Social Sciences Research Grant

Enhancing anti-doping education interventions using framed messages

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Executive Summary

Doping in sport is a worldwide problem that is not limited to the most elite athletes (Nicholls et al., 2017). Nicholls et al. (2017) reported that athletes as young as 10 years old reporting using performance-enhancing substances and estimates of doping rates among adolescents range from 1% to 26% of athletes (Backhouse, Whitaker, Patterson, Erickson, & McKenna, 2016; Goulet, Valois, Buist, & Côté, 2010). Recently, doping prevention programs have been designed to specifically target adolescent and high school athletes; however, one shortcoming of existing interventions is that they have been developed without consideration of some fundamental principles of health communication. Health messaging principles remain untested within the field of doping prevention but if effective messaging strategies are identified and included in prevention interventions they may enhance several factors from participant engagement in the program to the overall effects on reducing rates of doping initiation.

One widely-studied and well established health communication principle is message framing (Rothman & Salovey, 1997). The central assumption of message framing is that the way in which people respond to messages and subsequently make behavioural decisions is dependent, in part, on how the information in the message is presented, or framed (Rothman & Salovey, 1997). When encouraging people to avoid doping, research suggests that using gain-framed messages (e.g., "Saying no to doping will help you stay healthy") as opposed to a loss-framed message (e.g., ""Doping will put your health at risk") would be most persuasive. Among adolescents, research examining framing effects is limited and findings from the few existing studies have been mixed, suggesting a need for further tests of message framing effects in this population. Therefore, the purpose of this study was to test the hypothesis that gain-framed

messages would be more effective than loss-framed messages for influencing important cognitions related to doping abstinence among adolescent athletes.

In a randomized controlled trial, 114 athletes aged 12 to 16 years old (M_{age} = 13.67 years; 55% boys) viewed either a gain-framed or loss-framed video message. Outcome variables included intentions, attitudes, self-efficacy, and perceived norms related to doping and were assessed immediately before and after the videos. Mixed between-within subjects ANOVAS were conducted to assess differential changes in the outcome variables for participants who saw the gain as compared to loss-framed videos. Analyses revealed no effect for message framing condition on any of the outcomes. Manipulation check items revealed that the adolescents had substantial difficulty differentiating between the different message frames. Regardless of the message frame, there were significant improvements in attitudes, self-efficacy, and perceived norms related to doping, suggesting that a brief messaging intervention can have a significant influence on cognitions related to abstaining from doping. Overall, the findings of this research indicate that neither a gain-framed message nor a loss-framed message has a distinct advantage in changing important cognitions related to doping among adolescent athletes but that receiving either type of message may be influential in helping to establish a pattern of cognitions that will protect against doping initiation.

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Introduction

Doping refers to an athlete's use of illegal substances (e.g., steroids, growth hormones, stimulants) or methods (e.g., blood manipulation) to enhance performance that are banned by the World Anti-Doping Agency (WADA; 2015). Doping is a global issue that permeates all levels of sport, threatening sporting values, and athletes' overall health and well-being. The WADA reported that in 2016 just under two percent of their samples collected from elite athletes around the world tested positive for banned substances (WADA, 2016); yet, researchers suggest the prevalence of doping is much higher, ranging from 14%-39% of elite athletes (de Hon, Kuipers, & van Bottenburg, 2015). One study reported doping rates among adolescent athletes to range between 1% and 5% (Backhouse, Whitaker, Patterson, Erickson, & McKenna, 2016). However, a WADA-funded study conducted in Quebec, Canada indicated that amongst 3,573 adolescent male and female provincial team athletes from a variety of sports (M_{age} = 15.5 years, SD = 2.4 years), 25.8% of respondents admitted to having used one or more substances banned by the WADA within the past 12 months (Goulet, Valois, Buist, & Côté, 2010). Additionally, athletes as young as 10 years old have reported using banned substances (Nicholls et al., 2017), which may have serious implications for their health and future development.

There are many known side effects to prolonged exposure to performance-enhancing substances. Notably, prolonged exposure can affect individuals physiologically by decreasing fertility, causing hormonal imbalances, and potentially leading to the failure of some organs like the heart and liver. The damage can be irreversible and can ultimately lead to premature death (Bird, Goebel, Burke, & Greaves, 2016). Doping has also been linked to psychological changes that can alter personality and mood making individuals highly explosive and aggressive (Bahrke & Yesalis, 2004). Doping can also be associated with social and moral consequences, like guilt,

shame, ban from sport, a bad reputation, and loss of friendships (Ehrnborg & Rosén, 2009; Kirby, Moran, & Guerin, 2011; Overbye, Knudsen, & Pfister, 2013). The numerous consequences associated with doping proves that it is imperative to increase athletes' awareness about the consequences of doping and to take steps to prevent doping in the future.

There is a growing body of research demonstrating the efficacy of educational interventions to help reduce doping initiation rates among high school level athletes as well as athletes in community sports programs. For example, the ATLAS and ATHENA programs are multi-session, multi-component prevention interventions that aim to prevent the use of anabolic steroids among males (Goldberg et al., 1996; Goldberg, MacKinnon, Elliot, Moe, Clarke, & Cheong, 2000) and females (Elliot, Goldberg, Moe, DeFrancesco, Durham, & Hix-Small, 2004; Elliot et al., 2008), respectively. These programs are designed for high school athletic teams to educate athletes about proper sports nutrition, strength training and the effects of various doping agents. Both ATLAS and ATHENA are peer-led, gender specific and interactive programs that are easily implemented into a sports teams usual practice times.

