present study it was assumed that self-affirmed participants will establish a concrete mental construal on the effects of doping use on health that

Table 9: Effect of self-affirmation on the decision-making process

Step	Predictors	β	p	Adj R^2	F
1	Intervention	.13	.280	.003	1.18
2				.003	.91
	Intervention	.11	.366		
	Mental construal	.10	.422		
3				.20	6.61*
	Intervention	.03	.784		
	Mental construal	.09	.417		
	Message acceptance	-.47	.000		
4				.57	10.71*
	Intervention	.03	.660		
	Mental construal	.10	.212		
	Message acceptance	.15	.273		
	Attitudes	.09	.470		
	PBC	-.13	.163		
	Subjective norms	.43*	.004		
	Descriptive norms	-.04	.628		
	Situational	.59*	.000		
	temptation	-.20	.069		
	Anticipated regret				

Note. * $p \leq .001$.

will influence the decision making process towards doping use, especially in doping users. Thus, it was expected to mediate the effect of a self-affirmation manipulation on the doping-related cognition and intention of doping users. The results of the analyses did not support the abovementioned hypotheses.

More specifically, with respect to the first hypothesis the analyses indicated that self-affirmation manipulation did not significantly predict doping use intentions. Instead, message acceptance emerged as a significant predictor when entered in the analysis and its effect was subsequently explained by its correlation with subjective norm and situational temptation. Mental construal did not show any effect on doping use intentions. These findings contradict the previous studies that showed a significant effect of self-affirmation manipulation on nutritional supplement and doping intentions. Also, they contradict previous evidence suggesting a positive effect of self-affirmation on intentions towards unhealthy behaviours (Armitage, 2008; Cohen & Sherman, 2014; Cornil, & Chandon, 2013; Sweeney & Moyer, 2015). One possible explanation might lie in the data collection process. Data collection lasted approximately one year. Therefore, it is possible that participants were in different cycles with respect to doping use; some might have been on use and others not; before or after a doping cycle. This might have influenced the impact of the manipulation and the role of mental construal and message acceptance. For instance, athletes being on a doping cycle may have differentially interpreted the manipulation as compared to athletes in a recovery phase. Similarly, athletes in the beginning of the training season when planning for training and performance enhancement methods may have reacted differently than those in the middle and/or the end of the season that decisions regarding doping use had been made. Future studies should try to further investigate the effect of the training and doping use seasonality in order to provide indicators of

how they may influence the decision making process and when it is more suitable to intervene.

Importantly, message acceptance significantly predicted doping use intentions. This finding implies that understanding the health hazards of doping use may be an important component of anti-doping education in recreational sport. This is of great importance considering that doping use in recreational sports is rather uncontrolled and no formal education campaigns exists compared to competitive sport. Also, recreational sport athletes obtain information from non reliable sources, such as the internet, and may not be fully aware of the health side effects of doping use. Hence, providing information and ensuring that it is endorsed by the athletes may be a useful practice to educate recreational sport athletes. Still, the measure used to assess message acceptance largely resembles measures of attitudes. In this case, it may be that this measure estimated participants' attitudes too, and not only the acceptance of the provided message. Future studies need to use more explicit measures of message acceptance that do not incorporate the measurement of attitudes.

Furthermore, it seems that the role of social environment, expressed through compliance with significant others and resisting social pressure is also an important factor determining the decision of recreational sport athletes to dope. Future anti-doping campaigns should take these findings into consideration, and incorporate health-related messages and address the role of social environment. Self-affirmation did not emerge as a process that can enhance the effect of such practices in the decision making process. Still, taking into consideration Study 1 and 2, and the limitations of the sample in the present study, it should be considered as a strategy with a potential to influence doping-related cognitions and behaviour. Clearly, more

evidence is warranted to support the usefulness of self-affirmation manipulations in both predicting and tackling doping-related cognitions and behaviour

With respect to the second hypothesis, neither message acceptance nor mental construal mediated the effect of self-affirmation manipulation on doping use intentions. This could be a product of the lack of direct effect of self-affirmation on doping intentions. However, Hayes and Preacher (2013) argued that a mediation effect can exist even when a direct effect between the independent and dependent variables is not evident. This was not found in the present study. Hence, the absence of a mediation effect is mainly attributed to the small amount of variance in doping intentions explained by self-affirmation that did not allow mental construal and message acceptance to share common variance.

Besides the statistical reasons underpinning this finding, theoretical explanations can be extracted as well for mental construal. More specifically, mental construal was expected to establish a concrete interpretation of a health-related message in order to influence intentions to use doping in the immediate future (i.e., low-level construals). However, the effects of doping use on health are evident in the long term and perhaps a focus on a more abstract interpretation of the health side effects would have been more beneficial. For instance, it is possible that the athletes had developed an optimism bias belief towards the effect of doping use on their health. In this case, a concrete construal focusing on the near future that was employed in the present study asking participants to declare their intentions to use doping substances in the upcoming season may not be appropriate to describe the decision making process. On the other hand, putting the long term perspective of health and developing a higher-level construal might be more effective in predicting cognition and behaviour. This is consistent with Eyal et al. (2004) and Sagristano et

al. (2006) findings that higher-level construals may more accurately predict intentions for behaviours in the distant future. If this is the case, mental construal could be used to help doping users focus on the unpleasant long term consequences of doping use, rather than the immediate positive and impressive results. Nevertheless, more evidence is needed to identify the role of mental construal in understanding doping behaviours and its potential to assist in anti-doping education.

Despite the strengths of the present study, it is not free of limitations. Firstly, the frequency and “heaviness” of doping use was not assessed. Although all participants had a lifetime experience with doping use, their current doping behaviour was not measured; both in terms of engagement in the behaviour and the level of involvement (i.e., systematic vs occasional; heavy vs light use). It is therefore possible that the current doping behaviour may have distorted the data with respect to mental construal and message acceptance. In line with this, patterns of substance use were not assessed. It is possible that the frequency of substance use and the type of substances used may be associated with health risk perceptions for doping. Previous evidence (e.g., Barkoukis et al., 2015) showed that doping users reported more positive beliefs and attitudes towards doping than non-users. Hence, it is possible that existing doping related patterns have influenced participants’ mental construal, message acceptance and the overall decision making process. In addition, the periodization of the training was not taken into account during the study. Therefore, it cannot be estimated whether an athlete completed the survey while being in a doping cycle, before that cycle or after. In addition, the frequency of doping cycles was not measured and, thus, it is not possible to know whether they influenced the decision making process for doping use and mental construals. Finally, in the present study a newly developed measure of mental construal was used, instead of the typical

measure developed by Vallacher and Wegner (1989) that has been extensively used in the literature. This measure was preferred due to its simplicity and easiness to complete. Although both measures address mental construal similarly, possibly using a more established and robust measure of construal could have produced different results.

Chapter 8

General Discussion

The objective of the present thesis was to investigate the effect of self-affirmation on the decision making processes involved in doping during competitive and recreational sports. In this respect three studies were conducted. In Study 1 the effect of self-affirmation on decision making processes towards doping use was tested on fitness exercisers using nutritional supplements but not doping substances. The results of this study indicated that self-affirmation did not predict doping use intentions due to a ceiling effect on participants' scores on intentions. However, self-affirmation influenced participants' normative beliefs, moral norms and anticipated emotions about doping use. These findings suggest that self-affirmation may be useful in building an anti-doping culture in nutritional supplement users.

Participants' low scores of doping intentions being responsible for non significant effects of the self-affirmation implied that the self-affirmation manipulations should be tested with participants with higher in doping use intentions. Thus, Study 2 repeated Study 1 in a sample of competitive athletes who admitted doping use. The results supported the hypothesis that self-affirmation would predict doping use intentions. More specifically, self-affirmed athletes reported weaker doping use intentions as compared to non self-affirmed ones. This effect was direct and it was not mediated by social cognitive variables relevant to doping use (e.g., attitudes, social norms etc.). These findings highlight the role that self-affirmation can play in influencing the decision making processes towards doping use in users.

However, Studies 1 and 2 did not include measures of message acceptance. Hence, it is difficult to explain how self-affirmation influence this decision making

process. In order to better understand this effect Study 3 was conducted including measures of message acceptance and mental construal. Past research has shown that message acceptance (Harris & Epton, 2009) and mental construal (Sodenberg et al., 2015) can influence the decision making process towards unhealthy behaviours. Based on the findings from Study 2 that self-affirmation is impactful in doping users that report higher scores on doping use intentions, this study was performed with fitness exercisers using doping substances. The results of the analyses indicated that self-affirmation manipulation did not predict doping use intentions. Similarly, no significant effect was found for mental construal. However, message acceptance significantly predicted doping use intentions. These findings indicate that message acceptance may influence the decision making process towards doping use.

Taken together the results of the three studies provide valuable information about the role of self-affirmation in influencing the decision making process towards doping use. More specifically, the three studies indicated that the effect of self-affirmation manipulation and social cognition on doping use intentions varied to a notable extent implying a different mechanism associated with the formation of doping use intentions in dopers and non-dopers, competitive and recreational sports. These findings have important theoretical and practical implications for doping-related prevention interventions.

