The Effect of Negative Health Consequences Information on Likelihood to Use Anabolic Steroids: An International Investigation

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Executive Summary

There is considerable research documenting the negative health consequences of short-term and long-term Anabolic Steroid (AS) use for adolescents. As a result, one approach to prevention is to design programs that focus on informing adolescents of including these consequences. Surprisingly, little research has been conducted to provide empirically based evidence that such a prevention approach is effective. Additionally, there is a dearth of international research, which further inhibits the progress of developing effective interventions targeting AS use. Presenting information about negative health consequences may be a viable approach in one nation but not viable in another.

Two studies were conducted to test the effectiveness of an intervention that provided negative consequences information about AS to adolescent athletes. In one study adolescent athletes from Australia (*N* = 165) were recruited from organizations with strong junior programs and received a paper/pencil version of the intervention and questionnaire. In another study adolescent athletes from England (*N* = 137) and the United States (AS; *N* = 162) were recruited from high school and club sports teams. In this study the intervention and questionnaires were delivered on-line. Adolescents were randomly assigned to read one of three intervention messages: message containing negative consequences about of AS only, a comprehensive message containing positive and negative effects of AS, or a control message.

Results showed that the effect of the messages on attitudes, intentions, and willingness differed across the two studies. The study conducted in Australia showed that providing information about AS, whether it was through a negative consequences message or a comprehensive message, lead to more favorable attitudes and intentions than receiving control information.

Results of the study conducted with adolescents from England and the US showed something different. In this study providing adolescents with a negative consequences message led to a significantly fewer endorsed advantages than did exposure to a comprehensive or control message. Although the negative consequences led to fewer endorsed advantages, the negative consequences and the comprehensive message had no discernible impact on the other cognitions (e.g., attitudes, intentions or willingness) than did the control message. Together these findings imply that the negative consequences approach might be sufficient for reducing the potential benefits adolescents perceive regarding AS use, but the message does not lead to significant shifts in personal attitudes, intentions, willingness.

Taken together it appears that a negative consequences approach increased risk cognitions associated with AS use for the sample of Australian adolescents, but had little impact on adolescents in England and the US.

Introduction

There is considerable research documenting the negative health consequences of short-term and long-term Anabolic Steroid (AS) use for adolescents (Yesalis, 2000; National Institute on Drug Abuse [NIDA], 2005). Therefore, one effective strategy for the prevention of AS use would be to design prevention programs that include these consequences. Surprisingly, little research has been conducted to provide empirically based evidence that such a prevention approach is effective.

Before one can incorporate information about the negative consequences of AS use into interventions, it is necessary to establish that such information will have an effect on social cognitive constructs that have been identified as critical for behavior change (Ajzen & Fishbein, 1980; Armitage, 2008). Before designing AS use prevention programs that include negative health consequences, it is essential that we first establish that such information will influence attitudes, intentions, and willingness to use AS in the first place.

Additionally, there is a dearth of international research, which further inhibits the progress of developing effective interventions targeting AS use. Presenting information about negative health consequences may be a viable approach in one nation but not viable in another. Thus, it is critical for research on AS use to include international samples that will provide the opportunity to systematically investigate similarities and differences in the potential efficacy of negative consequences information. This leads to the general aim of the project which is to test whether presenting information that includes negative health consequences to an international sample of adolescents will have an immediate measureable effect on their explicit and/or implicit attitudes, intentions, and willingness to use AS.

Background and Significance

Doping agents are those substances used by adolescents to help improve their physical appearance, sport performance, or both. Anabolic Steroids (AS) are one of the most widely known prohibited doping agents and most frequently used among adolescents. In the United States (US) about 2-5% of adolescent boys aged 14-19 years and 0.5 – 1% of adolescent girls aged 14-19 years report having used AS (Yesalis, 2000). Similar prevalence estimates have been found in England (Fuller, 2008) and Australia (Dunn & White, 2011).

Studies have shown that the use of AS is associated with a number of short-term and long-term adverse health outcomes. Short-term health consequences include: acne, mood disturbance and changes in reproductive organs (NIDA, 2005). Some long-term health consequences include: increased blood pressure, kidney disease and risk of heart failure (NIDA, 2005). Thus, it is important to prevent the use of AS among adolescents.

The present study is designed to evaluate the effect of presenting information about the negative health consequences of AS use on social cognitive constructs that are critical for behavior change. This study is significant because it will provide the foundation for examining potential content for future evidence based anti-doping interventions in a sample of international adolescents.

Literature Review

In drug contexts other than AS use, there has been considerable research investigating the utility of incorporating negative health consequences into prevention efforts. While there is some empirical evidence to suggest that prevention efforts targeting negative health consequences can be effective in some contexts, there is also empirical evidence showing the opposite (see for example Mazanov & Byrne, 2007). Furthermore, there is little evidence studying the viability of such approaches in the prevention of doping. In fact, a published review of the literature identified that no study has attempted to isolate the

effects of negative health consequences information in the context of AS use (Petróczi, Dodge, Backhouse, & Adesanwo, 2013).

Scare tactics are approaches to intervention design whereby only the negative consequences of a risk behavior are included. For interventions to be effective they cannot simply rely on using scare tactics, as such approaches have been shown to be ineffective (Backhouse, McKenna & Patterson, 2009; Goldberg, Bents, Bosworth, Trevisan & Elliot, 1991). For example, Goldberg, et al. (1991) developed a program to educate adolescents about the dangers of AS use. The program was designed to compare the effectiveness of a negative health consequences only program, a comprehensive program that included the negative consequences plus potential benefits of AS use, and a control group. The program was delivered to more than 200 male American football players. Results of a randomized controlled trial showed that the negative consequences only program was no more effective than the control condition. Furthermore, the comprehensive program resulted in more negative beliefs about AS use than the control or negative consequences only conditions.

In another study, Trenhaile, Choi, Proctor and Work (1998) delivered an AS education program to a sample of 35 pre-adolescents ages 9-12 years. The comprehensive AS education program provided information about negative consequences of AS use, proper weight training and nutrition, and self-esteem training. Half of the students received the program and half were in the no-education control condition. The major outcome variables were: knowledge about AS use, attitudes toward use, and self-esteem/resistance skills. Results showed that adolescents in the education condition reported more knowledge and more negative attitudes toward AS use than those in the control condition.

Together these studies suggest that a negative consequences only prevention program may not be the most effective approach to efforts to prevent AS use. The questionable effectiveness of presenting negative consequences only information is not surprising when one examines the social psychological research on educational messages. This literature provides considerable evidence that source credibility is critical for educational messages to be effective (Pornpitakpan, 2004). If a source delivers information that is perceived by the target audience as one-sided or inaccurate, the audience is likely to disregard the communication, and view the message as not believable. Thus, if adolescents receive a one-sided message about AS use they are likely to dismiss it.

Based on existing research it appears that effective AS use prevention efforts must go beyond scare tactics alone. According to the rational-deliberative models of doping (see Mazanov & Huybers, 2009), there must be some combination of information that acknowledges the perceived positive outcomes, but is designed so that the negative health consequences considerably outweigh the perceived positive outcomes. Yet, there have been very few studies that systematically investigate the most effective way to incorporate negative health consequences into AS use education. Furthermore, a majority of the intervention programs have been developed and tested with adolescent samples in the US (Backhouse, Atkin & McKenna, 2007). The objective of the present study is to test the viability of two different methods of presenting negative consequences information: negative consequences alone priming approach vs. a comprehensive priming approach (i.e., includes negative consequences and acknowledgment of potential beneficial outcomes of doping).

The Present Study

Health Consequences.

Two general approaches to incorporating health consequences content into anti-doping interventions are 1) a negative consequences only approach and 2) a comprehensive approach. The negative consequences only approach involves presenting adolescents with information about the

negative health consequences of AS use without mentioning the perceived benefits of AS use. In contrast, the comprehensive approach involves presenting adolescents with information about the negative consequences of AS use along with the perceived benefits of AS use. Before we can begin to design education interventions, two critical questions regarding these approaches emerge: 1) are these approaches more or less effective than receiving no education and 2) is one educational approach more effective than the other?

International Considerations.

Unfortunately, a majority of research on anti-doping interventions and education rely on samples of adolescent males from the US (Backhouse et al., 2007). As a result, the extent to which intervention content works cross-nationally remains under-investigated.

Specific Aim 1: Message Effects

Test whether there are differences in adolescent athletes' attitudes, intentions, and willingness to use AS as a function of message condition (negative consequences only, comprehensive, control).

Specific Aim 2: Country

Test whether the above relationships vary as function of country.

Methods and Procedures

Adolescent athletes were recruited from Australia, England, and the United States (US). The methods and procedures for data collection in Australia differed from those in England and the US. Therefore, the methods and procedures are described for Australia; and then for England and US.

Australia

Participant Recruitment.

Participant recruitment and data collection were undertaken by an organization known for its work promoting sport and health. Sports in the Australian Capital Territory with strong juniors (athletes < 18 years of age) programs were invited to give junior athletes the opportunity to participate in the present project.

Procedures.

If a sport agreed to give athletes the opportunity to participate, information about the project and consent forms were disseminated through the sports organization (e.g. newsletter entries, electronic correspondence, and through athlete support personnel such as coaches). This provided parents and athletes some time to consider whether they wished to participate.