Although anti-doping interventions have demonstrated efficacy, their implementation has not yet led to the elimination of doping in sport. This failure to eradicate doping may be due, in part, to limitations of these existing interventions. First, given the intensive dose in which these interventions are delivered (i.e., 8 classroom sessions led by the coach plus ten weight room sessions led by research staff plus regular booster sessions), reaching the broad spectrum of high school athletes is difficult. Second, in order for coaches to administer these prevention interventions, they must obtain specialized training, which can be challenging given busy practice and competition schedules. Finally, these interventions fail to capitalize on some fundamental principles of health communication, which may enhance several factors from

participant engagement in the program to the overall efficacy of the program on reducing rates of doping initiation. Therefore, strategies are needed to enhance the effectiveness of these educational interventions. Applying established health communication strategies to these already effective prevention interventions may be one way to enhance the overall effectiveness of the prevention interventions.

Message Framing

One widely-studied and well established health communication principle is message framing (Rothman & Salovey, 1997), derived from prospect theory (Kahneman & Tversky, 1979). The central assumption of message framing is that the way in which people respond to messages and subsequently make behavioural decisions is dependent, in part, on how the information in the message is presented, or framed (Rothman & Salovey, 1997). Prospect theory postulates that individuals respond differently to factually-equivalent information depending on whether the information emphasizes benefits (gain-framed) or costs (loss-framed; Kahneman & Tversky, 1979). When faced with potential losses, people are more likely to engage in behaviours with risky or uncertain outcomes, but when considering potential gains, individuals are more likely to avoid risk (Kahneman & Tversky, 1984; Tversky & Kahneman, 1981). When encouraging people to avoid doping, research suggests that using gain-framed messages (e.g., "Saying no to doping will help you stay healthy and allow you to feel proud about being an honourable athlete!") would be most persuasive. This suggestion contrasts the more commonly held notion that messages are most persuasive if they are loss-framed and focus on the consequences of adopting the negative health behaviour (e.g., "Doping will put your health at risk lead you to feel ashamed about being a dishonourable athlete!").

Among adults, gain-framed messages have received considerable empirical support for changing attitudes and intentions toward prevention-related behaviours such as physical activity and dental hygiene behaviours (Gallagher & Updegraff, 2012). There are very few studies, however, that have tested a message-framing approach for changing cognitive predictors of substance use behaviours and no message framing interventions aimed at doping prevention among athletes. With regard to substance use, previous studies in adults have shown that gain-framed messages induce higher rates of smoking cessation (Toll et al., 2007) and lower rates of alcohol consumption (Gerend & Cullen, 2008). However, among adolescents, research examining framing effects is limited. The few studies that have been conducted in this area to date indicated that loss-framed messages seem to be more influential in promoting healthy cognitions related to prevention behaviours, such as avoiding drug use and smoking cessation (Cho & Boster, 2008; Latimer, Krishnan-Sarin, Cavallo, Duhig, Salovey, & O'Malley, 2012). The findings from these studies contradict the framing hypotheses in that loss-framed messages are preferred among adolescents for prevention behaviours, and suggest that further research is needed to examine the effect of message framing on the prevention of other risk behaviours such as doping.

Purpose

The purpose of this study was to test the message framing hypothesis in the context of doping prevention by comparing the efficacy of gain-framed and loss-framed messages for influencing intentions, attitudes, self-efficacy, and perceived norms to avoid doping among adolescent athletes. In line with the message framing hypothesis we predicted that gain-framed messages would be more effective than loss-framed messages for instilling a healthy pattern of cognitions and motivation to protect against the initiation of doping.

Method

Prior to conducting any element of this study involving human subjects, ethics approval was granted from the Research Ethics Board of the host institution. This research was conducted in two phases. In Phase I, we developed gain- and loss-framed video messages, through an extensive iterative process involving feedback from adolescent athletes and experts in the area of message framing. In Phase II, we conducted a randomized controlled trial to compare the efficacy of the gain- and loss-framed video messages for influencing intentions, attitudes, self-efficacy, and perceived norms around doping among adolescent athletes.

Phase I

In Phase I, we developed gain- and loss-framed health messages through an extensive, multi-stage process. First, we consulted the anti-doping literature and existing doping prevention resources (Duncan, Hallward, & Ziavras, 2016) and developed an initial script for the gain-framed video. The script was written to mimic with existing resources by providing a clear definition of doping, to present the physical, psychological, social, and moral implications of doping, and provide some information about healthy alternatives for performance improvement (such as healthy nutrition). A loss-framed script was then written based on the gain-framed script. Both scripts went through numerous rounds of feedback from members of the research team. Once the scripts were finalized, images were selected from the Shutterstock online library of royalty-free images with the goal of choosing engaging and relatable photos for young athletes of both genders and diverse ethnicities and sport types. PowerPoint was used to build gain- and loss-framed videos through incorporating the messages and photographs. The videos went through three rounds of feedback between members of the research team where the images and script were assessed for language, unity (between message and image), and if they targeted the

proper age group. After each round of feedback, changes were made to the videos based on the suggestions, for example, the amount of text was reduced and a voice-over reading the messages was added. Excerpts from these revised videos were shared with members of our target audience for another round of feedback. At this stage the adolescent athletes emphasized that anecdotes and quotations from elite athletes who have stayed clean (gain-framed) or been caught doping (loss-framed) were particularly engaging; therefore, we added some additional content highlighting well-known athletes. Once we felt the framed videos were near their final form, we solicited feedback from two researchers with expertise in message framing as well as consultants from the WADA. Feedback from these experts was integrated into the final versions of the videos.