Effect of self-affirmation on doping use intentions

Self-affirmation was found effective in modifying doping use intentions in competitive sport athletes using doping substances in Study 2. It was not effective when tested with non-dopers or recreational athletes using doping substances in Studies 1 and 3. A notable difference between these sets of studies was the inclusion

of a moral-related message in Study 2. It seems that self-affirmation was most effective when a moral message was presented to participants next to a health-related one. When the health-related message was presented alone, self-affirmation was not able to directly predict doping use intentions. This indicates an important association between self-affirmation and morality.

This association is in line with self-affirmation definition and theoretical predictions (Steele, 1988). More specifically, self-affirmation is defined as the act of bolstering or restoring a perception of oneself as ‘adaptive and morally adequate’ (Epton et al., 2014). Hence, morality is an inherent part of the self-affirmation process. This implies that people may be more prompt to moral messages as they comply with the act of self-affirmation. That is, self-affirmed people who perceive themselves as morally adequate endorse more effectively messages that support morality. A possible explanation for this association may lie on self-affirmation theory’s proposition that through self-affirmation people restore their self-integrity (Steele, 1988). In this sense, people are more susceptible in messages that further support the integrity of the person and highlight what is a morally adequate behaviour in a specific context. This assumption was supported in Study 2 which was the only one of the studies that included a moral message and showed a significant effect of self-affirmation on doping use intentions.

This is further corroborated by the findings of Study 1 pertaining to the effect of self-affirmation on moral norms despite the absence of a moral message. This finding is important considering that in recreational sports doping use is not illegal and, hence, it is not considered unethical; no rules are violated and no advantage is gained over other competitors. Hence, no influence on moral-related variables was expected as a result of the provided health message. Therefore, the explanation of this

finding may be ascribed on the theory's proposition that self-affirmation restores self-integrity and makes people feel morally adequate. In this sense, being self-affirmed influences beliefs about morality in a specific context as well.

Another notable difference between these sets of studies (i.e., Study 2 and Studies 1 and 3) is that Study 2 included competitive sport athletes, whereas the other two recreational sport athletes. The different sporting context might have influenced the effect of self-affirmation on doping use intentions. An important difference between these contexts in terms of doping use is the regulatory framework. In competitive sports there is a strict regulatory framework including doping controls and sanctions to athletes violating anti-doping rules. Notably, these rules include not only use of doping substances but also other activities related to doping such as possession, trafficking, and promotion of doping substances, tampering or avoiding doping controls etc (WADC, 2017). The sanctions may range from a public warning to life time suspension from sport competitions. In addition, several sport authorities run anti-doping campaigns that largely rely on the health side effects and the morality of doping use. On the other hand, there is no regulatory framework to control doping use or anti-doping campaigns in recreational sports not involving competitions.

This difference in the regulatory framework might have been responsible for different results found. More specifically, it is possible that competitive sport athletes who use doping are aware that they are doing something morally wrong and potentially harmful to their health and career. In addition, they probably feel more negative emotions from doping use. If this is the case, self-affirmation manipulation made them feel more morally adequate, reflect on their core values and resulted in lower doping use intentions. This is corroborated by the significant effect moral norms and anticipated regret showed in this study.

On the other hand, in recreational sports, athletes may not perceive that they are doing something wrong as doping use is not prohibited in this context. Also, they may have biased information on the health side effects of doping use. Notably, none of the available websites providing information on supplements for recreational sports provide evidence on the health hazards of doping use. Thus, they may have formed a biased belief about how doping use influences health and have no moral constraints to dope. If this is the case, self-affirmation manipulation was not strong enough to change their doping use intentions even to doping users who had relatively higher scores on future doping use intentions.

Overall, the findings of the studies offer important information about the usefulness of self-affirmation in predicting intentions towards health and moral related behaviours. The present studies show that the effect of self-affirmation is stronger when people are properly informed about the effects of the behaviour at hand and there are moral concerns about the behaviour. This is in line with Epton et al. (2014) who reported that the effect of self-affirmation is stronger when the threat was proximal. In Study 2 competitive sport athletes should have been aware of both the health and moral hazards of doping use due to the existent anti-doping campaigns and interactions with coaches and sport personnel. Whereas in recreational sports, such anti-doping campaigns are limited, if existent at all, and thus the threat may not be apparent to the athletes.

Effect of self-affirmation on doping use related cognition

Besides doping use intentions, self-affirmation manipulations were able to influence several social-cognitive variables related to the decision to dope, such as attitudes, towards doping use, moral norms, situational temptation to dope, and

anticipated regret. More specifically, in Study 1 with recreational athletes using nutritional supplements participants in the self-affirmation manipulation condition reported higher scores on descriptive and moral norms, and anticipated regret as compared to those in the control condition. Similarly, in Study 2 with competitive sport athletes using doping substances participants in the manipulation condition reported lower scores in situational temptation as compared to those in the control condition. No significant differences emerged between the experimental and control conditions in Study 3 with recreational exercisers who use doping substances.

These findings indicated that self-affirmation can influence the decision to dope indirectly through its effect on social cognition. Importantly, self-affirmation influences different social cognitive variables depending on the context and people's behaviour. This is in line with past research showing that self-affirmation manipulations improved poor's people executive control, fluid intelligence and willingness to benefit from participation in programs but did not influence them in wealthy participants (Hall, Zhao & Shafir, 2013). The present studies showed no effect on social cognition of recreational athletes using doping substances but a significant effect on social cognition of recreational athletes using nutritional supplements and competitive athletes using doping substances. It seems that self-affirmation may be effective in altering specific social cognitive variables in specific contexts. For instance, in non doping users self-affirmation positively influenced moral norms and anticipated regret. This is extremely important for anti-doping interventions as previous research on doping indicated that for non-doping users morality and anticipated emotions can be important protective factors against doping use (Barkoukis et al., 2013; Lazuras et al., 2015, 2017b; Ring & Kavussanu, 2017). Similarly, for doping users' self-affirmation positively influenced situational

temptation which again is among the most significant predictors of doping intentions and doping behaviour (Barkoukis et al., 2013; Lazuras et al., 2015; Mallia et al., 2016; Ring & Kavussanu, 2017).

Overall, these findings demonstrated that self-affirmation can be used as a mean to alter the social cognitive variables that influence the decision making process towards doping use and, thus, be used in anti-doping interventions. However, these findings support that in terms of anti-doping self-affirmation should target specific social cognitive variables depending on the context and the trainees. This is in line with past research suggesting that self-affirmation can influence not only intentions and/or behaviour itself but participants' self-perceptions and beliefs as well (Cohen & Sherman, 2014; Cohen et al., 2006, 2009; Logel & Cohen, 2011; Schmeichel & Vohs, 2009). In fact, when self-affirmation manages to influence people's self-perceptions, beliefs and normative processes it is expected to have longer effects on behaviour (Cohen & Sherman, 2014; Logel & Cohen, 2011).

Usefulness of self-affirmation in anti-doping interventions

In the present studies, self-affirmation has been found effective in altering several social cognitive constructs related to the decision making process towards doping. Study 3 demonstrated that message acceptance can further influence this process. Therefore, in order for self-affirmation to be effective it should be accompanied by appropriate messages. Most anti-doping interventions have been based on increasing athlete's awareness about doping control procedures and doping use side effects (Barkoukis, 2015). To achieve this, various types of threatening messages have been used. These messages typically provide the health side effects of doping use on the athlete, the legal and social consequences and the moral hazards of

doping use. The basic objective of these messages is to induce fear to the athletes in order to avoid doping use (Cleret, 2011). Fear has been conceptualized as a negative emotional reaction to a perceived threat and these messages aim to highlight these threats to the athletes. Past evidence on fear based prevention interventions has shown that showing the negative consequences of an undesirable behaviour is expected to change attitudes towards this behaviour and motivate future behaviours or behaviour change to avoid these negative consequences (Witte & Allen, 2000).

Such approaches have been found effective in several domains (Cho & Witte, 2005; McKay, Lynch, Shepard, Pettinati, 2005; Lentillon-Kaestner, 2015; Morrison, 2005; Moscato et al., 2001; Smalec & Klinge, 2000; Smith et al., 2008; Tay & Watson, 2002; Witte & Allen, 2000; Wong & Cappella, 2009), but their effectiveness in sport has been questioned (Barkoukis, 2015; Ntoumanis et al., 2014). The majority of the anti-doping awareness raising interventions highlights the severity of the doping use consequences and the athlete's susceptibility to these consequences. This approach is in line with the premises of the Extended Parallel Process Model (EPPM) described by Witte (1992, 1998) suggesting that the higher the fear level, the higher is the persuasive impact of the message. A threatening message that is perceived as irrelevant or insignificant, does not motivate the person to change behaviour or act accordingly, whereas a message that is perceived as relevant results in attitude change (Horcajo & De La Vega, 2014; Horcajo & Luttrell, 2016).

An important reason for failure of such approaches is that doping is stigmatized and athletes and their entourage avoid discussing about doping or are reluctant in actively engaging in anti-doping campaigns (Barkoukis et al., under review). In this sense, self-affirmation can play an important role both in promoting active participation in anti-doping campaigns and in increasing the acceptance of

threatening messages. Past evidence showed that effective messages encourage behaviour change, whereas less effective messages are associated with defensive reactions (Popova, 2011; Ruiters et al., 2004). More specifically, there is sufficient evidence that self-affirmed people display reduced defensiveness on fear appeal messages, rate the messages as more threatening and personally relevant, report more negative thoughts and feelings and higher levels of control, self-efficacy, and intentions (Harris, Mayle, Mabbott & Napper, 2007; Sherman, Nelson & Steele, 2000). Importantly, in their study Harris et al. showed that self-affirmation moderated the threat–intention relationship. Similarly, Harris and Napper (2005) reported that self-affirmed participants reported higher acceptance of the personal relevance of a threatening message either by helping people understand that the message means to them. Therefore, self-affirmation can be used in the existing awareness raising campaigns in order to reduce participants’ defensiveness to the threatening messages and increase the personal relevance and acceptance of the provided messages.