The organization commissioned to collect the data arranged a time to attend a training session where the athletes were given the opportunity to participate. Only those athletes with parental consent were allowed to participate. Participants were provided with a participant information form, a blank paper survey and a blank envelope. Athletes were informed their participation was entirely voluntary, and if they did not wish to participate, to simply return the survey packet. Athletes who completed the survey gave implied consent by returning the completed survey sealed a blank envelope. The envelopes were then collected together and returned for data entry. To preserve the anonymity and confidentiality of the data, the ethics approval precluded the collection of which teams adolescents belonged to, which may have identified the sports that agreed to participate. Neither the athletes nor the participant organizations received compensation for their participation.

The survey was a self-administered questionnaire. Adolescents completed pre-message exposure baseline assessments (e.g., knowledge about AS), randomly received a questionnaire that contained one of the three experimental messages, negative consequences (N = 52, male = 19, female = 33) comprehensive (N =

53, male = 24, female = 28, missing = 1), or a control message (*N* = 60, males = 24, females = 35, 1 = missing). Immediately following the messages was a manipulation check, followed by items that assessed the outcome variables of explicit attitudes, intentions, and willingness.

England and US

Participant Recruitment.

Adolescent athletes in England and the US were recruited to take part in a web-based study. Adolescents who received parental consent were provided with an instruction sheet that provided detailed steps for how to access the survey and a unique authentication code. The authentication code ensured that only adolescents with parental consent form could participate. Each code could be used only once. There was no way to connect an authentication code to an adolescent. Athletes in England and the US were compensated with retail gift cards for participating ($15; 10 £). At the end of the survey adolescents were redirected to a different page where they provided their name, postal address and gift card choice. This information was stored separate from survey responses to ensure responses remained anonymous.

England. One hundred and thirty-seven adolescent athletes between the ages of 12-18 years (male = 62, female = 75) were sampled from two high schools in the North of England. The researcher contacted the appropriate school office to seek consent from the Head Teacher of the School. Once approval was secured a description of the project, parental consent forms, and contact information for the researchers were distributed to adolescent athletes to take home to parents. The school contact proceeded to ask parents or guardians for their consent to allow their child to participate in the study. Once a signed consent form was returned, willing participants signed an assent form. After signing the assent form, adolescents were provided with the instruction sheet. To assist the process of data collection athletes completed the questionnaire in a computer laboratory on the school premises. The researcher was present in the event there were problems accessing the survey.

US. One-hundred and thirty-three adolescent athletes (male = 144, female = 18, missing = 1) between the ages of 11-18 years were recruited from a variety of sports leagues and camps (e.g., basketball, lacrosse) in the northeast and mid-Atlantic region of the US. The researcher contacted coaches of teams and camps and invited the teams and camps to participate. The researcher arranged a time (e.g., just before or after a practice) to meet with the athletes to provide a short description of the project and to distribute parental consent forms. Some data collection sites, however, required that the project description and consent forms be mailed home to parents. The researcher returned at a pre-arranged date and time to collect parental consent forms and distribute an instruction sheet that contained a web link to the survey and an authentication code that allowed adolescents to access the survey.

Procedures.

Once adolescents entered the authentication code they were directed to an assent form. Immediately following the assent form adolescents completed a demographic questionnaire and a series of baseline assessments (e.g., knowledge about AS, perceived advantages and disadvantages of using AS). Next participants randomly received one of three messages a negative consequences only message (*N* = 93; males = 62, females = 31, missing = 0), a comprehensive message (*N* = 96; males = 63, females = 32, missing = 1), or a control message (*N* = 81; males = 51, females = 30, missing = 0). These messages are shown in the Appendix.

Immediately following the message adolescents completed a manipulation check and a questionnaire that contained the primary dependent measures, intentions, willingness, beliefs about advantages and disadvantages, explicit attitudes, and the implicit attitudes test (IAT). Technical challenges prevented us

from collect IAT data from the entire sample. These challenges included that adolescents be on a machine that allowed them to run the IAT (e.g., having updated software, firewall permissions). Therefore, IAT data were collected from *N* = 79; negative consequences *N* = 29, comprehensive *N* = 28, control *N* = 22).

Message Manipulations

Three messages were created for the project, negative consequences only, comprehensive message, and a control message. The control message was crafted to match the experimental messages in length and difficulty. These messages were similar across the three countries (Australia, England, and the US).

Negative consequences only message. This message described gender specific negative consequences (e.g., impotence and baldness for boys; growth of facial hair and menstrual problems for girls). The message also listed several consequences relevant for both boys and girls (e.g., heart problems and stunted growth). The full messages are show in Appendices 1 and 4.

Comprehensive message. This message was identical to the wording of the negative consequences message but it also included information about why individuals might try AS. Before providing information about the negative consequences of AS use, this message explained why individuals might use AS (e.g., bulk up, feel more confident). The full messages are shown in Appendices 2 and 5.

Control message. This message described how adolescent athletes would experience a doping test. This message was designed to be roughly equivalent in terms of length and difficulty to the two experimental messages. The full messages are shown in Appendices 3 and 6.

Measures

Baseline knowledge.

Adolescents were provided with six statements regarding their knowledge of AS and were instructed to respond, true, false, don't know. A sample item read "When a person stacks it means that s/he uses more than one kind of steroid at the same time." Responses were scored so that if the adolescent got the item *correct* = *1*, *incorrect* and *don't know* = *0*. The six items were summed to create a total knowledge score at baseline.

Advantages and Disadvantages.

Advantages and disadvantages were assessed at baseline and following the message manipulation. These items were asked only in the England and US.

Baseline. At baseline adolescents were provided with a list of eight reasons why a person would take AS and were asked "Which of the following are reasons why you would take AS?" The following were listed as options, get bigger, become a better athlete, feel more confident, be more aggressive, get stronger, improve my appearance, increase my chances of college sports scholarship, fit in with players on my team who are using them." Adolescents were instructed to select all that applied. A sum was created to reflect the total number of advantages selected by the adolescents where scores could range from 0 to 8.

To assess disadvantages at baseline adolescents were provided with a list of nine reasons why a person would not take AS and were asked "Which of the following are reasons why you would not take AS?" The list included the following options, heart problems, cause me to be depressed, very bad acne, lose my hair, reproductive problems, get addicted, e violent, feel like a cheater, be aggressive. Adolescents were instructed to select all that applied. A sum was created to reflect the total number of advantages selected by the adolescents where scores could range from 0 to 9.

Post-manipulation. Following message exposure adolescents were provided with a list of 14 outcomes associated with use of AS that mirrored those assed at baseline. Seven outcomes were advantages (i.e. increase in size or weight (to get bigger), become a better athlete, improve muscle definition, become more confident, have a better chance of a college sport scholarship, be better looking, get stronger), and seven were disadvantages (i.e. have heart problems, be seen as a cheater, get cancer, experience depression, lose my hair, get addicted, get really bad acne). A sum was created to reflect the total number of advantages selected by the adolescents where scores could range from 0 to 7. A sum was created to reflect the total number of disadvantages selected by the adolescents where scores could range from 0 to 7.

Explicit attitudes. Explicit attitudes in England and the US were assessed with two items that were designed to match implicit attitudes measure. The stem of the question read "Taking Anabolic Steroids is…" followed by the following two responses: 1 (foolish) and 10 (wise); 1 (not for me) to 10 (for me). The two items were moderately correlated ($r = .58$, $p < .01$), so a mean of the two items was calculated to reflect an overall attitude.

Explicit attitudes in Australia were with seven items. The stem of the question read, "Taking steroids is…" followed by the adjectives: important, pleasant, nice, worthwhile, unpleasant, nasty, and pointless. Responses ranged from 1 (*strongly disagree*) to 7 (*strongly agree*). Items were reverse scored where necessary so that higher numbers reflected more positive attitudes, and a mean of the seven items was calculated ($\alpha = .96$).

Implicit attitudes. Implicit attitudes were measured with an adjusted Brief Implicit Association Test (B-IAT) that has been used in previous research (Petróczi, et al.,2010; Petróczi, et al., 2011). The B-IAT differs from the standard IAT in that it utilizes fewer sorting trials and a simplified instruction set requiring participants to focus on two out of four categories during each combined task. Participants completed a practice test and then completed two B-IATs.

IAT-Cognitive. One assessed implicit favorability about AS which we refer to as the IAT favorable. The IAT favorable was used to determine participants' favorability of steroids and whether participants would associate steroids as being foolish or wise. The target categories in this B-IAT were 'steroids' (drug, testosterone, hormone, dope) and 'training' (workout, exercise, gym, effort), where 'training' was non-focal. The attributes included in the B-IAT were 'foolish' (crazy, careless, unreasonable, stupid) and 'wise' (sensible, clever, reasonable, careful).

IAT-Identification. The other B-IAT assessed the extent to which participants implicitly identified with AS use. The second B-IAT was used to determine whether participants would associate steroids with themselves or others (i.e. self-identification with steroid use). The target categories and focal points were the same (i.e. 'steroids' and 'training'). However, the attributes included were 'me' (I, myself, mine, my) and 'not me' (they, their, them, others).

In accordance with IAT convention, response times below 300 and above 3000 ms were capped (Greenwald et al., 1998). Mean latency scores and differences were calculated. D-scores were created using the scoring algorithm used by Greenwald and colleagues (2003) where D-scores < 0 indicate stronger associations between 'foolish' and 'steroids'/'steroids' and 'not me,' while D-scores > 0 indicate stronger associations between 'wise' and 'steroids'/'steroids' and 'me.'