Framed messages. The products of our message development phase were one gain-framed video (Appendix A) and one loss-framed video (Appendix B). Both videos contained information about the definition of doping and performance-enhancing substances (PES) as well as healthy alternative options to doping such as talking to your coach about optimal training or eating a healthy diet. Although we attempted to make the videos equivalent in every way except the framing, some minor variations in the length or content was discrepant between the videos to ensure that the framed language flowed well and was grammatically correct. To confirm that the videos included a sufficient amount of framed content the text and images were coded by 2 research assistants, trained in message framing. The gain-framed video contained 37.5% gain-framed information, 0% loss-framed information, and 62.5% neutral information. The loss-framed video contained 33.33% loss-framed messaged, 0% gain-framed, and 66.67% neutral information. It is consistent with other message framing studies and existing doping prevention resources (Duncan et al., 2016) that a substantial percentage of the video content was neutral (or

non-framed). Once the messages were finalized, they were translated into French to allow for data collection to take place in both of the official languages spoken in the city where data collection took place.

Phase II

Participants. The eligibility criteria for participation was: (1) athletes 12 to 16 years of age, (2) compete in any sport, (3) read and understand English or French. Although the primary outcome was intentions to begin doping, we did not exclude participants who had already initiated doping because we did not want participants to misrepresent their doping behaviour to gain or avoid access to the study.

Measures. Social-cognitive variables from the theory of planned behaviour (Ajzen, 1991) were used to assess the effects of the framed messages. The theory of planned behaviour was selected because this theory has been the foundation for most of the published research on social-cognitive determinants of doping (Ntoumanis, Ng, Barkoukis, & Backhouse, 2014). Given that this research represents a brief messaging intervention, and effective messages exert their most immediate influence on the psychological antecedents to behaviour (Petty & Cacioppo, 1986) our objective was to influence these antecedents, rather than behaviour per se. According to the theory of planned behaviour (Ajzen, 1991) intention is the most proximal predictor of behaviour. In addition, intention is one of the most common outcomes in message framing studies (Gallagher & Updegraff, 2012). Therefore, the primary outcome variable was intentions to begin doping. Secondary outcome variables included attitudes, self-efficacy, and perceived norms. Doping attitudes and perceived norms have been shown to predict doping intentions, and to a lesser extent, doping behaviour (e.g., Goulet et al., 2010; Lucidi et al., 2008). Where possible we used scales that had been previously validated, or had been used in previous research

with some evidence of validity. Given the logistics of data collection (i.e., on site at sport venues during practice time) we were limited in the length of the questionnaire that could be administered; therefore, some scales were abbreviated.

Demographics. Participants responded to six basic demographic questions including their age, gender, race, family composition, family income/standard of living, and languages spoken at home.

Sport participation and doping education. Each participant provided information about the main sport they compete in, other (secondary) sports they compete in, how many hours per week they train and compete in their sports, how many years they have participated in their main sport, what position they play (if relevant), and the highest level of competition they have achieved in their main sport. Participants also indicated if they had ever spoken to a coach, family member, friend, teammate, teacher, or someone else about doping. They also indicated if they had ever participated in formal doping education (and if so, where this formal education had been delivered).

Behaviour. Although behaviour was not assessed as an outcome of this study we collected information about use of performance-enhancing substances for descriptive purposes. We assessed behaviour using a scale slightly modified from previous research (Goulet et al., 2010). Participants indicated from 0 (*no*) to 4 (*yes, I use it regularly*) how often they have used 28 different substances within the past year to improve their athletic performance.

Intentions. To assess the primary outcome of doping intentions we used a single item "I intend to use performance enhancing substances in the next year" which was rated from 1 (*disagree a lot*) to 7 (*agree a lot).*

Attitudes. We assessed attitudes using a measure adapted (for length) from previous research (Goulet et al., 2010). The participants responded to 13 items (e.g., "using performance-enhancing substances in the following year would make me feel guilty" and "using performance-enhancing substances would increase my chances of winning a competition") rated on a scale from 1 (*disagree a lot*) to 5 (*agree a lot*). Where necessary, items were reverse scored such that higher values represented healthier attitudes. An average score across the 13 items was calculated for each participant. Cronbach's alpha for this scale was .61.

Self-efficacy. To measure the participants' self-efficacy for avoiding doping we used four items adapted from previous research (e.g., "How confident are you that you could avoid doping if you were being pressured by a teammate?"; MacKinnon et al., 2001). Participants rated each item on a 100% confidence scale (Bandura, 2006) and a total self-efficacy score was derived from the average of the four items (Cronbach's alpha .92).

Perceived norms. We used 5 items, adapted from previous research (MacKinnon et al., 2001) to assess perceived tolerance for doping among coaches, peers, and parents (e.g., "If I got caught doping I would get in trouble with my coaches"). Each item was rated from 1 (*strongly disagree*) to 5 (*strongly agree*). Where necessary, items were reverse scored such that higher values represented healthier perceived norms. An average score across the 5 items was calculated for each athlete. The Cronbach's alpha value scale was .45, which is below the value that is traditionally considered to be acceptable.