Furthermore, Barkoukis (2015) advocated for a more educational-based approach in anti-doping interventions as compared to increasing awareness about the consequences of doping use. In this line, cross-national projects funded by international sport authorities (e.g., SafeYou and SafeYou+, Coach MADE and POINT projects) have adopted this approach and attempt to develop anti-doping interventions targeting psychological constructs influencing the decision making process, such as motivational climate, self-efficacy, normative beliefs, moral related variables, anticipated emotions etc. In the present studies, self-affirmation has been found effective in altering several social cognitive constructs related to the decision making process towards doping. Therefore, self-affirmation can be effectively used as

part of these interventions in order to alter these constructs and result in changing athletes' mindset and decision making process towards doping use.

It is important to note that in the present studies, self-affirmation manipulations did not influence all social cognitive variables involved in the decision making process towards doping use. It rather influenced only a few of them. However, it is also important to note that it influenced the most important variables in the decision making process. More specifically, in Study 1 self-affirmation positively influenced participants' normative beliefs, moral norms and anticipated emotions about doping use. In Study 2, situational temptation was positively influenced by the self-affirmation manipulation. Importantly, these are among the stronger predictors of doping use intentions.

More specifically, Tsorbatzoudis (2014) indicated that athletes' social norms significantly predict doping use intentions in both competitive and recreational sports. Athletes develop biased beliefs towards the behaviour and this affects their decision to engage with the behaviour (Petroczi et al., 2008). Similarly, Dunn, Thomas, Swift and Burns (2011) showed that doping users tend to overestimate the prevalence of doping use among athletes and suggest the integration of normative beliefs in anti-doping education. Similarly, Barkoukis et al. (2013) and Lazuras et al. (2015) suggested that situational temptation and anticipated regret predicted doping use intentions over and above the effect of the other TPB-based social cognitive variables. Moreover, Mallia et al. (2016) suggested that situational temptation significantly predicts future doping use intentions. In this line, Lazuras et al. (2017b) reported that anticipated regret significantly predicted doping intentions over and above the effects of doping substances and nutritional supplements past use, and other social cognitive variables,

and significantly interacted with past use of nutritional supplements, and social norms in predicting doping intentions.

Taken together, these findings suggest that the social cognitive variables influenced by the self-affirmation manipulation in the present studies are among the most influential variables in predicting doping use intentions. This highlights the significance of self-affirmation in anti-doping education interventions. It is expected that the inclusion of self-affirmation in anti-doping education can further increase their effectiveness as it has the potential to increase message acceptance, especially those with a threatening content, and influence important variables in the decision making process towards doping use in competitive and recreational sports.

Limitations of the studies and future directions

The present studies are not free of limitations. Firstly, intentions were measured with a scale based on the traditional recommendations provided by Ajzen (2002). Recent research on doping has shown that this approach provides extremely low scores on doping use intentions. This is partly due to the actual low scores that non-dopers may have towards using doping substances or due to social desirability. This was explicitly evident in Study 1 where non-dopers reported low scores on doping use intentions. With respect to social desirability, doping use is considered an illegal and unethical behaviour and is expected that athletes, especially doping users as in Studies 2 and 3, would tend to avoid reporting actual doping use or intentions to use (Gucciardi, Jalleh & Donovan, 2015). To minimize the effect of social desirability an online survey was used in Studies 1 and 2. Also, in Study 3 participants returned the surveys in sealed envelopes to ensure their anonymity. Towards this end, only participants' age and gender was asked in the surveys in order to avoid providing

personal demographics that would allow identification of the participant's identity. Finally, in order to further protect the anonymity of the participants the surveys were distributed by athletes and coaches to those they knew that were using doping substances. The researcher had no contact with the participants in none of the studies.

Still, there is a possibility that participants in the studies have hidden their true intentions towards doping use. Petroczi et al. (2010) reported almost half of doping users deny doping use in self-report measures and provide biased responses on doping related cognition against doping use. Recent years new approaches have been suggested to tackle the problems encountered with the measurement of doping use intentions. Hypothetical situations, hypothetical scenarios and items measuring the likelihood of using doping substances in specific situations have been suggested to lower social desirability and provide more accurate responses compared to intentions (Gucciardi et al. 2015; Petroczi, 2015). Recent studies have already used this approach to measure doping use intentions with satisfactory results (Mallia et al., 2016; Zelli et al., 2010). Future studies should further investigate what measures of intentions can maximize participants' responsiveness and overcome social desirability.

Another limitation of the present studies is that actual doping behaviour was not monitored. Typically, athletes use doping cycles depending on the sport, the objective of doping use and the substance used. In competitive sports, doping use is increased in the preparation period and lowered in the competitive period as doping controls may occur. In team sports the preparation period lasts approximately two months and in Europe may last from late July to middle September. On the contrary, in individual sports may last up to eight months and typically starts on September and ends on March - April. Still, even in these eight months of preparation in individual

sports athletes use different patterns of doping use. Typically, 10-days cycles are performed every two or three months, whereas there are occasions of athletes do less doping cycles but for longer periods. These cycles depend on the athletes' sport, competing level and substance intended to use. In recreational sports there are no limitations in doping use considering that there are no doping controls. Hence, athletes may use doping substances all year depending on their reason to use, training level and substance intended to use.

In the present studies in order to protect the anonymity of responses such information (e.g., sport, competitive or training level, substances used etc) were not asked to participants. For the same reason, further information regarding training/sport and substance use issues was not asked. The lack of a monitoring of the doping behaviour in parallel with the seasonality in doping use constitute a limitation of the present studies as the data collection in each study lasted from six months to one year. Thus, participants completed the survey at different moments in their doping behaviour. This might have influenced their responses. For instance, an athlete finishing a long doping use cycle or being in the competition period may have reported low intentions for doping use in the next months/season. On the other hand, an athlete in the preparation season or before the initiation of a doping use cycle should probably report higher intentions for future doping use. Clearly, this is a difficult issue to address considering the many different parameters involved. At the moment there is not a single study on doping research that has attempted to take this limitation into consideration. Taking into consideration that convenience samples are mostly used and convenient to the research groups periods for data collection are selected, this may also be an explanation for the mixed findings reported in the literature and the low scores on the determinants of doping use.

Future studies, however, should be designed taking into consideration the seasonality of doping use. These studies should incorporate measures of substances used and monitor their progress. In this line, longitudinal studies would provide important information on the development of a doping use mindset and would help identify the time points and situations that may trigger doping use. So far, such longitudinal studies are rather limited. Ntoumanis, Barkoukis, Gucciardi, and Chan (2017) indicated that doping intentions in the beginning of the training season predicted new and continued doping users at the end of the training season, and highlight the usefulness of longitudinal designs in better understanding doping behaviour. In this research line, the role of self-affirmation is expected to be interesting to investigate. Such longitudinal designs would provide valuable information on the long-term effects of self-affirmation on actual doping behaviour, doping use intentions and related cognition.

In line with the longitudinal designs, pre-post designs could be used to further understand the effect of self-affirmation on doping-related cognition and behaviour. Such a design would not be appropriate for the present studies due to potential contamination of the responses by shift bias and a change in participants' beliefs measured between the pre- and posttests due to the seasonality of doping use. That is the same athlete would report different scores in the two measurement points because of the doping cycle he/she is in rather than the actual effect of self-affirmation. Still, such designs have a value especially for non-dopers considering that doping users are a rather small and difficult to access population.

Also, the measurement of message acceptance in Studies 1 and 2 would have provided valuable information in interpreting their findings. For instance, in Study 2 with competitive athletes it is not clear whether self-affirmation directly influenced

participants' doping use intentions by increasing their self-integrity or indirectly through the higher endorsement of the information provided in the messages. And in the latter case, it is not clear which of the two messages, moral- or health-related, had a stronger influence on doping use intentions. Although this does not constitute a methodological flaw, the inclusion of message acceptance might have provided more fruitful insights in the interpretation of the study's results.

In a similar vein, a moral message was not included in Studies 1 and 3 involving recreational athletes. This was a conscious choice based on the lack of a regulatory framework about doping use in recreational sports and the absence of ethical constraints in using doping substances in this context. However, it turned out that morality was affected by self-affirmation in Study 1. This was probably due to the stigmatization of doping use in general as an unethical and cheating behaviour. Perhaps, the inclusion of a moral message would further improve the effects of self-affirmation considering its strong association with morality.

Taken together these points, future research using self-affirmation in doping would benefit from the inclusion of both moral and health related messages. This is expected to be beneficial for both competitive and recreational sports. Many recreational athletes were former competitive athletes and may hold the mentality of doping use as an unethical behaviour. Also, doping use has been stigmatized as an immoral and cheating behaviour and culture against doping use has been developed. In this sense, even recreational athletes can benefit from a moral related message. This is especially true in self-affirmation research.