Intentions. For the England and US sample, intentions to use AS were assessed with the following three items: "I plan to try anabolic steroids at least once within the next 12 months", "I will try anabolic steroids sometime in the future", and "Within the next 12 months I intend to try anabolic steroids at least once".

Response options included, *definitely no = 1*, *most likely no = 2*, *perhaps no = 3*, *perhaps yes = 4*, *most likely yes = 5*, *definitely yes = 6*. A mean of the three variables was calculated to reflect overall intentions to use AS (α = .82).

Intentions in Australia were assessed with the following item, "Within the next 6 weeks I intend to use one pill, one injection or to start one cycle of steroids. A cycle is a time period during which a person takes steroids." Response options included, *definitely no = 1*, *most likely no = 2*, *perhaps no = 3*, *perhaps yes = 4*, *most likely yes = 5*, *definitely yes = 6*.

Willingness. Adolescents were provided with a scenario and were asked to answer questions based on the scenario. The scenario read describe the following, "You have noticed that one of your good friends on your team has really improved in your sport. After practice one day your friend tells you that he or she has been using anabolic steroids. Your friend tells you he or she has an extra 6-week supply to give you. Your friend asks if you would like to try the anabolic steroids." Adolescents from England and the US reported how willing they would be to: take the AS and keep them either at home, in a locker or somewhere else; try at least one dose; try AS for the full 6-weeks. Adolescents from Australia received only the last two items. Responses ranged from 1(*not at all willing*) to 7(*very willing*). A mean of the items was calculated (α = .81; r = .87, $p < .01$).

Manipulation check. Immediately after reading the experimental message participants encountered a manipulation check item. Adolescents from England and the US were asked "Which of the following best describes what you have just read about?" Response options included: how steroids can cause me harm; how steroids might make me feel good, but also harm me; how I would experience a doping test; how I can tell one type of anabolic steroid apart from another. Responses were scored so that 1 = *correct*, 0 = *incorrect*.

Adolescents in Australia were asked "Which of the following best describes what you have just read about?" Response options included: negative health effects of steroids; the reasons why people use steroids and the negative effects of steroids; the doping control process; officials in sporting matches. Responses were scored so that 1 = *correct*, 0 = *incorrect*.

Past use of AS and supplements. Adolescents were asked how many times they had used Anabolic Steroids in their lifetime. A separate item was asked about the number of times they had used creatine or other protein supplements. Response options were modeled after those used in other US surveys that assess drug use among adolescents (Bachman, Johnston, & O'Malley, 2012; Meich, Johnston, O'Malley, Bachman, & Schuleberg, 2016) and included: 0 (*never*), 1 (*1 or 2 times*), 3 (*3 to 9 times*), 4 (*10-19 times*), 5 (*20-39 times*), 6 (*40 or more times*).

All of the adolescents (in England, the US, and Australia) responded they never used AS or used only 1 or 2 times. A majority of adolescents in England (75%), the US (60%), and Australia (84%) responded they never used creatine or protein supplements or used only 1 or 2 times. Because these responses more closely reflect binary outcomes rather than continuous outcomes dichotomous variables were created, one reflected whether the adolescent had ever used AS in their lifetime and another reflected whether the adolescent had ever used NS in their lifetime. Responses were coded so that 0 (*never used*) and 1 (*used*).

Adolescents also reported the frequency with which they used nutritional supplements in the past 12-months with the following response options: 0 (*never*), 2 (*once or twice*), 3 (*two or four times a week*), 4 (*nearly every day*). Because the number of adolescents who reported having used supplements in the past

12 months was so small (*N* = 34 in England; *N* = 57 in US; *N* = 32 in Australia), a dichotomous variable was created where 0 (*not used in past 12-months*) and 1 (*used in past 12-months*).

Data Analytic Plan

Descriptive statistics were run to characterize the past use of AS and performance enhancing dietary supplements. To test whether randomization to condition worked, an Analysis of Variance (ANOVA) was run to test whether baseline knowledge about AS was equivalent across conditions.

Analysis of Covariance (ANCOVA) was be used to test Specific Aim1 and Specific Aim 2. Seven ANCOVAs were run to test Specific Aim 1. These analyses included the following seven dependent variables for the England and US sample: post-message advantages, post-message disadvantages, explicit attitudes, IAT identification, IAT cognitive, intentions and willingness. When post-message advantages and disadvantages are the dependent measures the covariates in the analyses will include: gender, country and baseline [dis]advantages. For the remaining dependent measures, the covariates in the analyses included: gender, country and baseline knowledge. The dependent measures for the Australia sample included, explicit attitudes, intentions, and willingness. The series of ANCOVAs that tested Specific Aim 1 were run twice, once for the full sample and once restricting analyses only to adolescents who got the manipulation check correct. Because each of the analyses that tested Specific Aim 1 were run twice the chance of making a Type I error (i.e., finding an effect when one is not present) increased, an adjusted p-value was used. To adjust the p-value a modified Bonferroni procedure outlined by Jaccard (1998) was used. The adjusted p-value was calculated by dividing $\alpha = .05$ by the number of comparisons ($n = 2$). Therefore, an adjusted p value of $p < .025$ was used across analyses.

To test Specific Aim 2, which was only relevant for the England/US sample, the above analyses were repeated with the addition of an interaction term between country and condition. Again, the ANCOVAs that tested Specific Aim 2 were run twice, once for the full sample and once restricting analyses only to adolescents who got the manipulation check correct. To adjust for multiple tests, the adjusted p-value of $p < .025$ was used.

Results from Australia

Descriptive Statistics

Approximately 12.1% of adolescent athletes reported having ever used AS (*N* = 20), and of those who reported having ever used AS, 60% used AS in the past 12 months (*N* = 12). Males were somewhat more likely to report having used during their lifetime (18.5%) than females (8.5%; $F(1, 157) = 3.49$, $p = .06$). Approximately 19% of adolescent reported having used supplements at some point during their life time (*N* = 32).

Randomization Check

There were statistically significant differences in baseline knowledge whereby those in the control condition were more knowledgeable ($M = 3.87$, $SE = 0.17$) about anabolic steroids than those in the negative consequences ($M = 3.06$, $SE = 0.18$) and comprehensive conditions ($M = 2.89$, $SE = 18$; $F(2, 162) = 9.37$, $p = .00$; $\eta_p^2 = 0.10$). The were no statistically significant differences in baseline knowledge between the negative consequences and comprehensive conditions.

Manipulation Check

Approximately 64% of those in the negative consequences condition, 66% of those in the control condition, and 56% of those in the comprehensive condition got the manipulation check correct. That about a third of the sample answered the manipulation check incorrectly suggests they did not understand (or did not read) the message. We tested whether younger adolescents might have been more likely to miss the manipulation check than older adolescents. Results showed there were no differences in age between those who got the manipulation check right (*M* age = 15.74, *SD* = 0.96) when compared to those who got the manipulation check wrong (*M* age = 15.84, *SD* = 0.98; *F* (1, 54) = 0.13, *p* = .72).

Given that a number of adolescents got the manipulation check wrong, analyses were run on the full sample (including those who got the manipulation check) and then were replicated with only those adolescents who got the manipulation check correct. Analyses that were run only with adolescents who got the manipulation check correct reflect adolescents who accurately identified the main points of the message.

Testing Aim 1: Message Effects

Explicit Attitudes

Results of the ANCOVA showed that none of the predictors for explicit attitudes reached the a priori established p-value set for statistical significance, gender (*F* (1, 156) = 4.25, *p* = .04, η_p^2 = .03), baseline knowledge (*F* (1, 156) = 0.38, *p* = .54, η_p^2 < .01), and condition (*F* (2, 156) = 1.70, *p* = .19, η_p^2 = .02). The adjusted means for explicit attitudes are shown below in Figure 1a.

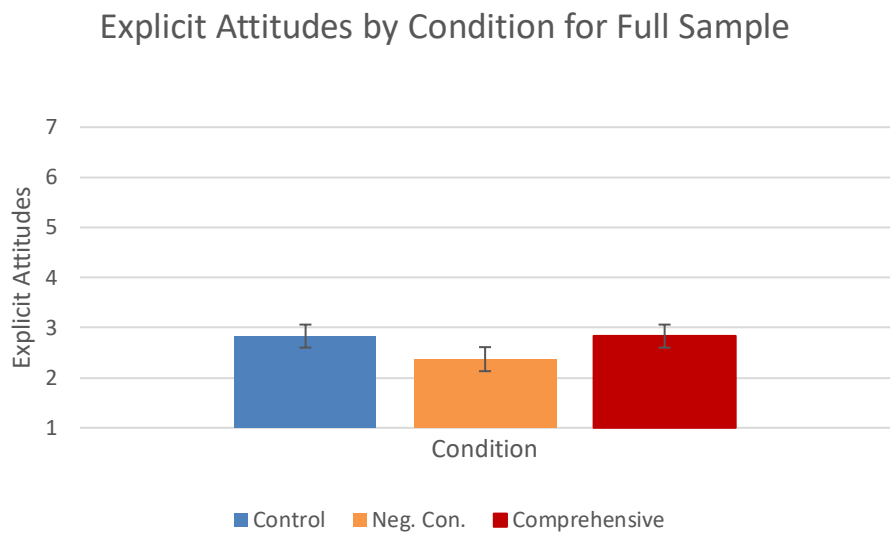

Figure 1a. Adjusted explicit attitude means by condition for full sample

When the above analysis was re-run and restricted to adolescents who got the manipulation check correct results changed. Condition was a statistically significant predictor of explicit attitudes (*F* (2, 93) = 5.07, *p* = .01, η_p^2 = .10), but baseline knowledge (*F* (1, 93) = 1.36, *p* = .25, η_p^2 = .01), and gender (*F* (1, 93) = 0.42, *p* = .52, η_p^2 = .01) were not. Follow-up comparisons showed that adolescents in the comprehensive condition reported more positive attitudes (*M* = 3.39, *SE* = 0.29) than adolescents in the control condition (*M* = 2.16, *SE* = 0.25) and the negative consequences condition (*M* = 2.2, *SE* = 0.28). The mean attitudes for

adolescents in the control condition and negative consequences condition were not statistically significantly different from one another. The adjusted means are shown in Figure 1b.