Manipulation check. Immediately after viewing the messages, participants responded to 2 manipulation check items. The participants indicated (from 1 = *disagree a lot* to 5 = *agree a lot*) the degree to which they thought that the video was mostly about: (a) the good things that could happen if you avoid doping (gain-frame) or (b) the bad things that could happen if you

begin doping (loss-frame). These items have been used in previous message framing studies (e.g., Rivers, Salovey, Pizarro, Pizarro, & Schneider, 2005).

Check for confounds. At the post-video assessment point, the participants rated the video in terms of (a) how much they believed the information presented to be true, (b) how interested they were in the video, (c) how much they could relate to the information presented in the video, and (d) how much new information they learned from the video. Each item was rated from 1 to 5 with higher values indicating a more positive assessment of the video. These items have been used in previous message framing studies (Rivers et al., 2005).

Procedures. Participants were recruited through partnerships with community sports programs. A research assistant responsible for recruitment contacted coaches and administrators from a variety of sport programs in the greater Montreal area to solicit their participation. When coaches agreed, letters of information, parent consent, and adolescent assent forms were mailed to them for distribution to their parents and athletes, and a date was scheduled for data collection. Data collection occurred at the practice location of the sports teams, before or after a regularly-scheduled practice session. The sessions took place in quiet, comfortable settings where the data collection and video presentation could occur with minimal distractions. The research team members met with the athletes to describe the study purpose and procedures and confirm their willingness to participate. The participants completed the before-video questionnaire and were then assigned an iPad on which to view the assigned message. To avoid contamination randomization to framing condition occurred at the level of the team, using a computer-generated list of random numbers; thus, all of the athletes from one team watched the same video. Immediately after the video presentation the participants completed the post-video questionnaire. The participants received $15 for participating in the study.

Data analysis. The data were screened to detect missing values and outliers, and to test for conformity with the assumptions of parametric statistical tests. To assess changes in the primary outcome (intentions) and secondary outcomes (attitudes, self-efficacy, and perceived norms) from before to after watching the video, we conducted mixed between-within subjects ANOVAs. Partial eta squared values were used to determine effect sizes of the multivariate tests and were interpreted using common guidelines (.01 = small; .06 = moderate; .14 = large effect; Cohen, 1988, pp. 284-287).

Results

Descriptive Statistics

The participants included a total of 114 athletes, 63 boys (55%) and 51 girls (45%) with a mean age of 13.67 (SD = 1.27). The athletes reported that their primary sports were swimming (37; 32.5%), speed skating (21; 18.4%), dance (19; 16.7%), hockey (18; 15.8%), tennis (8; 7%), fencing (4; 3.5%), baseball (2; 1.8%), soccer (2; 1.8%), track (1; 0.9%), figure skating (1; 0.9%), and triathlon (1; 0.9%). The athletes reported spending an average of 10.09 hours per week (SD = 5.38 hours) training or competing in their main sport. Thirty-nine athletes (34.2%) compete in one sport, 63 athletes (55.3%) compete in two sports, 11 athletes (9.6%) compete in three sports, and one athlete competes in four sports. The other sports that athletes competed in included basketball, handball, cycling, skiing, snowboarding, cross country running, volleyball, gymnastics, football, lacrosse, karate, golf, artistic (synchronized) swimming, and water polo.

Fifty-seven athletes reported that they had previously talked to someone about doping. Among these 57 athletes, 16 said they talked with their coach, 19 talked with friends or teammates, 31 talked with family members, and 24 talked to a teacher. Thirty-two athletes reported having previously participated in at least one doping education program or workshop.

Among these 32 athletes, 7 received education at their sports practice, 30 had participated in a program at school, 6 had participated in an after school program, and one had received some education from a program delivered at a community center.

Sixty-two of the 114 participants reported that they had used at least one substance to help improve their performance in the past month. The most common substances that participants reported taking were chocolate (43%), recovery drinks (29%), Tylenol (26%), vitamin supplements (20%), and coffee (15%). It is worth noting that none of these substances are currently banned by the WADA, but are considered legal substances or nutritional supplements. Very few athletes reported the use of banned substances including amphetamines (n = 1), cocaine (n = 1), growth hormones (n = 1), and marijuana (n = 2). The use of an asthma inhaler (n = 10) or caffeine tablets (n = 4) were reported; however, these substances are restricted (i.e., not entirely prohibited). No participants reported using steroids, beta-blockers, blood transfusions, diuretics, erythropoietin, local anesthetics, masking products, narcotic analgesics, stimulants, or urine manipulation. Overall, the athletes mainly reported the use of low-risk substances that are legal or considered nutritional supplements. The level of substance use reported by our participants was appropriate given our objective to recruit participants for a study focused on primary prevention (i.e., enroll participants and intervene before substance use has been initiated).

Message Condition

Among the 114 athletes, 49 were assigned to receive the loss-framed message and 65 were assigned to the gain-framed message. The number of participants in each message condition is not even because the random assignment was done by team and not by individual athlete to protect against potential contamination effects.

Message Evaluation

Overall the videos were rated as very positive with mean scores for each of the items above around 4 on the 5-point scale. Independent samples t-tests revealed, however, significant differences between the gain and loss-framed conditions in how interesting the videos were rated to be, t (112) = 3.03, p = .003, and the degree to which participants thought they learned new things from the videos, t (111) = 2.40, p = .018. In both cases the videos were rated more positively by participants who viewed the loss-framed video. The means and standard deviations for these message evaluation variables are presented in Table 1.