Another limitation of the present studies involves the rather small sample size. A rule of thumb of 30 participants in each condition was used all three studies. It is expected that a bigger sample may have revealed stronger effects of self-affirmation

on the tested variables. However, doping use is a stigmatized and illegal behaviour and therefore the recruitment of bigger samples is extremely difficult. In fact, the recruitment of 60 doping users is the largest sample of doping users reported in the literature so far, in studies targeting this population. Considering that the prevalence of doping use in competitive sports is between 10% and 15% in self-reports it would require the recruitment of extremely large numbers of athletes in order to obtain larger samples of doping users. For instance, Barkoukis et al. (2013) recruited 750 elite level athletes and among those 74 admitted doping use in self-reports. Similarly, in recreational sports Lazuras et al. (2017a) recruited 915 exercisers and 178 (19.3) of them admitted prior experience doping use in self-reports. Importantly, only 85 participants were actively using doping substances at the time of data collection. Considering that both these studies did not target doping users, it seems that a number of 60 participants in each of the present studies is representative of the distribution of doping users in the sporting population and, actually, among the biggest samples of doping users in the literature.

A potential limitation of the present studies is the use of an online questionnaire in Studies 1 and 2, but paper and pencil questionnaire in Study 3. This might have influenced participants' responses and distorts the comparison of the studies. However, research evidence showed that there are no significant differences between data collection with online and paper and pencil in terms of feasibility (Stanton, 1998), reliability and factor structure of the scales (Hertel, Naumann, Konradt, & Batinic, 2002; Lonsdale, Hodge, & Rose, 2006; Vallejo, Jordán, Díaz, Comeche, & Ortega, 2007) and administration procedure in general (Thorén, Andersson, & Lunner, 2012). Hence, the use of both approaches is not considered as a limitation that could hinder the interpretation and comparison of the studies' findings.

Still, each of these two approaches has advantages and disadvantages. Among the advantages of using online questionnaires are good response rate, few missing responses, access to unique populations, cost-effective (Kongsved, Basnov, Holm-Christensen, & Hjollund, 2007; Lonsdale et al., 2006; Wright, 2005). These advantages seem quite important in studying doping in sports considering the relative low prevalence of the behaviour and the difficulty in accessing doping users, and the sensitive nature of the behaviour. Similarly, it may be important for self-affirmation theory as well as it allows participants to freely express their feelings and thoughts in an isolated environment without lying. Thus, future studies on self-affirmation and doping could benefit using online questionnaires.

In addition, a potential limitation of the present studies may be considered the large number of significance tests performed. This criticism might lie on the small sample size and the theoretical support of these tests. With respect to the latter, it is important to note that the present studies investigated the effect of self-affirmation on a rather unique behaviour. Doping use is an illegal, unethical and unhealthy behaviour. At the moment, there is no past evidence on the effect of self-affirmation on similar behaviours. Thus, the present studies explored the theoretical assumptions in this unique behaviour. Still, replication of these studies is needed in order to further understand the effect of self-affirmation on doping behaviour. However, the present studies provided information on the variables that are more inclined to be affected by self-affirmation in each context (i.e., competitive and recreational sports) and target group (supplement users and doping users).

In addition, correction of significance levels for multiple testing (e.g., Bonferroni corrections) could be used to address this issue. However, this is not standard in sport psychology research. There is continuing debate in the statistical

literature about when (if ever) to apply ‘corrections’ for multiple testing. Rothman (1990) notes that ‘Adjustments for making multiple comparisons in large bodies of data are recommended to avoid rejecting the null hypothesis too readily. Unfortunately, reducing the type I error for null associations increases the type II error for those associations that are not null. The theoretical basis for advocating a routine adjustment for multiple comparisons is the ‘universal null hypothesis’ that ‘chance’ serves as the first-order explanation for observed phenomena. This hypothesis undermines the basic premises of empirical research, which holds that nature follows regular laws that may be studied through observations. A policy of not making adjustments for multiple comparisons is preferable because it will lead to fewer errors of interpretation when the data under evaluation are not random numbers but actual observations on nature. Furthermore, scientists should not be so reluctant to explore leads that may turn out to be wrong that they penalize themselves by missing possibly important findings’ (Rothman, 1990). Rothman considers that routine alteration of significance levels would be damaging to research progress: ‘Cynical researchers would slice their results like salami, publishing one P value at a time to escape the wrath of the statistical reviewer. Idealists would conduct studies to examine only one association at a time wasting time, energy, and public money.’ Rothman’s suggestions are in line with those of a number of other authors (e.g. Perneger, 1998; O’Keefe, 2003). Following this approach, no corrections of significance levels for multiple testing has been performed in the present studies.

Conclusions

Notwithstanding the abovementioned limitations, the present studies provide valuable information about the effect of self-affirmation on doping use intentions and doping-related cognition. The results of the present studies demonstrate:

- a) Self-affirmation has differential effect on doping use intentions depending on the context and the target groups. Self-affirmation manipulation was more influential in competitive sports.
- b) Self-affirmation can influence both cognitive and affective variables related the doping use. The effect of self-affirmation on doping related constructs varied depending on the context and the target groups.
- c) Self-affirmation can be used in the prevention of doping use indirectly by altering the decision-making process towards doping use. In different contexts and target groups different aspects of the decision making process should be targeted.
- d) Self-affirmation can be used to suspend doping use in doping users in competitive sports. This might be due to the strong association of self-affirmation with morality. Future anti-doping interventions incorporating self-affirmation would benefit from the inclusion of moral related messages.
- e) Self-affirmation does not influence doping use intentions and doping related cognition in exercisers using doping substances.
- f) Message acceptance can have a significant impact on doping use intentions and doping related cognition in exercisers using doping substances. Future research on self-affirmation and doping, and anti-doping education

interventions should incorporate measures of message acceptance in order to identify the most effective messages.

- g) Mental construal does not influence doping use intentions and doping related cognition in exercisers using doping substances. Further research is needed in other contexts and target groups to further investigate the usefulness of mental construal in doping research and anti-doping education.

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APPENDICES**APPENDIX 1 – Consent form****Consent form**

Title of Research Project: Personal beliefs about doping behaviour

Name of Researcher: Vasileios Barkoukis

1. I confirm that I have read and understand the information letter explaining the above research project.
2. I understand that my participation is voluntary and that I am free to Withdraw at any time without giving any reason and without there being any negative consequences. In addition, should I not wish to answer any particular question or questions, I am free to decline.
3. I understand that my responses will be kept strictly confidential. I give permission for members of the research team to have access to my anonymised responses. I understand that my e-mail address will not be linked with the research materials, and I will not be identified or identifiable in the report or reports that result from the research.
4. I agree for the data collected from me to be used in future research
5. I agree to take part in the above research project.

APPENDIX 2 - Survey of Study 1 and Study 2– Self-affirmation manipulation

Gender: Male Female

Age:

Type of sport: Athletics

Swimming

Weight lifting

Rowing

Basketball

Football

Volleyball

Handball

Fitness/exercise

Other? Please specify:

The use of nutritional substances to enhance my performance during this season is...
(circle the number that best describes your answer and circle ONE number on EACH line).

Bad	1	2	3	4	5	6	7	Good
Useless	1	2	3	4	5	6	7	Useful
Harmful	1	2	3	4	5	6	7	Beneficial
Unethical	1	2	3	4	5	6	7	Ethical

Have you ever used prohibited substances to enhance your performance?

- No, I have never used prohibited substances to enhance my performance
- Yes, I have used prohibited substances to enhance my performance once, but not ever since
- Yes, I use prohibited substances occasionally to enhance my performance
- Yes, I use prohibited substances systematically to enhance my performance

Personal Attributes Inventory

The following questions are designed to measure level of kindness toward others. These questions refer to behaviours that YOU have performed for other people. As you read each question, please try to recall a time when YOU performed each behaviour for another person. There are no right or wrong answers, so please be as honest as possible. Place an "X" next to the answer that best describes your behaviour toward other people. If you answer YES to any of the questions, please provide a short example of the last time you performed this behaviour.

1) Have you ever forgiven another person when they have hurt you?

_____ YES _____ NO

IF YES, EXAMPLE:

2) Have you ever been considerate of another person's feelings?

_____ YES _____ NO

IF YES, EXAMPLE:

3) Have you ever been concerned with the happiness of another person?

_____ YES _____ NO

IF YES, EXAMPLE:

4) Have you ever looked out for another person's interests before your own?

_____ YES _____ NO

IF YES, EXAMPLE:

5) Have you ever been generous and selfless to another person?

_____ YES _____ NO

IF YES, EXAMPLE:

6) Have you ever attended to the needs of another person?

_____ YES _____ NO

IF YES, EXAMPLE:

7) Have you ever tried not to hurt the feelings of another person?

_____ YES _____ NO

IF YES, EXAMPLE:

8) Have you ever felt satisfied when you've helped another person?

_____ YES _____ NO

IF YES, EXAMPLE:

9) Have you ever gone out of your way to help a friend even at the expense of your own happiness?

_____ YES _____ NO

IF YES, EXAMPLE:

10) Have you ever found ways to help another person who was less fortunate than yourself?

_____ YES _____ NO

IF YES, EXAMPLE:

The use of prohibited substances to enhance my performance during this season is...
(circle the number that best describes your answer and circle ONE number on EACH line).