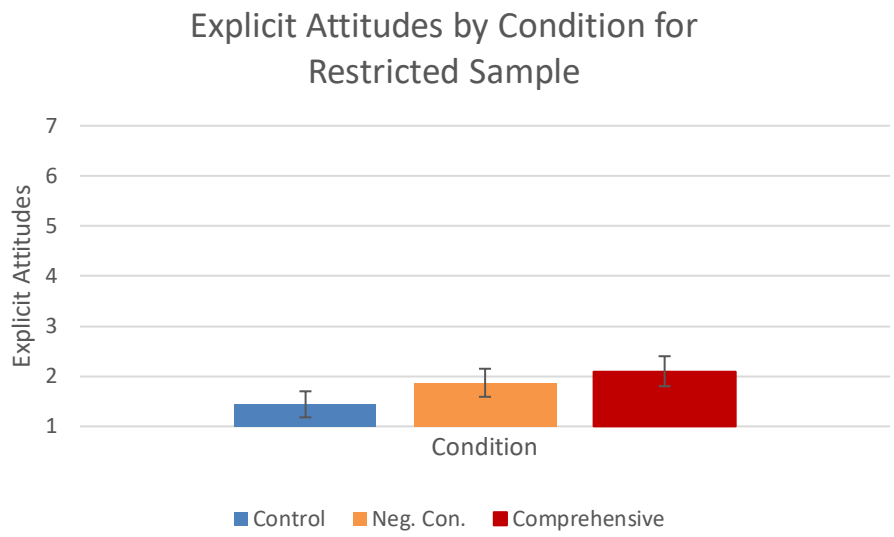

Figure 1b. Adjusted explicit attitude means by condition for restricted sample

Intentions

Results of the ANCOVA showed that none of the variables in the model predicting intentions were statistically significant, baseline knowledge (F (1, 154) = 1.62, p = .21, η_p^2 = .01), gender (F (1, 154) = 0.37, p = .54, η_p^2 < .01) and condition (F (2, 154) = 2.70, p = .07, η_p^2 = .03). Adjusted means for intentions are shown below in Figure 2a.

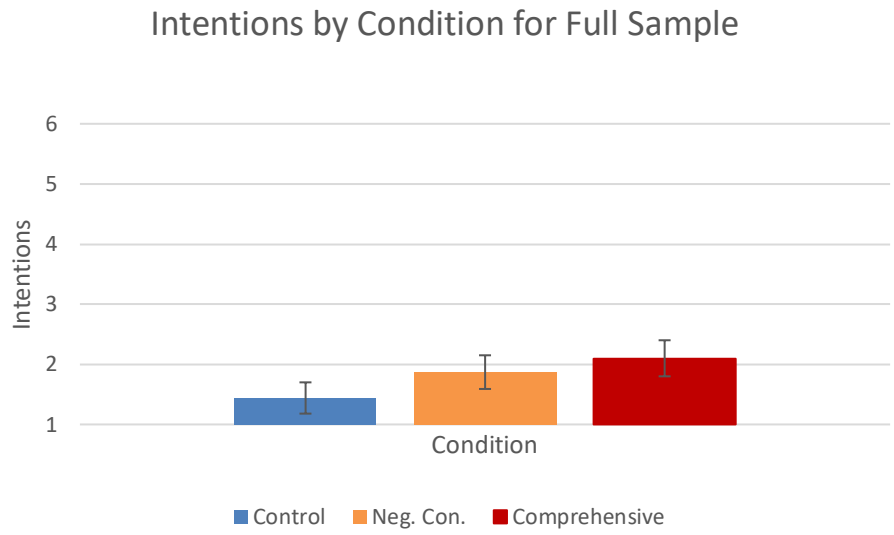

Figure 2a. Adjusted intention means by condition for full sample

A slightly different pattern of results emerged when the analysis was replicated only with adolescents who got the manipulation check correct. In this analysis the effect of condition on intentions became statistically

significant (F (2, 92) = 5.23, p = .01, η_p^2 = .10). Follow-up comparisons showed that adolescents in the control condition reported significantly lower intentions to use AS (M = 1.34, SE = 0.21) than adolescents in the negative consequences (M = 2.33, SE = 0.24) and comprehensive conditions (M = 2.07, SE = 0.24). Intentions to use AS were not statistically significantly different from another in negative consequences and comprehensive conditions. Neither baseline knowledge or gender were statistically significant predictors (ps > .45). Adjusted means are shown below in Figure 2b.

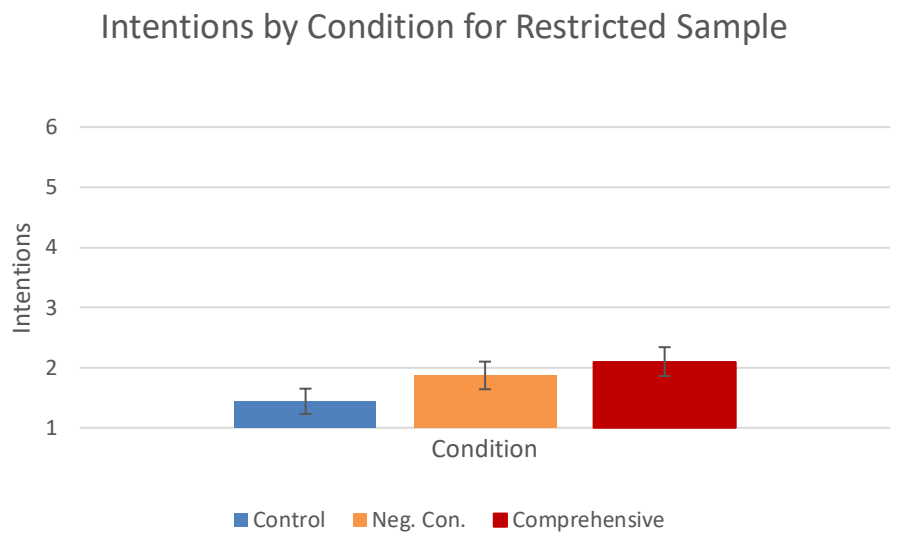

Figure 2b. Adjusted intention means by condition for restricted sample

Willingness

Results of the ANCOVA showed a statistically significant effect of gender (F (1, 154) = 8.78, p = .00, η_p^2 = .05) whereby males reported greater willingness to try AS than females. Baseline knowledge (F (1, 154) = 3.19, p = .08, η_p^2 = .02) and condition (F (2, 154) = 0.18, p = .98, η_p^2 < .01) were not statistically significant predictors of willingness. Adjusted means are shown in Figure 3a.

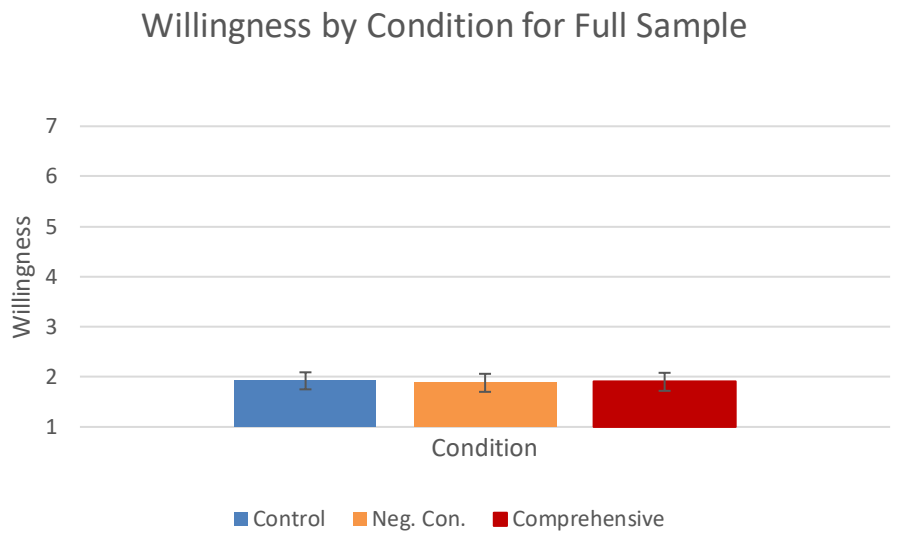

Figure 3a. Adjusted willingness means by condition for full sample

A similar pattern of results emerged when the analysis above was replicated by including only adolescents who got the manipulation check correct (*F*s < 3.72, *p*s > .06). Adjusted means are shown below in Figure 3b.