Manipulation Check

Only 55 participants passed the manipulation check. Fifty-seven participants failed and two participants had missing data on one or both of the manipulation check items. We conducted a chi-square test to determine if the rates of pass/fail for the manipulation check were consistent across messaging conditions. The results revealed that participants in the gain-framed condition were significantly more likely to fail the manipulation check compared to participants in the loss-framed condition (Pearson chi-square = 6.99, p = .013). In the loss-framed condition 31 athletes passed the manipulation check and 18 athletes failed. In the gain-framed condition 24 athletes passed and 39 athletes failed. Rates of pass/fail for the manipulation check did not differ significantly by gender (p = .455) or age (p = .122).

Main Analysis

The following mixed between-within subjects ANOVAs are conducted only for participants who passed the manipulation check.

Intentions. There was no significant interaction between frame and time, Wilk's Lambda = .99, F (1, 53) = .64, p = .429, partial eta squared = .012. There was no significant main effect for

time, Wilk's Lambda = .98, F (1, 48) = 1.22, p = .275. The main effect for frame was not significant, F (1, 53) = .04, p = .841, partial eta squared = .001.

Attitudes. There was no significant interaction between frame and time, Wilk's Lambda = .94, F (1, 48) = 2.74, p = .105, partial eta squared = .06. There was a significant main effect for time, Wilk's Lambda = .87, F (1, 48) = 6.92, p = .012, partial eta squared = .13. The main effect comparing the two frames was not significant, F (1, 48) = 1.01, p = .320, partial eta squared .02.

Self-efficacy. There was no significant interaction between frame and time, Wilk's Lambda = .97, F (1, 48) = 1.56, p = .217, partial eta squared = .03. There was a significant main effect for time, Wilk's Lambda = .87, F (1, 48) = 7.80, p = .007. The main effect comparing the two frames was not significant, F (1, 48) = 1.35, p = .250, partial eta squared .03.

Norms. There was no significant interaction between frame and time, Wilk's Lambda = .94, F (1, 48) = 2.74, p = .105, partial eta squared = .06. There was a significant main effect for time, Wilk's Lambda = .87, F (1, 48) = 6.92, p = .012, partial eta squared = .13. The main effect comparing the two frames was not significant, F (1, 48) = 1.01, p = .320, partial eta squared .02.

Discussion

The purpose of this study was to compare the efficacy of gain-framed and loss-framed messages for influencing intentions (primary outcome), attitudes, self-efficacy, and perceived norms (secondary outcomes) to avoid doping among adolescent athletes aged 12-16 years. In line with the literature on message framing (Rothman & Salovey, 1997; Gallagher & Updegraff, 2012), derived from prospect theory (Kahneman & Tversky, 1979), we hypothesized that the gain-framed messages would lead to greater improvements in the primary and secondary outcome variables. Our findings revealed no significant advantage for the gain-framed message over the loss-framed message on any of the study variables. Notably, more that 50% of the

participants failed the manipulation check indicating that the participants had substantial difficulty differentiating between the two message frames. Despite this, there were significant improvements in attitudes, self-efficacy, and perceived norms related to doping prevention for all participant, regardless of the frame of the message. This finding suggests that even a brief intervention could be effective for helping to change the cognitions known to be associated with doping prevention.

Our hypothesis that the gain-framed message would lead to greater improvements in intentions, attitudes, self-efficacy, and perceived norms for doping prevention was not confirmed. Although very few studies have explored the effects of framed messages among adolescents, findings from these studies have been mixed and have also not supported a gain-framed advantage for encouraging prevention behaviours. For example, Latimer et al. (2012) reported that among adolescent smokers, gain-framed messages were preferred and rated as more novel but loss-framed messages actually led to greater improvements in attitudes toward cessation. Cho and Boster (2008) examined the effects of framed messages on adolescents' attitudes and intentions toward alcohol, tobacco, and marijuana use. Among adolescents who perceived that their friends used these substances, loss-framed messages led to healthier attitudes and intentions about alcohol, tobacco, and marijuana whereas there were no framing effects among adolescents whose friends did not use these substances. Among adolescents who reported using these substances themselves there was a general (albeit not perfectly consistent) advantage for loss-framed messages. Among adolescents who reported that they did not use these substances neither the gain-framed nor the loss-framed messages were systematically more persuasive. It should be noted that in this study by Cho and Boster (2008) attitudes and intentions were only assessed after the messages were presented thus a change in attitudes and intentions

that results from viewing the framed messages cannot be inferred. Taken together, these findings point to the inconsistency in framing effects for studies conducted among adolescents.

Findings from Cho and Boster (2008) highlight the role that actual experience with a behaviour or awareness of that behaviour occurring within one's environment may have on the differential persuasiveness of framed messages. The participants in our study reported almost no doping behaviour. It is not known the degree to which they perceived doping among their peer groups; however, given the low frequency with which doping was discussed amongst them, doping is likely uncommon. Perhaps having some personal or environmental exposure to a behaviour, rather than only hypothetical consideration of that behaviour, better prepares adolescents to receive and process the message.