Bad	1	2	3	4	5	6	7	Good
Useless	1	2	3	4	5	6	7	Useful
Harmful	1	2	3	4	5	6	7	Beneficial
Unethical	1	2	3	4	5	6	7	Ethical

How much control do you have over using prohibited substances to enhance your performance during this season. (Tick the box that best describes your answer)

Very little control								Complete control
1	2	3	4	5	6	7		

If I wanted to I could use prohibited substances to enhance my performance during this season. (Tick the box that best describes your answer)

Strongly disagree								Strongly agree
1	2	3	4	5	6	7		

I feel in complete control over whether I will use prohibited substances to enhance my performance during this season. (Tick the box that best describes your answer)

Completely false								Completely true
1	2	3	4	5	6	7		

Subjective norms

Most people who are important to me *would not want* me to use prohibited substances to enhance my performance during this season. (Tick the box that best describes your answer)

Strongly disagree								Strongly agree
1	2	3	4	5	6	7		

Most people I know *would not approve* of me using prohibited substances to enhance my performance during this season. (Tick the box that best describes your answer)

Strongly disagree								Strongly agree
1	2	3	4	5	6	7		

People who are important to me would... (Tick the box that best describes your answer)

Strongly disapprove							Strongly approve
1	2	3	4	5	6	7	

...of me using prohibited substances to enhance my performance during this season.

Most people close to me *do not expect* me to use prohibited substances to enhance my performance during this season. (Tick the box that best describes your answer)

Extremely unlikely							Extremely likely
1	2	3	4	5	6	7	

Out of 100%, how many athletes at your competitive level, do you believe engage in doping to enhance their performance?

_____%

Out of 100%, how many elite athletes in Greece do you think engage in doping to enhance their performance?

_____%

Out of 100%, how many elite athletes do you believe will be engaged in doping during the next 3 years to enhance their performance?

_____%

I would feel guilty about engaging in doping to enhance my performance

Strongly disagree							Strongly agree
1	2	3	4	5	6	7	

Engaging in doping to enhance my performance would be against my principles

Strongly disagree							Strongly agree
1	2	3	4	5	6	7	

I feel morally obliged to use doping substances to enhance my performance

Strongly disagree							Strongly agree
1	2	3	4	5	6	7	

How much would you be tempted to use prohibited substances if...

...your coach suggested this to you?	1	2	3	4	5
...you believed that most colleagues of yours use prohibited substances?	1	2	3	4	5
...you prepared for an important game/competition?	1	2	3	4	5
...you had to enhance your performance?	1	2	3	4	5

If I use prohibited substances to enhance my performance during this season, I will...

...regret it

Definitely not							Definitely yes
1	2	3	4	5	6		7

...be disappointed with myself

Definitely not							Definitely yes
1	2	3	4	5	6		7

...feel sad

Definitely not							Definitely yes
1	2	3	4	5	6		7

...feel shame

Definitely not							Definitely yes
1	2	3	4	5	6		7

I intend to use prohibited substances to enhance my performance during this season.
(Tick the box that best describes your answer)

Extremely unlikely							Extremely likely
1	2	3	4	5	6		7

I plan to use prohibited substances to enhance my performance during this season.
(Tick the box that best describes your answer)

Strongly disagree							Strongly agree
1	2	3	4	5	6	7	

I expect I will use prohibited substances to enhance my performance during this season. (Tick the box that best describes your answer)

Definitely false							Definitely true
1	2	3	4	5	6	7	

	True	False
1. I sometimes litter.	<input type="checkbox"/>	<input type="checkbox"/>
2. I always admit my mistakes openly and face the potential negative consequences.	<input type="checkbox"/>	<input type="checkbox"/>
3. In traffic I am always polite and considerate of others.	<input type="checkbox"/>	<input type="checkbox"/>
5. I always accept others' opinions, even when they don't agree with my own.	<input type="checkbox"/>	<input type="checkbox"/>
6. I take out my bad moods on others now and then.	<input type="checkbox"/>	<input type="checkbox"/>
7. There has been an occasion when I took advantage of someone else.	<input type="checkbox"/>	<input type="checkbox"/>
8. In conversations I always listen attentively and let others finish their sentences.	<input type="checkbox"/>	<input type="checkbox"/>
9. I never hesitate to help someone in case of emergency.	<input type="checkbox"/>	<input type="checkbox"/>
10. When I have made a promise, I keep it – no ifs, ands	<input type="checkbox"/>	<input type="checkbox"/>
11. I occasionally speak badly of others behind their back.	<input type="checkbox"/>	<input type="checkbox"/>
12. I would never live off other people.	<input type="checkbox"/>	<input type="checkbox"/>
13. I always stay friendly and courteous with other people, even when I am stressed out.	<input type="checkbox"/>	<input type="checkbox"/>
14. During arguments I always stay objective and matter- of- fact.	<input type="checkbox"/>	<input type="checkbox"/>
15. There has been at least one occasion when I failed to return an item that I borrowed.	<input type="checkbox"/>	<input type="checkbox"/>
16. I always eat a healthy diet.	<input type="checkbox"/>	<input type="checkbox"/>
17. Sometimes I only help because I expect something in	<input type="checkbox"/>	<input type="checkbox"/>

Debriefing

Thank you for your participation in the study

APPENDIX 3 – Survey of Study 1 and Study 2– Control condition

Gender: Male Female

Age:

Type of sport: Athletics

Swimming

Weight lifting

Rowing

Basketball

Football

Volleyball

Handball

Fitness/exercise

Other? Please specify:

The use of nutritional substances to enhance my performance during this season is...
(circle the number that best describes your answer and circle ONE number on EACH line).

Bad	1	2	3	4	5	6	7	Good
Useless	1	2	3	4	5	6	7	Useful
Harmful	1	2	3	4	5	6	7	Beneficial
Unethical	1	2	3	4	5	6	7	Ethical

Have you ever used prohibited substances to enhance your performance?

No, I have never used prohibited substances to enhance my performance

Yes, I have used prohibited substances to enhance my performance once, but not ever since

Yes, I use prohibited substances occasionally to enhance my performance

Yes, I use prohibited substances systematically to enhance my performance

Personal Opinion Survey

The following questions are designed to measure personal opinions. These questions refer to YOUR opinions on each topic. There are no right or wrong answers, so please be as honest as possible. Place an "X" next to the answer that best describes YOUR opinion. If you answer YES to any of the questions, please provide a reason why you believe this statement to be true.

- 1) I think that the colour blue looks great on most people. _____
 YES _____ NO
 IF YES, WHY?

- 2) I think that chocolate is the best flavour for ice cream. _____
 YES _____ NO
 IF YES, WHY?:

- 3) I think that winter is the most satisfying season during the year. _____
 YES _____ NO
 IF YES, WHY?

- 4) I think that the most aromatic trees in the world are pine trees. _____
 YES _____ NO
 IF YES, WHY?

- 5) I think that cooking is an important skill to possess. _____
 YES _____ NO
 IF YES, WHY?

- 6) I think that house plants help to brighten a home. _____
 YES _____ NO
 IF YES, WHY?

- 7) I think that sewing is an important skill to possess. _____
 YES _____ NO
 IF YES, WHY?

- 8) I think that the beach is a great place to vacation. _____
 YES _____ NO
 IF YES, WHY?

- 9) I think that the subway is the best form of public transportation. _____
 YES _____ NO
 IF YES, WHY?

- 10) I think that fruit makes the best dessert. _____
 YES _____ NO
 IF YES, WHY?

The use of prohibited substances to enhance my performance during this season is...
(circle the number that best describes your answer and circle ONE number on EACH line).

Bad	1	2	3	4	5	6	7	Good
Useless	1	2	3	4	5	6	7	Useful
Harmful	1	2	3	4	5	6	7	Beneficial
Unethical	1	2	3	4	5	6	7	Ethical

How much control do you have over using prohibited substances to enhance your performance during this season. (Tick the box that best describes your answer)

Very little control								Complete control
1	2	3	4	5	6	7		

If I wanted to I could use prohibited substances to enhance my performance during this season. (Tick the box that best describes your answer)

Strongly disagree								Strongly agree
1	2	3	4	5	6	7		

I feel in complete control over whether I will use prohibited substances to enhance my performance during this season. (Tick the box that best describes your answer)

Completely false								Completely true
1	2	3	4	5	6	7		

Subjective norms

Most people who are important to me *would not want* me to use prohibited substances to enhance my performance during this season. (Tick the box that best describes your answer)

Strongly disagree								Strongly agree
1	2	3	4	5	6	7		

Most people I know *would not approve* of me using prohibited substances to enhance my performance during this season. (Tick the box that best describes your answer)

Strongly disagree								Strongly agree
1	2	3	4	5	6	7		

People who are important to me would... (Tick the box that best describes your answer)

Strongly disapprove							Strongly approve
1	2	3	4	5	6	7	

...of me using prohibited substances to enhance my performance during this season.

Most people close to me *do not expect* me to use prohibited substances to enhance my performance during this season. (Tick the box that best describes your answer)

Extremely unlikely							Extremely likely
1	2	3	4	5	6	7	

Out of 100%, how many athletes at your competitive level, do you believe engage in doping to enhance their performance?

_____ %

Out of 100%, how many elite athletes in Greece do you think engage in doping to enhance their performance?

_____ %

Out of 100%, how many elite athletes do you believe will be engaged in doping during the next 3 years to enhance their performance?