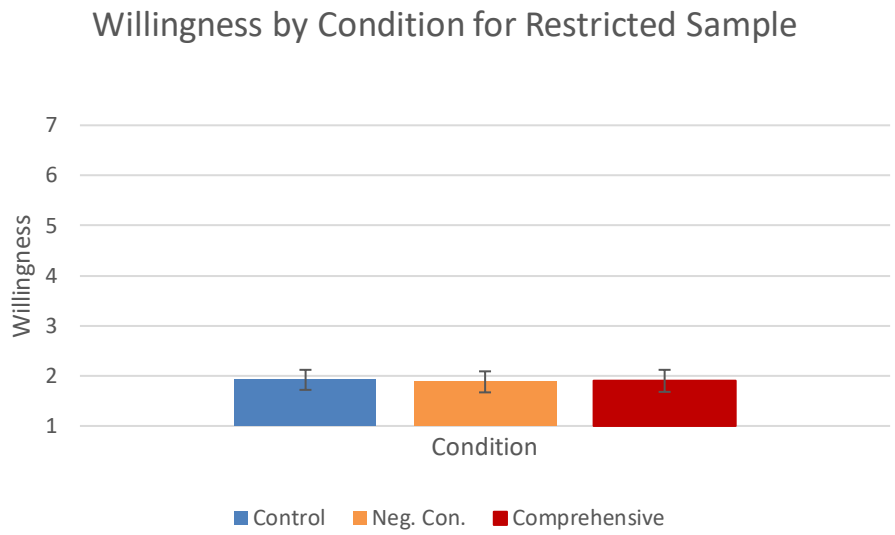

Figure 3b. Adjusted willingness means by condition for restricted sample

Summary of Results for Australia Data

In analyses that included all adolescents, even those who got the manipulation check wrong, results showed that there was no statistically significant effect of message on attitudes, intentions, or willingness. However, when the analyses were restricted to adolescents who got the manipulation check correct, results showed that adolescents who read either a negative consequences message or a comprehensive message reported significantly more favorable attitudes and higher intentions than adolescents who read a control message. The type of message had no effect on willingness.

About 12% of the sample reported having used AS during their lifetime which is slightly higher than estimates obtained in other studies (Dodge & Clarke, 2015; Dodge & Jaccard, 2006). One reason for this may be the sample that was recruited to participate. Adolescent athletes were recruited from the juniors programs in Australia. Athletes who are part of this program are somewhat more involved in their sports than samples reflected in other studies (for example, Dodge & Clarke, 2015; Dodge & Jaccard, 2006) which have recruited a more heterogeneous and somewhat less involved group of adolescent athletes.

Results from England and US

Descriptive Statistics

Lifetime use of AS was relatively low with about 1.5% (*N* = 2) of adolescents from England reporting have ever used and about 0.7% (*N* = 1) of those in the US reporting having ever used (*F* (1, 258) = 0.30, *p* < .60). A greater percentage of adolescents from the US reported having used a NS in their lifetime (51%, N = 65) than from England (31%, *N* = 41; *F* (1, 258) = 10.82, *p* < .01). Overall, males were more likely to report NS use (54%, N = 92) than were females (15.6%, *N* = 14; F (*1*, 258) = 41.78, *p* < .01).

Randomization Check

The groups were statistically equivalent on knowledge and perceived advantages and disadvantages at the start suggesting that random assignment was successful. This is shown below in Table 1.

Table 1. Knowledge and Beliefs at Baseline

	Negative Consequences	Comprehensive	Control	F, p-value
	Mean (SE)	Mean (SE)	Mean (SE)	
Knowledge	2.52 (0.15)	2.48 (0.14)	2.45 (0.14)	$F(2,264) = 0.60$, $p = .94$
Advantages	2.63 (0.16)	2.95 (0.18)	2.72 (0.18)	$F(2,267)=0 .93$, $p = .40$
Disadvantages	4.37 (0.25)	4.78 (0.23)	4.78 (0.22)	$F(2,267)= 1.07$, $p = .35$

Manipulation Check

Approximately 89% of those in the control condition and about 82% of those in the negative consequences condition got the manipulation check correct. However, only about 43% of those in the comprehensive condition got the manipulation check correct. We tested whether there was a difference in age for those who got the manipulation check right compared to those who got the manipulation check wrong. Results showed adolescents who got the manipulation check right were significantly younger (*M* age =14.59, *SD* = 1.63) than those who got the manipulation check wrong (*M* age = 15.37, *SD* = 1.48; *F* (1, 93) = 6.00, $p < .03$).

Because of the percentage of adolescents who missed the manipulation check, analyses were run on the full sample (including those who got the manipulation check) and then replicated with only those adolescents who got the manipulation check correct. Analyses that were run only with adolescents who got the manipulation check correct reflect adolescents who accurately identified the main points of the message.

Tests of Aim 1: Message Effects

A series of ANCOVAs were run to test whether condition had an effect on the outcome variables including, perceived advantages and disadvantages, explicit and implicit attitudes, intentions, and willingness. In all analyses condition was entered as a fixed factor and gender and country were entered as covariates. When [dis]advantages was the DV pre-manipulation [dis]advantages was entered as a covariate. This allowed us to identify whether there were changes in [dis]advantages as a result of condition. For intentions, willingness, and attitudes, baseline knowledge was entered as a covariate.

Advantages and Disadvantages

Advantages. Results of the ANCOVA showed a statistically significant effect of baseline advantages (*F* (1, 263) = 37.76, $p < .01$, $\eta_p^2 = .13$) and a statistically significant effect of condition (*F* (2, 263) = 7.33, $p < .01$, $\eta_p^2 = .05$) on post-message advantages. Follow-up comparisons showed that adolescents in the comprehensive (*M* = 4.04, *SE* = 0.20) and control conditions (*M* = 4.23, *SE* = 0.22) reported significantly more advantages after reading the message than adolescents who read the negative consequences message (*M* = 3.17, *SE* = 0.21). This is shown in Figure 4a below.

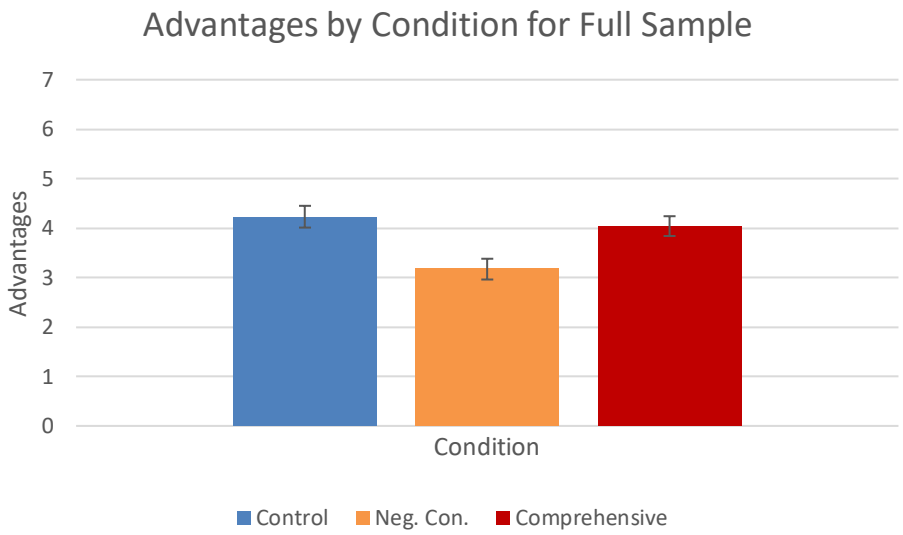

Figure 4a. Adjusted mean number of advantages as a function of condition for full sample

A similar pattern of results emerged with the analysis was re-run only including adolescents who got the manipulation check correct (*N* = 189). Means are shown in Figure 4b.

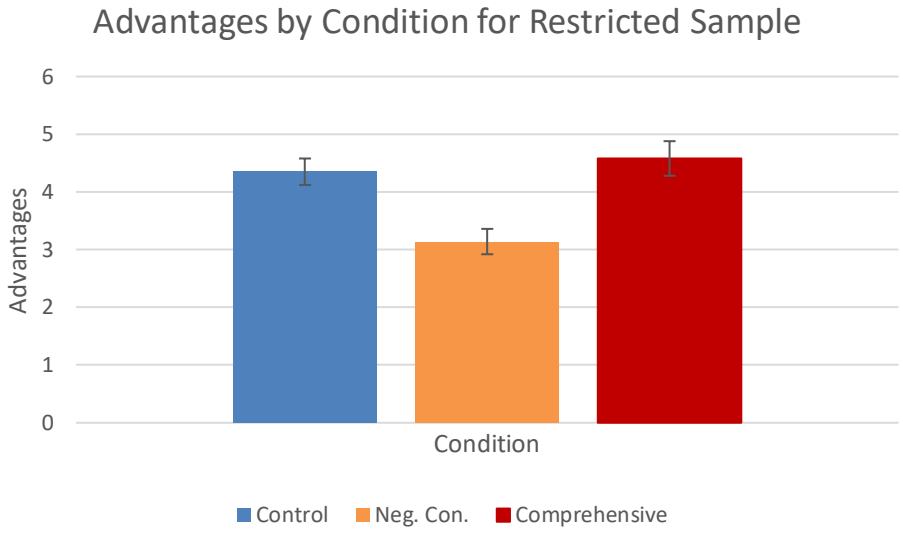

Figure 4b. Adjusted mean number of advantages as a function of condition for restricted sample

Disadvantages. Results of the ANCOVA showed a statistically significant effect of baseline disadvantages (F (1, 263) = 97.00, p = .00, η_p^2 = .27) but no statistically significant effect of condition (F (2, 263) = 1.05, p = .35, η_p^2 = .01) on post-message disadvantages. The mean disadvantages broken down by condition are shown in Figure 5a.