Our findings showed that regardless of message condition, significant changes in the expected direction were reported in intentions, attitudes, self-efficacy, and perceived norms for doping prevention. These findings suggest that there may be some benefit to exposure to a brief doping prevention intervention (however, it should be noted that this study did not include a "no message" control condition). Although we do not suggest that a brief messaging intervention is adequate for doping prevention, we are encouraged by the improvement that were reported after exposure to the 5-minute videos. Researchers have reported that many adolescent athletes do not receive any doping education and have called for more widespread prevention efforts (Backhouse et al., 2016; Hallward & Duncan, in press). Exposure to a brief intervention appears to have at least some impact on adolescents' cognitions related to doping.

It should be noted that at the before-video assessment, the participants' intentions, attitudes, self-efficacy, and perceived norms were already very positive; therefore, there was little room for improvement in these variables among our participants. The inherent nature of

primary prevention research is such that participants are enrolled "before it's too late" or, before they begin to display an unhealthy pattern of thoughts, motives, and behaviours. Therefore, the goal of primary prevention interventions should be for reports of these variables to remain positive, while you might expect them to decrease if no intervention is offered, placing the participants at risk for doping initiation. The ideal time for the delivery of prevention interventions is before a risky pattern of thoughts and behaviour is adopted but not so early that the participants' have not yet developed the contextual knowledge that would make them impressionable to intervention. Other researchers have identified that the optimal age to intervene for doping prevention is 11 – 14 years (Backhouse, McKenna, & Patterson, 2009). This age range is would be appropriate given that rates of doping are still relatively low (Backhouse et al., 2016); however, our own formative research for this project suggested that adolescents on the younger end of this age range may not have the contextual knowledge needed for them to perceive the interventions as relevant and engaging (Rebner, Hallward, & Duncan, 2015). To determine the optimal target age range for primary doping prevention, there is a need for longitudinal studies that intervene during adolescence and follow participants through their later teenaged years to document whether the interventions truly have effects on reduced rates of initiation.

An unexpected finding from this research was that despite a rigorous process of message development that involved consultation with adolescents and message framing experts, the rate of failure on the framing manipulation check was very high. One explanation for this may be that adolescents' cognitive development may not be advanced enough that they execute the predictable pattern of decision making described in prospect theory. This may explain why previous studies have failed to demonstrated a gain-framed advantage for encouraging

prevention behaviours among adolescents when it is considerably more consistent among adults. Having said this, previous message framing studies conducted with adolescents have employed similar manipulation check items with a much smaller rate of failure, suggesting that adolescents can detect the different frames but did not do so successfully in this study. It is notable that participants in the gain-framed condition were significantly more likely to fail the manipulation check. In addition, participants in the gain-framed condition rated their message as less interesting and as providing less novel information than the participants in the loss-framed condition. These findings suggest that adolescents may process the loss-framed messages more deeply than the gain-framed messages. According to the elaboration likelihood model, familiarity with a message (or elements of a message) may stimulate deeper processing of the message (Petty & Cacioppo, 1986). Researchers have noted that adolescents may be more familiar with loss-framed warning label-type messages because of their frequent use in risk prevention campaigns (e.g., Duncan et al., 2016; Goodall & Appiah, 2008; Latimer et al., 2012); thus, it is possible that the loss-framed messages attracted more attention and led to deeper cognitive processing than the gain-framed messages.

Limitations

There are a few notable limitations to this research. First, the participants reported relatively healthy levels of the primary and secondary outcome variables prior to message presentation, suggesting possible ceiling effects whereby even the strongest messages might not have resulted in substantial improvements. The theory of planned behaviour posits the central assumption that behaviour is rational and intentional; however, studies have demonstrated the decision to dope may not be entirely intentional (e.g., Dodge, Stock, & Litt, 2013; Whitaker, Backhouse, & Long, 2014). Rather, an athlete's decision to dope can depend on reasoned actions

(i.e., intentions are influenced by attitudes and perceived norms) or social reactions (i.e., responses to risk-conducive situations influenced by social norms and an athlete's willingness to dope; Gibbons, Gerrard, Blanton, & Russell, 1998). We did not assess an athlete's willingness to dope which may be more sensitive to the effects of message framing.

We only evaluated the acute effects of the message framing intervention therefore we are unable to explore the lasting effects of the intervention on the psychological outcome variables or explore the potential long-term impact on behaviour. Given the high rate of failure on the manipulation check; however, even a longer term follow up would not allow us to explore differential effects of gain and loss-framed messages. More research is needed to explore the mixed results of message framing effects among adolescents.

Implications and Conclusion

The results of this study did not support the hypothesis that gain-framed messages would lead to better improvements in the psychological antecedents of doping behaviour than loss-framed messages among adolescent athletes. These findings contribute to a growing body of research demonstrating that among adolescents framing effects are less consistent than they are among adults. The results of our manipulation check may provide some insight into the mixed findings among adolescents suggesting that adolescents don't perceive the difference between the frames thus eliminating their potential to have differential influences. Despite these disappointing findings we were encouraged to see improvements in attitudes, self-efficacy, and perceived norms for our participants, regardless of the message they saw. This suggests that even a brief intervention may be worthwhile for helping adolescent athletes establish a pattern of cognitions that could protect them against doping initiation in the future.

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Table 1. Descriptive statistics for the message evaluation variables by framing condition.

	Gain Frame M (SD)	Loss Frame M (SD)
I believe the facts and information presented in the video are true	4.75 (.47)	4.80 (.68)
The video was interesting to me	3.92 (1.12)	4.43 (.65)
I could relate to the facts and information presented in the video	4.03 (1.05)	4.29 (.92)
I learned new things about doping from the video	4.22 (.99)	4.60 (.61)

Note. All items were rated on a scale ranging from 1 (*disagree a lot*) to 5 (*agree a lot*).