_____ %

I would feel guilty about engaging in doping to enhance my performance

Strongly disagree							Strongly agree
1	2	3	4	5	6	7	

Engaging in doping to enhance my performance would be against my principles

Strongly disagree							Strongly agree
1	2	3	4	5	6	7	

I feel morally obliged to use doping substances to enhance my performance

Strongly disagree							Strongly agree
1	2	3	4	5	6	7	

How much would you be tempted to use prohibited substances if...

...your coach suggested this to you?	1	2	3	4	5
...you believed that most colleagues of yours use prohibited substances?	1	2	3	4	5
...you prepared for an important game/competition?	1	2	3	4	5
...you had to enhance your performance?	1	2	3	4	5

If I use prohibited substances to enhance my performance during this season, I will...

...regret it

Definitely not							Definitely yes
1	2	3	4	5	6	7	7

...be disappointed with myself

Definitely not							Definitely yes
1	2	3	4	5	6	7	7

...feel sad

Definitely not							Definitely yes
1	2	3	4	5	6	7	7

...feel shame

Definitely not							Definitely yes
1	2	3	4	5	6	7	7

I intend to use prohibited substances to enhance my performance during this season.
(Tick the box that best describes your answer)

Extremely unlikely							Extremely likely
1	2	3	4	5	6	7	7

I plan to use prohibited substances to enhance my performance during this season.
(Tick the box that best describes your answer)

Strongly disagree							Strongly agree
1	2	3	4	5	6	7	

I expect I will use prohibited substances to enhance my performance during this season. (Tick the box that best describes your answer)

Definitely false							Definitely true
1	2	3	4	5	6	7	

	True	False
1. I sometimes litter.	<input type="checkbox"/>	<input type="checkbox"/>
2. I always admit my mistakes openly and face the potential negative consequences.	<input type="checkbox"/>	<input type="checkbox"/>
3. In traffic I am always polite and considerate of others.	<input type="checkbox"/>	<input type="checkbox"/>
5. I always accept others' opinions, even when they don't agree with my own.	<input type="checkbox"/>	<input type="checkbox"/>
6. I take out my bad moods on others now and then.	<input type="checkbox"/>	<input type="checkbox"/>
7. There has been an occasion when I took advantage of someone else.	<input type="checkbox"/>	<input type="checkbox"/>
8. In conversations I always listen attentively and let others finish their sentences.	<input type="checkbox"/>	<input type="checkbox"/>
9. I never hesitate to help someone in case of emergency.	<input type="checkbox"/>	<input type="checkbox"/>
10. When I have made a promise, I keep it – no ifs, ands	<input type="checkbox"/>	<input type="checkbox"/>
11. I occasionally speak badly of others behind their back.	<input type="checkbox"/>	<input type="checkbox"/>
12. I would never live off other people.	<input type="checkbox"/>	<input type="checkbox"/>
13. I always stay friendly and courteous with other people, even when I am stressed out.	<input type="checkbox"/>	<input type="checkbox"/>
14. During arguments I always stay objective and matter- of-fact.	<input type="checkbox"/>	<input type="checkbox"/>
15. There has been at least one occasion when I failed to return an item that I borrowed.	<input type="checkbox"/>	<input type="checkbox"/>
16. I always eat a healthy diet.	<input type="checkbox"/>	<input type="checkbox"/>
17. Sometimes I only help because I expect something in	<input type="checkbox"/>	<input type="checkbox"/>

Debriefing

Thank you for your participation in the study

APPENDIX 4 – Survey of Study 3 – Self-affirmation manipulation

Gender: Male Female

Age:

Mental construal (psychological distance)

Please select the ONE word in each pair that best fits your frame of mind RIGHT NOW.

Near – Far
 Tomorrow – A year
 Friend – Enemy
 We – They
 Sure – Unsure
 Certainly – Possibly
 Real – Abstract
 Practical – Desirable
 Close – Distant
 Self – Others
 Likely – Unlikely
 Specific – General
 Here – There
 Now – Future

The use of nutritional substances to enhance my performance during this season is...
 (circle the number that best describes your answer and circle ONE number on EACH line).

Bad	1	2	3	4	5	6	7	Good
Useless	1	2	3	4	5	6	7	Useful
Harmful	1	2	3	4	5	6	7	Beneficial
Unethical	1	2	3	4	5	6	7	Ethical

Have you ever used prohibited substances to enhance your performance?

- No, I have never used prohibited substances to enhance my performance
- Yes, I have used prohibited substances to enhance my performance once, but not ever since
- Yes, I use prohibited substances occasionally to enhance my performance
- Yes, I use prohibited substances systematically to enhance my performance

Personal Attributes Inventory

The following questions are designed to measure level of kindness toward others. These questions refer to behaviours that YOU have performed for other people. As you read each question, please try to recall a time when YOU performed each behaviour for another person. There are no right or wrong answers, so please be as honest as possible. Place an "X" next to the answer that best describes your behaviour toward other people. If you answer YES to any of the questions, please provide a short example of the last time you performed this behaviour.

1) Have you ever forgiven another person when they have hurt you?

_____ YES _____ NO

IF YES, EXAMPLE:

2) Have you ever been considerate of another person's feelings?

_____ YES _____ NO

IF YES, EXAMPLE:

3) Have you ever been concerned with the happiness of another person?

_____ YES _____ NO

IF YES, EXAMPLE:

4) Have you ever looked out for another person's interests before your own?

_____ YES _____ NO

IF YES, EXAMPLE:

5) Have you ever been generous and selfless to another person?

_____ YES _____ NO

IF YES, EXAMPLE:

6) Have you ever attended to the needs of another person?

_____ YES _____ NO

IF YES, EXAMPLE:

7) Have you ever tried not to hurt the feelings of another person?

_____ YES _____ NO

IF YES, EXAMPLE:

8) Have you ever felt satisfied when you've helped another person?

_____ YES _____ NO

IF YES, EXAMPLE:

9) Have you ever gone out of your way to help a friend even at the expense of your own happiness?

_____ YES _____ NO

IF YES, EXAMPLE:

10) Have you ever found ways to help another person who was less fortunate than yourself?

_____ YES _____ NO

IF YES, EXAMPLE:

There is an association between doping use and negative health side effects.

Strongly disagree									Strongly agree
1	2	3	4	5	6	7	8	9	

Not using doping substances will help ME avoid negative health side effects

Strongly disagree									Strongly agree
1	2	3	4	5	6	7	8	9	

I think it is important that I do not use doping substances

Not important at all									Extremely important
1	2	3	4	5	6	7	8	9	

I believe that using doping substances increases an athlete's chances of having negative health side effects

Strongly disagree									Strongly agree
1	2	3	4	5	6	7	8	9	

The evidence linking doping substances and negative health side effects is

Very weak									Very strong
1	2	3	4	5	6	7	8	9	

How threatening did you find the message?

Not at all									Very
1	2	3	4	5	6	7			7

How unpleasant did you find the message?

Not at all									Very
1	2	3	4	5	6	7			7

How personally relevant did you find the message?

Not at all									Very
1	2	3	4	5	6	7			7

The use of prohibited substances ... (circle the number that best describes your answer and circle ONE number on EACH line).

Bad	1	2	3	4	5	6	7	Good
Useless	1	2	3	4	5	6	7	Useful
Harmful	1	2	3	4	5	6	7	Beneficial
Unethical	1	2	3	4	5	6	7	Ethical

How much control do you have over using prohibited substances.

Very little control							Complete control
1	2	3	4	5	6	7	

If I wanted to I could use prohibited substances.

Strongly disagree						Strongly agree
1	2	3	4	5	6	7

I feel in complete control over whether I will use prohibited substances.

Completely false						Completely true
1	2	3	4	5	6	7

Subjective norms

Most people who are important to me *would not want* me to use prohibited substances.

Strongly disagree						Strongly agree
1	2	3	4	5	6	7

Most people I know *would not approve* of me using prohibited substances.

Strongly disagree						Strongly agree
1	2	3	4	5	6	7

People who are important to me would...

Strongly disapprove						Strongly approve
1	2	3	4	5	6	7

...of me using prohibited substances.

Most people close to me *do not expect* me to use prohibited substances.

Extremely unlikely							Extremely likely
1	2	3	4	5	6	7	

Descriptive norms

Out of 100%, how many exercisers at your competitive level, do you believe engage in doping?

_____%

Out of 100%, how many exercisers in Greece do you think engage in doping?

_____%

Out of 100%, how many exercisers do you believe will be engaged in doping during the next 3 years?

_____%

I would feel guilty about engaging in doping to enhance my performance

Strongly disagree							Strongly agree
1	2	3	4	5	6	7	

Engaging in doping to enhance my performance would be against my principles

Strongly disagree							Strongly agree
1	2	3	4	5	6	7	

I feel morally obliged to use doping substances to enhance my performance

Strongly disagree							Strongly agree
1	2	3	4	5	6	7	

Situational temptation

How much would you be tempted to use prohibited substances if...

...your trainer suggested this to you?	1	2	3	4	5
...you believed that most exercisers use	1	2	3	4	5

prohibited substances?						
...you prepared for an important event?	1	2	3	4	5	
...you had to enhance your performance?	1	2	3	4	5	

If I use prohibited substances, I will...