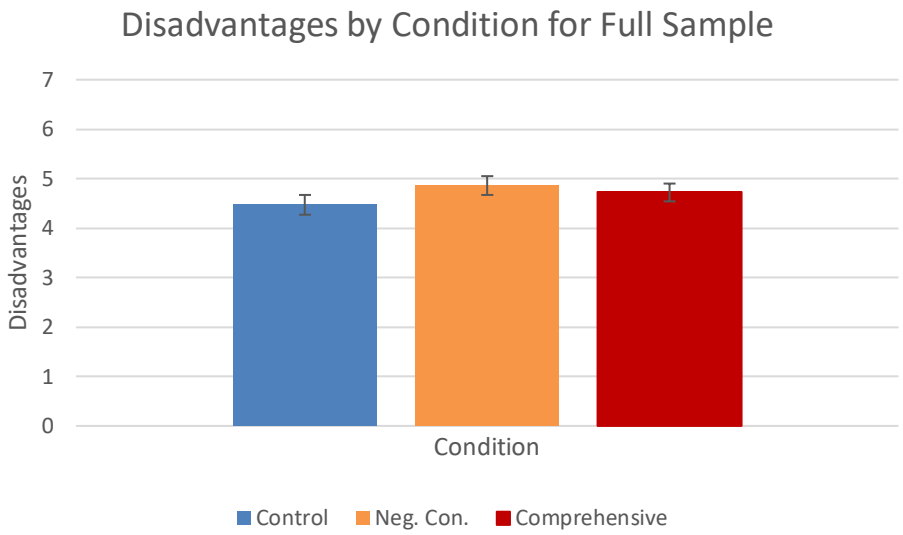

Figure 5a. Adjusted mean number of disadvantages by condition for full sample

When the analysis was re-run and restricted only to adolescents who go the manipulation check correct baseline disadvantages were a statistically significant predictor of post-message disadvantages (F (1, 183) = 70.40, p = .00, η_p^2 = .28), but the effect of country (F (1, 183) = 4.75, p = .03, η_p^2 = .03) and condition (F (2, 183) = 2.97, p = .054, η_p^2 = .03) did not reach statistical significance when compared to the a priori adjusted p-value. The mean disadvantages broken down by condition are shown in Figure 5b.

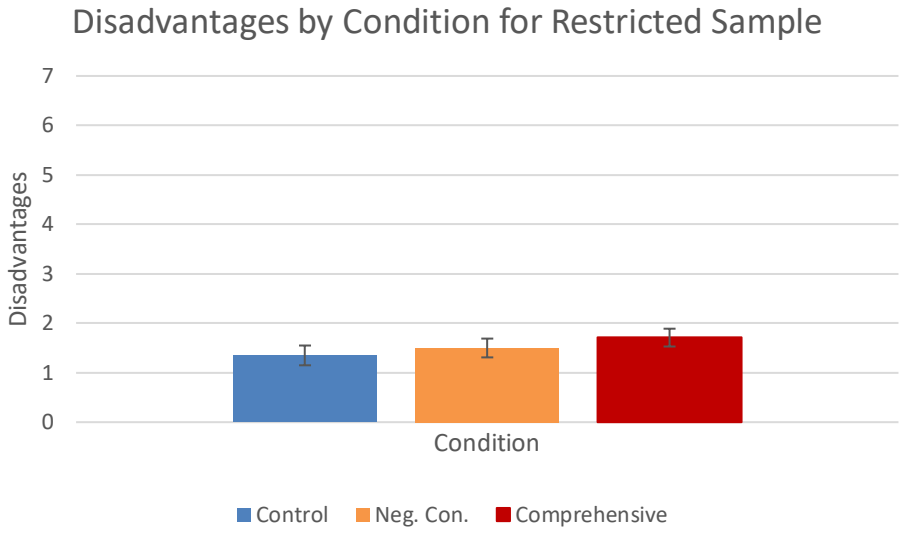

Figure 5b. Adjusted mean number of disadvantages by condition for full sample

Explicit Attitudes

Results of the ANCOVA showed that gender (F (1, 257) = 2.47, p = .12, η_p^2 = .01), country (F (1, 257) = 3.48, p = .06, η_p^2 = .01), baseline knowledge (F (1, 257) = 1.53, p = .22, η_p^2 = .01), and condition (F (2, 257) = 1.15, p = .32, η_p^2 = .01) were not statistically significant predictors of explicit attitudes. A similar pattern of results

emerged when the analyses were re-run and restricted to adolescents who got the manipulation check correct (*F*s < 1.50 and *p*s > .15). The adjusted means are shown in Figures 6a and 6b.

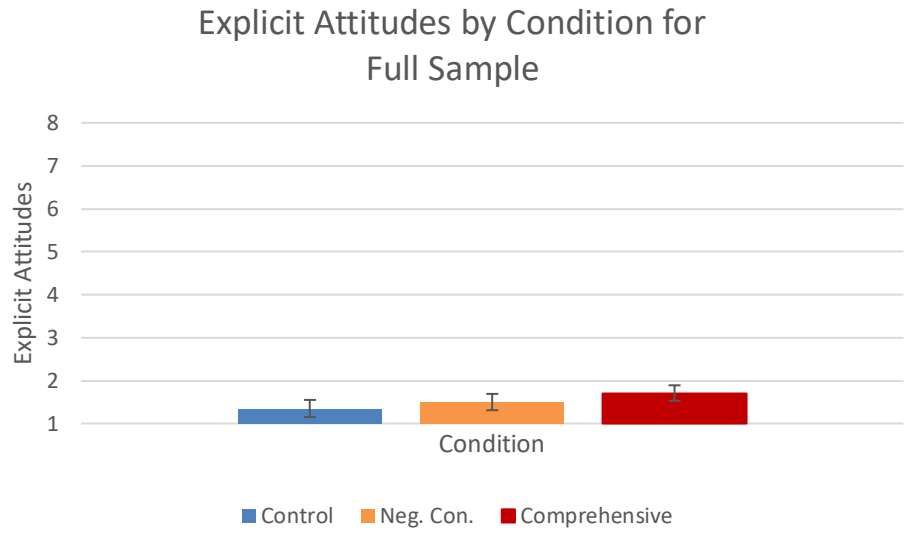

Figure 6a. Adjusted mean explicit attitudes by condition for full sample

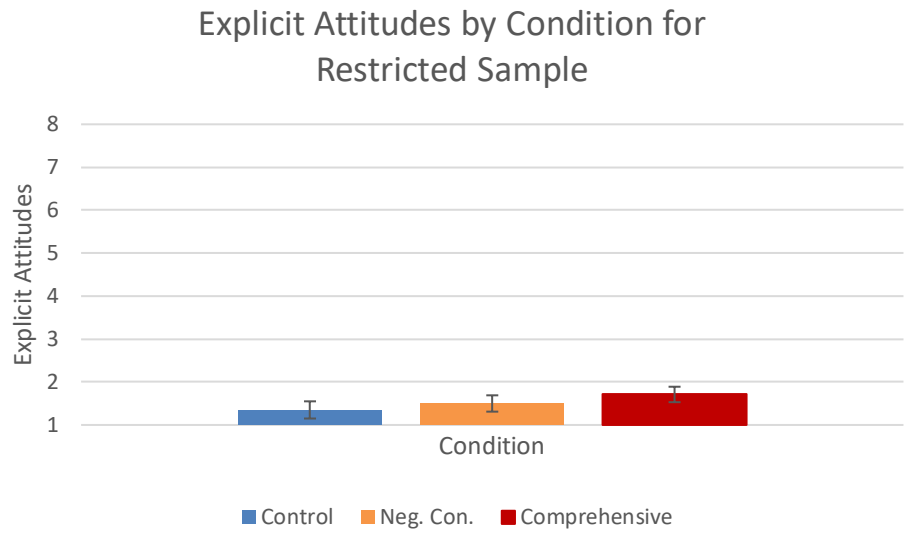

Figure 6b. Adjusted mean explicit attitudes by condition for restricted sample

Implicit Attitudes: IAT Identification and IAT Cognitive

IAT Identification. Results of the ANCOVA showed that when IAT identification was the dependent variable none of the predictors, which included gender (F (1, 73) = 0.17, p = .67, η_p^2 < .01), country (F (1, 73) = 0.46, p = .50, η_p^2 = .01), baseline knowledge (F (1, 73) = 0.19, p = .66, η_p^2 < .01), and condition (F (2, 73) = 0.01, p = .99, η_p^2 = .01) were statistically significant. A similar pattern of results emerged when these analyses were replicated by restricting only to adolescents who got the manipulation check correct (N = 56) where none of the predictors were statistically significant (*F*s < 0.98 and *p*s > .32). Adjusted means are shown below in Figures 7a and 7b.