Table 2. Descriptive statistics for primary and secondary outcomes before and after message presentation.

	Before Video		After Video	
	Gain Frame M (SD)	Loss Frame M (SD)	Gain Frame M (SD)	Loss Frame M (SD)
Intentions	1.21 (.72)	1.29 (.86)	1.17 (.82)	1.03 (.18)
Attitudes	4.15 (.52)	4.15 (.36)	4.21 (.42)	4.41 (.31)
Norms	4.48 (.76)	4.74 (.35)	4.78 (.39)	4.84 (.34)
Self-Efficacy	90.51 (11.82)	83.06 (24.56)	91.99 (11.46)	86.94 (22.60)

Note. Intentions were rated on a scale ranging from 1 (disagree a lot) to 5 (agree a lot); lower values indicate healthier intentions. Attitudes were rated on a scale ranging from 1(disagree a lot) to 5 (agree a lot); higher values indicate healthier attitudes. Norms were rated on a scale ranging from 1 (disagree a lot) to 5 (agree a lot); higher values indicate healthier perceived norms. Self-efficacy was rated on a 100% confidence scale with higher values indicating higher self-efficacy.

Appendix A: Gain-Framed Message

Saying no to doping is a winning game!

More than a million young athletes think using performance-enhancing substances is taking the easy road to victory.

Are you on the clean road to success?

You may have heard about professional athletes doping, but it even happens in college and high school

Even young athletes are impacted because there is a lot of pressure to excel or to have a certain body type.

Doping means using performance-enhancing substances (PES) to help increase qualities such as speed and strength in order to perform better.

PES are unethical and banned from sport. They include steroids, growth hormones, marijuana and more…

PES can even include substances that you may not consider dangerous such as:

- Caffeine pills
- Protein powder or herbal supplements
- Common cold and over the counter medications

Many of the top athletes in the world such as Wayne Gretzky, David Beckham, and Clara Hughes have avoided doping and have been incredibly successful.

"I wasn't naturally gifted in terms of size and speed; everything I did in hockey I worked for, and that's the way I'll be as a coach." – Wayne Gretzky

"I train with athletes day in and day out who are doing it right and doing it clean and they are winning." – Clara Hughes

These role models are examples of how you can be a champion athlete while staying drug free.

By deciding to stay clean, you are taking care of your health both physically and mentally.

Clear skin and avoiding the risk of abnormal hair or breast growth

Regular sleep patterns and a good night sleep

Healthy organs such as your lungs, heart and liver

Increased life expectancy

Stable mood and the absence of violent outbursts

Avoid depression and increase happiness and health

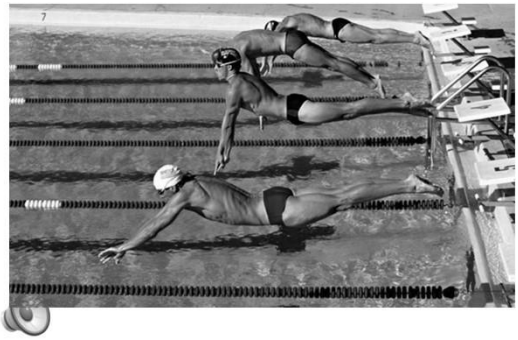
The only way to stay safe is to avoid drugs completely.

The positive benefits of staying free from PES go beyond the scope of sports. They can also help you stay focused and succeed in school.

You can maintain good relationships with people who are your biggest supporters.

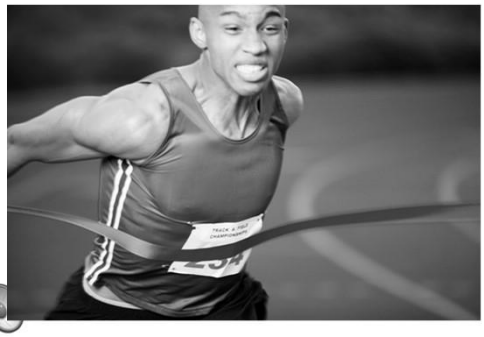
Avoiding doping is the right choice.

Allow fair play and equal sporting competition



Maintain the spirit of sport and a good reputation for yourself

Avoiding penalties and suspensions!



The most respected athletes are the ones who have avoided doping and excel in their sport.

By avoiding doping, you may experience all of the positive benefits that come from staying clean.

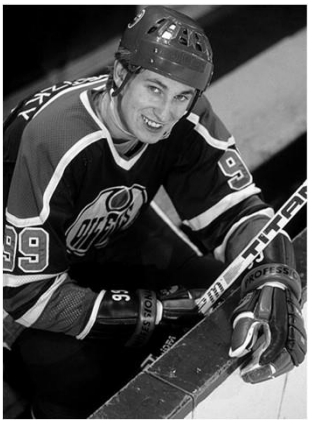
There are other options that can be used to enhance your sports performance.

Talk with your coach, trainer, or parents about any frustrations you might have about performing in your sport

Get advice from reliable professionals about safe ways to gain strength and endurance.

Focus on eating a proper diet, staying hydrated and getting plenty of rest

Successful athletes have had great success by staying clean and so can you!



"The highest compliment that you can pay me is to say that I work hard every day, that I never dog it."