...regret it

Definitely not						Definitely yes
1	2	3	4	5	6	7

...be disappointed with myself

Definitely not						Definitely yes
1	2	3	4	5	6	7

...feel sad

Definitely not						Definitely yes
1	2	3	4	5	6	7

...feel shame

Definitely not						Definitely yes
1	2	3	4	5	6	7

I intend to use prohibited substances .

Extremely unlikely						Extremely likely
1	2	3	4	5	6	7

I plan to use prohibited substances.

Strongly disagree						Strongly agree
1	2	3	4	5	6	7

I expect I will use prohibited substances.

Definitely false						Definitely true
1	2	3	4	5	6	7

	True	False
1. I sometimes litter.	<input type="checkbox"/>	<input type="checkbox"/>
2. I always admit my mistakes openly and face the potential negative consequences.	<input type="checkbox"/>	<input type="checkbox"/>
3. In traffic I am always polite and considerate of others.	<input type="checkbox"/>	<input type="checkbox"/>
5. I always accept others' opinions, even when they don't agree with my own.	<input type="checkbox"/>	<input type="checkbox"/>
6. I take out my bad moods on others now and then.	<input type="checkbox"/>	<input type="checkbox"/>
7. There has been an occasion when I took advantage of someone else.	<input type="checkbox"/>	<input type="checkbox"/>
8. In conversations I always listen attentively and let others finish their sentences.	<input type="checkbox"/>	<input type="checkbox"/>
9. I never hesitate to help someone in case of emergency.	<input type="checkbox"/>	<input type="checkbox"/>
10. When I have made a promise, I keep it – no ifs, ands	<input type="checkbox"/>	<input type="checkbox"/>
11. I occasionally speak badly of others behind their back.	<input type="checkbox"/>	<input type="checkbox"/>
12. I would never live off other people.	<input type="checkbox"/>	<input type="checkbox"/>
13. I always stay friendly and courteous with other people, even when I am stressed out.	<input type="checkbox"/>	<input type="checkbox"/>
14. During arguments I always stay objective and matter- of-fact.	<input type="checkbox"/>	<input type="checkbox"/>
15. There has been at least one occasion when I failed to return an item that I borrowed.	<input type="checkbox"/>	<input type="checkbox"/>
16. I always eat a healthy diet.	<input type="checkbox"/>	<input type="checkbox"/>
17. Sometimes I only help because I expect something in	<input type="checkbox"/>	<input type="checkbox"/>

Debriefing

Thank you for your participation in the study

APPENDIX 5 – Survey of Study 3 – Control conditionGender: Male Female

Age:

Mental construal (psychological distance)

Please select the ONE word in each pair that best fits your frame of mind RIGHT NOW.

Near – Far

Tomorrow – A year

Friend – Enemy

We – They

Sure – Unsure

Certainly – Possibly

Real – Abstract

Practical – Desirable

Close – Distant

Self – Others

Likely – Unlikely

Specific – General

Here – There

Now – Future

The use of nutritional substances to enhance my performance during this season is...
(circle the number that best describes your answer and circle ONE number on EACH line).

Bad	1	2	3	4	5	6	7	Good
Useless	1	2	3	4	5	6	7	Useful
Harmful	1	2	3	4	5	6	7	Beneficial
Unethical	1	2	3	4	5	6	7	Ethical

Have you ever used prohibited substances to enhance your performance?

 No, I have never used prohibited substances to enhance my performance Yes, I have used prohibited substances to enhance my performance once, but not ever since Yes, I use prohibited substances occasionally to enhance my performance Yes, I use prohibited substances systematically to enhance my performance

Personal Opinion Survey

The following questions are designed to measure personal opinions. These questions refer to YOUR opinions on each topic. There are no right or wrong answers, so please be as honest as possible. Place an "X" next to the answer that best describes YOUR opinion. If you answer YES to any of the questions, please provide a reason why you believe this statement to be true.

- 1) I think that the colour blue looks great on most people. _____
 YES _____ NO
 IF YES, WHY?

- 2) I think that chocolate is the best flavour for ice cream. _____
 YES _____ NO
 IF YES, WHY?:

- 3) I think that winter is the most satisfying season during the year. _____
 YES _____ NO
 IF YES, WHY?

- 4) I think that the most aromatic trees in the world are pine trees. _____
 YES _____ NO
 IF YES, WHY?

- 5) I think that cooking is an important skill to possess. _____
 YES _____ NO
 IF YES, WHY?

- 6) I think that house plants help to brighten a home. _____
 YES _____ NO
 IF YES, WHY?

- 7) I think that sewing is an important skill to possess. _____
 YES _____ NO
 IF YES, WHY?

- 8) I think that the beach is a great place to vacation. _____
 YES _____ NO
 IF YES, WHY?

- 9) I think that the subway is the best form of public transportation. _____
 YES _____ NO
 IF YES, WHY?

- 10) I think that fruit makes the best dessert. _____
 YES _____ NO
 IF YES, WHY?

There is an association between doping use and negative health side effects.

Strongly disagree									Strongly agree
1	2	3	4	5	6	7	8	9	

Not using doping substances will help ME avoid negative health side effects

Strongly disagree									Strongly agree
1	2	3	4	5	6	7	8	9	

I think it is important that I do not use doping substances

Not important at all									Extremely important
1	2	3	4	5	6	7	8	9	

I believe that using doping substances increases an athlete's chances of having negative health side effects

Strongly disagree									Strongly agree
1	2	3	4	5	6	7	8	9	

The evidence linking doping substances and negative health side effects is

Very weak									Very strong
1	2	3	4	5	6	7	8	9	

How threatening did you find the message?

Not at all								Very
1	2	3	4	5	6	7		

How unpleasant did you find the message?

Not at all								Very
1	2	3	4	5	6	7		

How personally relevant did you find the message?

Not at all								Very
1	2	3	4	5	6	7		

The use of prohibited substances ... (circle the number that best describes your answer and circle ONE number on EACH line).

Bad	1	2	3	4	5	6	7	Good
Useless	1	2	3	4	5	6	7	Useful
Harmful	1	2	3	4	5	6	7	Beneficial
Unethical	1	2	3	4	5	6	7	Ethical

How much control do you have over using prohibited substances.

Very little control							Complete control
1	2	3	4	5	6	7	

If I wanted to I could use prohibited substances.

Strongly disagree						Strongly agree
1	2	3	4	5	6	7

I feel in complete control over whether I will use prohibited substances.

Completely false						Completely true
1	2	3	4	5	6	7

Subjective norms

Most people who are important to me *would not want* me to use prohibited substances.

Strongly disagree						Strongly agree
1	2	3	4	5	6	7

Most people I know *would not approve* of me using prohibited substances.

Strongly disagree						Strongly agree
1	2	3	4	5	6	7

People who are important to me would...

Strongly disapprove						Strongly approve
1	2	3	4	5	6	7

...of me using prohibited substances.

Most people close to me *do not expect* me to use prohibited substances.

Extremely unlikely							Extremely likely
1	2	3	4	5	6	7	

Descriptive norms

Out of 100%, how many exercisers at your competitive level, do you believe engage in doping?

_____ %

Out of 100%, how many exercisers in Greece do you think engage in doping?

_____ %

Out of 100%, how many exercisers do you believe will be engaged in doping during the next 3 years?

_____ %

I would feel guilty about engaging in doping to enhance my performance

Strongly disagree							Strongly agree
1	2	3	4	5	6	7	

Engaging in doping to enhance my performance would be against my principles

Strongly disagree							Strongly agree
1	2	3	4	5	6	7	

I feel morally obliged to use doping substances to enhance my performance

Strongly disagree							Strongly agree
1	2	3	4	5	6	7	

Situational temptation

How much would you be tempted to use prohibited substances if...

...your trainer suggested this to you?	1	2	3	4	5
...you believed that most exercisers use	1	2	3	4	5

prohibited substances?						
...you prepared for an important event?	1	2	3	4	5	
...you had to enhance your performance?	1	2	3	4	5	

If I use prohibited substances, I will...

...regret it

Definitely not							Definitely yes
1	2	3	4	5	6	7	

...be disappointed with myself

Definitely not							Definitely yes
1	2	3	4	5	6	7	

...feel sad

Definitely not							Definitely yes
1	2	3	4	5	6	7	

...feel shame

Definitely not							Definitely yes
1	2	3	4	5	6	7	

I intend to use prohibited substances .

Extremely unlikely							Extremely likely
1	2	3	4	5	6	7	

I plan to use prohibited substances.

Strongly disagree							Strongly agree
1	2	3	4	5	6	7	

I expect I will use prohibited substances.