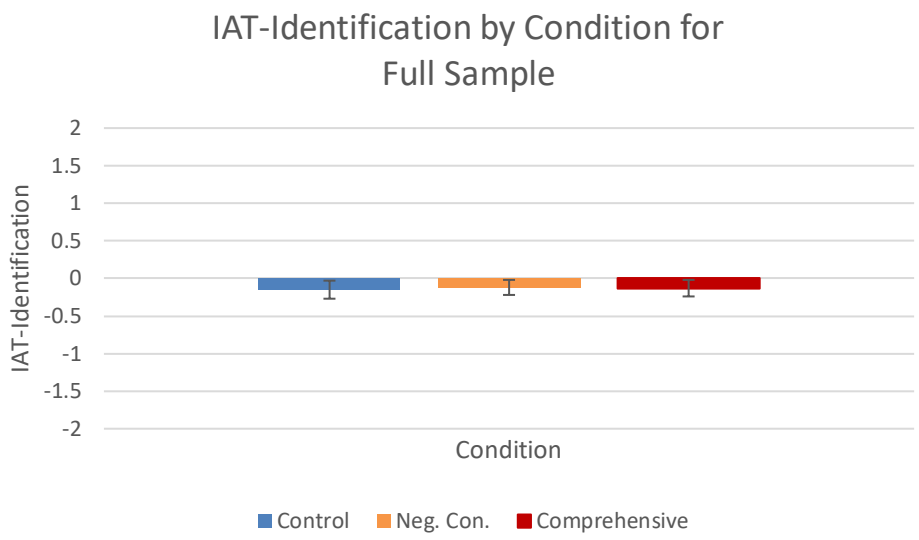

Figure 7a. Adjusted means for IAT-Identification as a function of condition for full sample

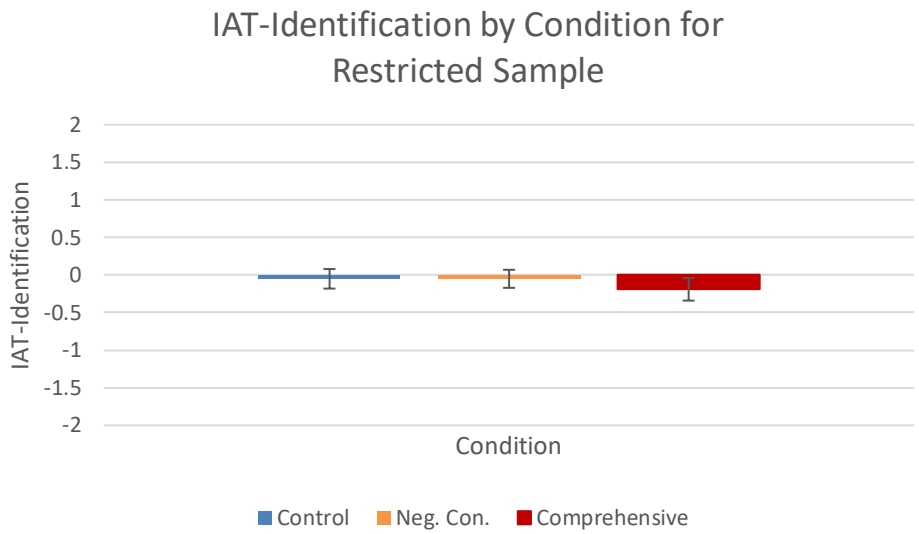

Figure 7b. Adjusted means for IAT-Identification as a function of condition for full sample

IAT Cognitive. Results of the ANCOVA for the model predicting IAT cognitive as the dependent variable mirrored those for IAT identification whereby none of the predictors, which included gender (F (1, 73) = 2.54, p = .12, η_p^2 = .03), country (F (1, 73) = 0.09, p = .77, η_p^2 < .01), baseline knowledge (F (1, 73) = 0.25, p = .62, η_p^2 < .01), and condition (F (2, 73) = 0.52, p = .59, η_p^2 = .01) were statistically significant. A similar pattern of results emerged when these analyses were replicated by restricting only to adolescents who got the manipulation check correct (N = 56) where none of the predictors were statistically significant (Fs < 3.78 and ps > .05). Adjusted means are shown below in Figures 8a and 8b.

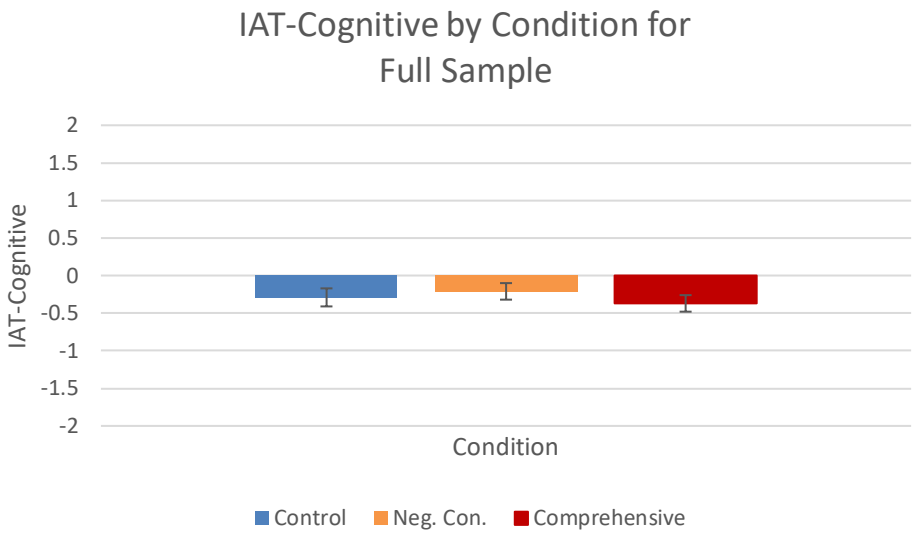

Figure 8a. Adjusted means for IAT-Cognitive as a function of condition for full sample

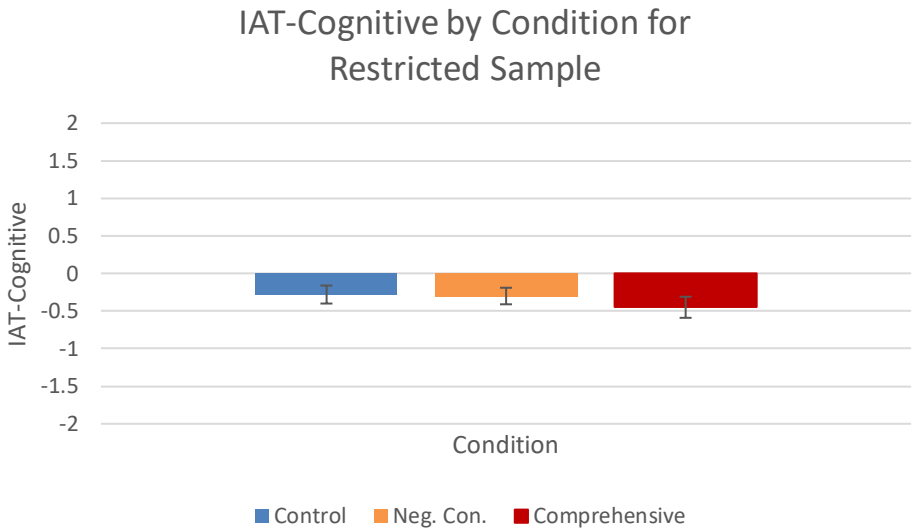

Figure 8b. Adjusted means for IAT-Cognitive as a function of condition for restricted sample

Intentions

Results of the ANCOVA showed that gender (F (1, 258) = 2.60, p = .11, η_p^2 = .01), country (F (1, 258) = 2.59, p = .11, η_p^2 = .01), baseline knowledge (F (1, 258) = 1.23, p = .27, η_p^2 = .01) and condition (F (2, 258) = 0.67, p = .52, η_p^2 = .01) were not statically significant predictors of intentions to use AS. A similar pattern of results emerged when the analysis was replicated by including only adolescents who got the manipulation check correct (Fs < 2.42 and ps > .12). Adjusted means are shown below in Figures 9a and 9b.