- Wayne Gretzky

"I just want people to see me as a hard-working footballer and someone who is passionate about the game."

- David Beckham

"You always want to win. That is why you play tennis, because you love the sport and try to be the best you can at it."

– Roger Federer

Stay clean! You have so much to gain

Appendix B: Loss-Framed Message

Saying yes to doping is a losing game!

More than a million young athletes think using performance-enhancing substances is taking the easy road to victory.

Are you cheating by taking the easy road?

You may have heard about professional athletes doping, but it even happens in college and high school

Even young athletes are impacted because there is a lot of pressure to excel or to have a certain body type.

Doping means using performance-enhancing substances (PES) to help increase qualities such as speed and strength in order to perform better.

PES are unethical and banned from sport. They include steroids, growth hormones, marijuana and more…

PES can even include substances that you may not consider dangerous such as:

- Caffeine pills
- Protein powder or herbal supplements
- Common cold and over the counter medications

Many well-known athletes such as Lance Armstrong, Alex Rodriguez (A-Rod), and Marion Jones have doped and ruined their successful careers and reputations.

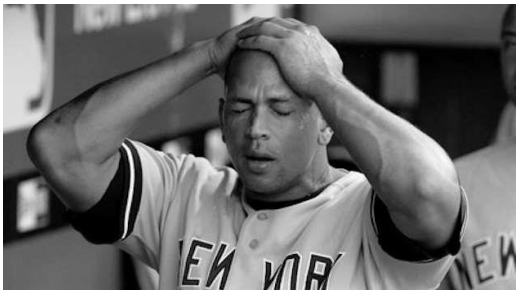
"I will spend the rest of my life trying to earn back trust and apologize to people."

– Lance Armstrong

"It is with a great amount of shame that I stand before you and tell you I have betrayed your trust."

– Marion Jones

These athletes are examples of how years of victory can be thrown away by doping.



By deciding to use PES, you are harming your health both physically and mentally.

Oily skin, acne, and abnormal hair or breast growth

Difficulty falling and staying asleep at night

Damage to organs such as your lungs, heart and liver

Decreased life expectancy

Mood swings and violent outbursts

Depression and decreased health and happiness

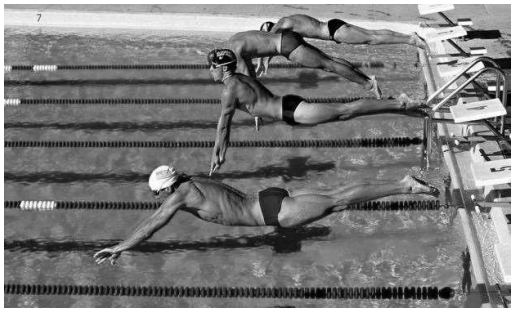
There is no safe level of drug use.

The negative effects of doping go beyond the scope of sports. They change the way your brain works, challenging your focus in school.

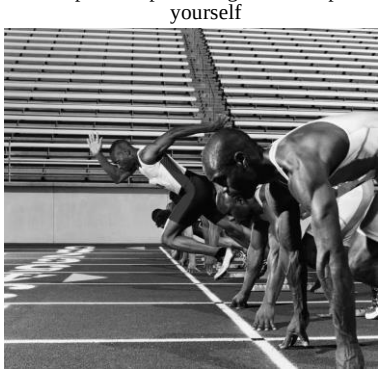
You could destroy relationships with the people who should be your biggest supporters.

Doping is the wrong choice.

Destroy fair play and make sporting competition unequal

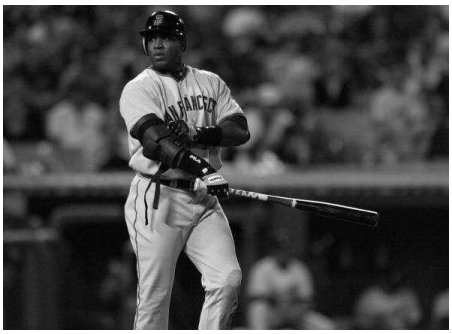


Violate the spirit of sport and get a bad reputation for yourself



Risk destroying your athletic career and getting yourself banned from the sport.

The most disrespected athletes are the ones who have doped and had their records and medals taken away.



By doping, you may experience all of the negative consequences associated with PES

There are other options that can be used to enhance your sports performance.

Talk with your coach, trainer, or parents about any frustrations you might have about performing in your sport

Get advice from reliable professionals about safe ways to gain strength and endurance.

Focus on eating a proper diet, staying hydrated and getting plenty of rest

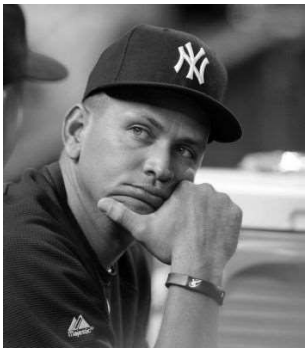
Successful athletes have been ruined by doping and you do not want the same for yourself!

"A boo is a lot louder than a cheer. If you have 10 people cheering and one person booing, all you hear is the booing"

- Lance Armstrong

"I couldn't feel more regret and feel more sorry because I have so much respect for this game"

- Alex Rodriquez



"My story is unique, in that the first part of my life, my journey, I hit the pinnacle of my career, and it was a very public career, and then I made decisions that cost me all of that."

- Marion Jones

Do not dope! You have too much to lose