Definitely false							Definitely true
1	2	3	4	5	6	7	

	True	False
1. I sometimes litter.	<input type="checkbox"/>	<input type="checkbox"/>
2. I always admit my mistakes openly and face the potential negative consequences.	<input type="checkbox"/>	<input type="checkbox"/>
3. In traffic I am always polite and considerate of others.	<input type="checkbox"/>	<input type="checkbox"/>
5. I always accept others' opinions, even when they don't agree with my own.	<input type="checkbox"/>	<input type="checkbox"/>
6. I take out my bad moods on others now and then.	<input type="checkbox"/>	<input type="checkbox"/>
7. There has been an occasion when I took advantage of someone else.	<input type="checkbox"/>	<input type="checkbox"/>
8. In conversations I always listen attentively and let others finish their sentences.	<input type="checkbox"/>	<input type="checkbox"/>
9. I never hesitate to help someone in case of emergency.	<input type="checkbox"/>	<input type="checkbox"/>
10. When I have made a promise, I keep it – no ifs, ands	<input type="checkbox"/>	<input type="checkbox"/>
11. I occasionally speak badly of others behind their back.	<input type="checkbox"/>	<input type="checkbox"/>
12. I would never live off other people.	<input type="checkbox"/>	<input type="checkbox"/>
13. I always stay friendly and courteous with other people, even when I am stressed out.	<input type="checkbox"/>	<input type="checkbox"/>
14. During arguments I always stay objective and matter- of-fact.	<input type="checkbox"/>	<input type="checkbox"/>
15. There has been at least one occasion when I failed to return an item that I borrowed.	<input type="checkbox"/>	<input type="checkbox"/>
16. I always eat a healthy diet.	<input type="checkbox"/>	<input type="checkbox"/>
17. Sometimes I only help because I expect something in	<input type="checkbox"/>	<input type="checkbox"/>

Debriefing

Thank you for your participation in the study

APPENDIX 6 – Health risk message

There is substantial evidence suggesting that the use of prohibited substances may pose a threat to the athlete's health. And this is an important reason to include several substances in to the list of prohibited substances. The substances' side effects may vary from simple reactions of the body to the substance to permanent failure of several organs and sudden death.

There have been identified from mild to severe side effects on hepatic function, function of the reproductive system, endocrine effects, cardiovascular function, musculo-skeletal effects, psychological disturbances, and even increased mortality.

The side effects identified with respect to **cardiovascular function** include:

- (a) Elevated blood pressure, decreased high-density lipoprotein, Erythrocytosis, Myocardial hypertrophy, Arrhythmia, Thrombosis.
- (b) Association between Endothelial dysfunction with an atherogenic blood lipid profile, and increased risk of atherosclerosis.
- (c) Decrease (25% - 27%) in HDL cholesterol & increase in diastolic blood pressure after 8 weeks of anabolic steroid use (Kuipers,1991).
- (d) Associated with hypertension, myocardial ischemia, and sudden cardiac death (Fieschi et al., 2001; Meichert et al., 1995; Sullivan et al., 1998; Parssinen et al., 2002; Wight et al., 1995).

The side effects identified with respect to **hepatic function** include:

- (a) Hepatotoxicity (elevated liver function tests) / jaundice.
- (b) Neoplasm.

The **reproductive- Endocrine system** side effects identified include:

- (a) Libido changes, Subfertility, Decreased Luteinizing hormone and follicle-stimulating hormone.
- (b) Increased aggressiveness and sexual appetite, sometimes resulting in aberrant sexual and criminal behaviour.
- (c) In Males Only: Impotence with chronic or repeated use, testicular shrinkage (atrophy), breast enlargement (gynecomastia), prostatic enlargement, reduction of sperm production, premature baldness.
- (d) In Females Only: Masculinization/Hirsutism, excessive hair growth on the face & body, deepening of the voice, enlargement of clitoris, abnormal menstrual cycles (suppression of ovarian function and menstruation), reduced breast size. Polycystic ovarian syndrome.
- (e) Children: Premature epiphyseal closure of the growth center of long bones (in adolescents) which may result stunted growth. Premature puberty among female child.

The **Psychological - behavioural** side effects identified involve:

- (a) Mood swings, Aggression, Mania, Depression, Withdrawal, Dependence.
- (b) Direct cause of significant disturbances in personality profiles (Cooper et al., 1996).
- (c) Significantly less in control of their aggression than did controls (Midgley et al., 2001).

The **Dermatologic** side effects identified involve:

- (a) Acne, Striae, Alopecia
- (b) Gynecomastia
- (c) Hirsutism (male pilosis)
- (d) Collagen reducing skin elasticity

The **Musculo-skeletal** system side effects identified involve:

- (a) Muscle tightness and cramp.
- (b) Stiff tender, resulting in an increased potential for muscle strains or rupture.

Other **mild symptoms** identified:

- (a) Headache, insomnia, nausea, nervousness, tremor, muscle cramps
- (b) Increased heart rate and blood pressure
- (c) Withdrawal symptoms, physiologic dependence, habituation.
- (d) Tachyphylaxis (become refractory to the protective effects) (Cheung et al., 1992; Chong et al., 1995; Ramage et al., 1994).
- (e) Association with an increased risk of the combined outcome of fatal and near-fatal asthma, as well as of death from asthma alone (Spitzer et al., 1992; Sears et al., 1990).

Other **Long-Term Health Risks** involve:

- (a) The health risks associated with long-term therapeutic doses of testosterone and chronic supraphysiologic doses of AAS are unknown.
- (b) The most severe consequences of long-term AAS use may be on the cardiovascular system (Parssinen et al., 2002).
- (c) As etiologic factors for some cancers (Parssinen et al., 2002).
 - * Hepatic tumor (Nako A. et al.: 2000).
 - * Renal cell carcinoma (Bryden, 1995; Martorana et al., 1999).
 - * Testicular tumor (Froehner et al., 1999).
 - * Prostatic cancer (Heikkila et al., 1999).
- (d) The risk of mortality among chronic AAS users is reported to be 4.6 times higher than non-AAS users (Parssinen et al., 2000).

APPENDIX 7 – Moral message

The Olympic spirit is best expressed in the Olympic Creed:

"The most important thing in the Olympic Games is not to win but to take part, just as the most important thing in life is not the triumph but the struggle. The essential thing is not to have conquered but to have fought well."

The Olympic Games give us the chance to celebrate our shared humanity, and the object of the competitors should be to express this humanity by performing fairly and honestly to the best of their natural ability. The Olympic spirit can be seen in all those who compete in the Games, not just in those who win the medals.

According to World Anti-doping Agency (WADA Code, 2009) the anti-doping programs seek to preserve this "spirit of sport", which is the essence of Olympism; it is how we play true. The spirit of sport is the celebration of the human spirit, body and mind, and 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
- Community and solidarity

Doping is fundamentally contrary to the spirit of sport.

Yet, in everyday life athletes face many dilemmas regarding the use of prohibited substances. For instance, Helen is a javelin thrower with body and soul. At the moment, she is supported by a promotional program for young athletes; this gives her the best opportunity to practice her sport. She receives weekly medical attention, a car, and spending money of 700 Euros a month. Because of the full time schedule, Helen rarely meets people besides her co-athletes, who she naturally considers her best friends. During the last months, Helen has made very little progress in her javelin throwing. She has not shown signs of agitation, but instead she has been motivated to train even more intensively. Nonetheless, her coach has recently told her that the gap between her and the others is getting too large. Helen will not remain in the promotional program, if she cannot close that gap soon. Helen cannot imagine leaving the group and rejoining her old club. After two weeks, in which she did not complete the norms, a friend asks her if she wants to increase her performance with enhancing substances. Helen desperately wants to keep the promotional status.

She started thinking using prohibited substances but she thought that it would be unethical to use these substances. In addition, for Helen it was important to respect herself and her co-athletes and not violate the rules and laws, and the spirit of athletics. Furthermore, practices wouldn't be fun anymore due to cheating and trying not to be caught, lying to her coach, parents, teammates, and friends and suspecting and treating everybody as a possible user. Besides these, using these substances would possible harm her health as there are several side effects from their use. So, she decided not to use these substances and rely on her talent and effort.

APPENDIX 8 – List of publications and presentations arising from the thesis

Publications

Barkoukis, V., Lazuras, L., & Harris, P. R. (2015). The effects of self-affirmation manipulation on decision making about doping use in elite athletes. *Psychology of Sport and Exercise, 16*, 175-181. (Chapter 6)

Barkoukis, V., Rowe, R., Lazuras, L., & Harris, P. R. (in preparation). The effect of self-affirmation on doping use intentions in recreational gym users. (Chapter 5)

Barkoukis, V., Rowe, R., Lazuras, L., & Harris, P. R. (in preparation). The role of mental construal and message acceptance on the effect of self affirmation on the decision making about doping use. (Chapter 7)

Presentations

Barkoukis, V., Lazuras, L., Rodafinos, A., Harris, P. (2012). *Self-affirmation as a Method to Increase Susceptibility in Anti-doping Campaigns*. International conference on anti-doping. Tunis, Tunisia.

Barkoukis, V. (2012). *The role of trait variables on the prediction of doping use. Features of effective interventions*. International conference of Physical Education and Sport, Thessaloniki, Greece.

Barkoukis, V. (2013). *'I am not doped'. But is he telling the truth ?*. International conference of Physical Education and Sport, Thessaloniki, Greece.

Barkoukis, V. (2014). *A social cognitive approach in doping research*. Invited presentation at the University of Potsdam, Germany.

Barkoukis, V., Lazuras, L., Rodafinos, A., Harris, P. (2014). *Effect of health and moral messages on doping use: A self-affirmation approach*. Presented at the conference of French Association of Sport Psychologists, Nice, France.

Barkoukis, V. (2015). *Effectiveness of an anti-doping intervention based on health and ethical information*. Invited presentation at the Annual meeting of the International Society of Sport Psychology, Rome, Italy.

Barkoukis, V. (2015). *Psycho-social parameters of doping use: The present and our future research plan*. Invited presentation at the 'Sapienza University of Rome', Rome, Italy.

Barkoukis, V. (2015). *Psychology of doping: From Tour de France to the gym*. Invited presentation at the 'Sapienza University of Rome', Rome, Italy.