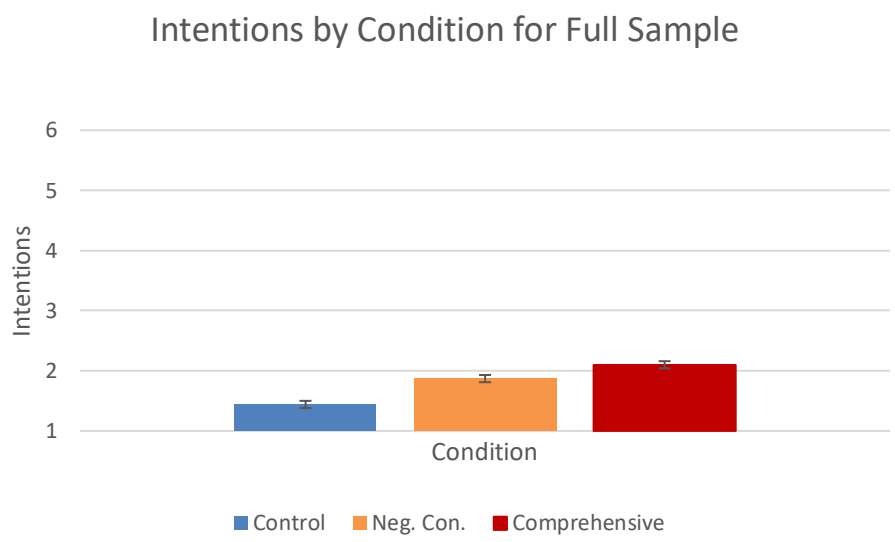

Figure 9a. Adjusted mean intentions as a function of condition for full sample

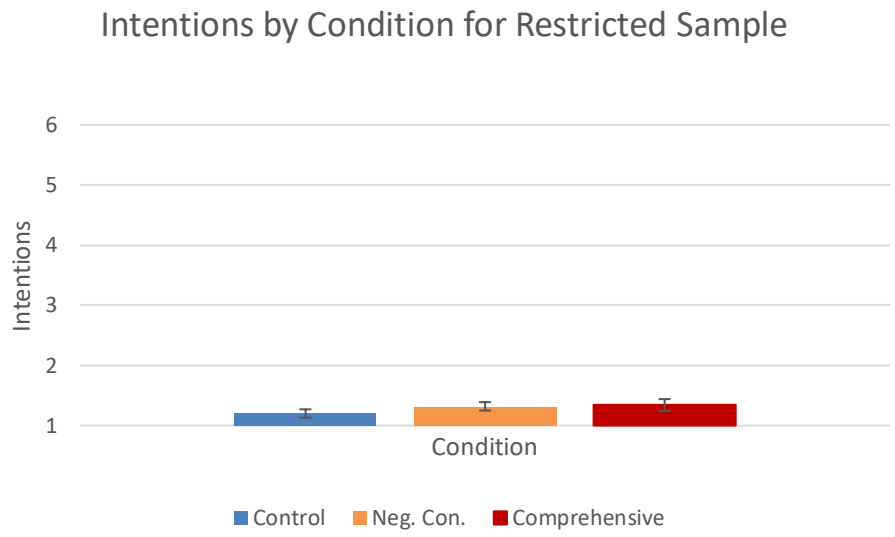

Figure 9b. Adjusted mean intentions as a function of condition for restricted sample

Willingness

Results of the ANCOVA that baseline knowledge (F (1, 259) = 2.89, p = .09, η_p^2 = .01), gender (F (1, 259) = 0.59, p = .44, η_p^2 = .00), country (F (1, 259) = 2.33, p = .13, η_p^2 = .01), and condition (F (2, 259) = 0.11, p = .90, η_p^2 = .00) were not statistically significant predictors of willingness to use AS. A similar pattern of results emerged when the analysis was replicated by including only adolescents who got the manipulation check correct (Fs < 2.82 and ps > .09). Adjusted means are shown below in Figures 10a and 10b.

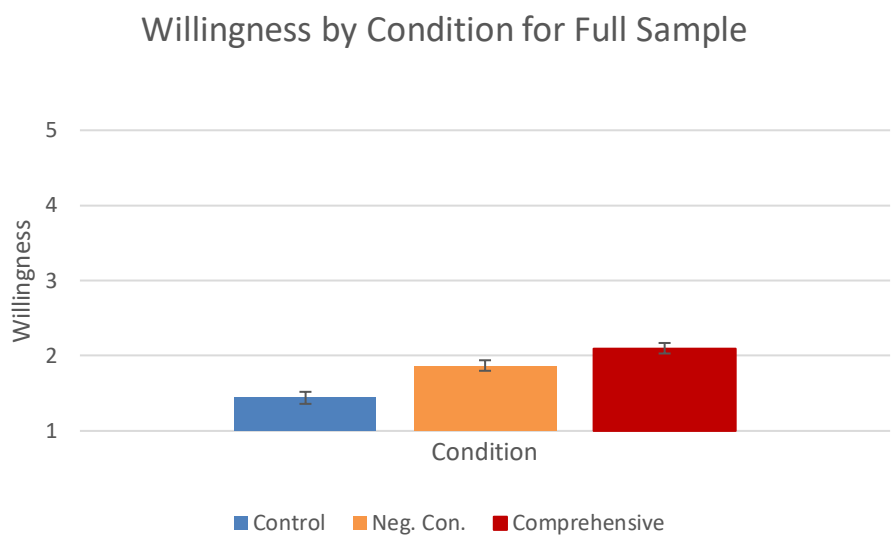

Figure 10a. Adjusted mean willingness as a function of condition for full sample

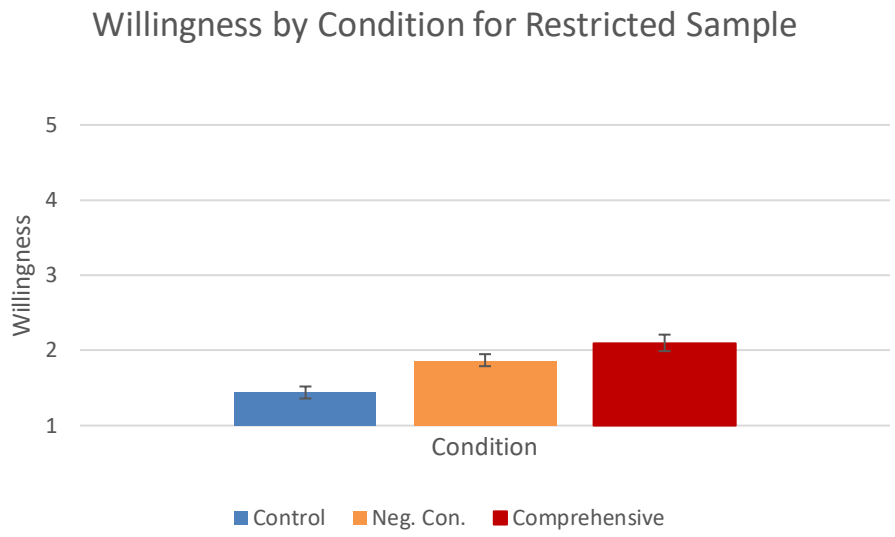

Figure 10b. Adjusted mean willingness as a function of condition for restricted sample

Testing Aim 2: Differences as a Function of Country

Results of the ANCOVAs with the full sample testing whether the effect of condition on the dependent variables was moderated by country showed that the interactions between condition and country were not statistically significant (*F*s < 1.50, *p*s > .3). The closest was the interaction predicting IAT cognition where $F(2, 71) = 3.16$, $p = .05$, but given the number of comparisons and that this failed to reach the a priori established p-value this effect was not pursued.

When the above analyses were replicated including only the adolescents who got the manipulation check correct again, the condition by country interactions were not statistically significant in any of the analyses (*F*s < 1.81, *p*s > .17).

Summary Results for England and US

Results of the present study showed that among adolescent athletes sampled from England and the US, that exposure to the negative consequences message led to significantly fewer perceived advantages than exposure to a comprehensive and control message. However, the messages had no statistically significant effect on any of the other outcome variables.

Finding that the negative consequences message had the effect of lowering perceived advantages but failed to impact any of the other psychological outcomes implies that presenting negative consequences information may limit the likelihood that adolescents recognize or acknowledge potential advantages associated with AS use. It also implies, however, that the effect is not strong enough to lead to meaningful changes in other psychological constructs (e.g., attitudes, intentions) that have been shown to predict risk of AS use (Ntoumanis, Ng, Barkoukis, & Backhouse, 2014; Whitaker, Long, Petróczi, & Backhouse, 2014). One reason why message exposure had no effect on other constructs may be that exposure was too brief or limited. Another possibility is that providing information about the consequences of AS us is simply an ineffective approach at changing attitudes, intentions, and willingness to use AS. This possibility is consistent with results from a recent qualitative study with cyclists. Semi-structure interviews were conducted with groups of cyclists, some of whom had engaged in doping. Results indicated that cyclists decisions to engage in doping behaviors were uninfluenced by the potentially harmful health effects associated with doping (Lentillon-Kaestner, Hagger, & Hardcastle, 2012).

General Discussion

The objective of the present set of studies was to test whether a negative consequences approach or a comprehensive approach to providing information about AS to adolescent athletes would lead to less favorable cognitions (e.g., advantages, attitudes) than a control message. Findings regarding the effect of messages on cognitions differed across the two studies. The study conducted in Australia showed that providing information about AS, whether it was through a negative consequences message or a comprehensive message, lead to more favorable attitudes and intentions than receiving control information. These findings imply that AS messages can lead to a greater risk for using AS to the extent that greater attitudes and intentions lead to a greater likelihood of behavioural enactment, which is supported by the literature (Ntoumanis, et al., 2014).

However, the study conducted with adolescents from England and the US implies something different. In this study providing adolescents with a negative consequences message led to a significantly fewer endorsed advantages than did exposure to a comprehensive or control message. Furthermore, exposure to a negative consequences or a comprehensive message had no discernible impact on the other cognitions (e.g., attitudes, intentions or willingness) than did a control message. Together these findings imply that the negative consequences approach might be sufficient for reducing the potential benefits adolescents perceive regarding AS use, but the message does not lead to significant shifts in personal attitudes, intentions, willingness. This is important as there is some evidence that reasons, which are synonymous with our advantages and disadvantages, can account for unique variance in intentions over and above attitudes (Westaby, 2005).

Taken together it appears that a negative consequences approach increased risk cognitions associated with AS use for the sample of Australian adolescents, but had little impact on adolescents in England and the US. Why there were such different results between the Australian study and the study in England and the US is not entirely clear, but one reason might be the different type of athletes represented in each sample. The

sample of Australian adolescents may have included athletes who were more specialised in sport than those in the England and US study. This is because the Australian adolescents were recruited from juniors programs whereas adolescents in England and US were recruited from school based sports teams (England) and recreational sports leagues (US). Although the evidence base is mixed, some studies have found that competitive athletes typically report more favourable attitudes and intentions towards AS use (Backhouse, Whitaker, Patterson, Erickson & McKenna, 2015). Therefore, when presented with any information about AS, whether it focused on negative consequences or is comprehensive including both negative outcomes and potential benefits, athletes are reminded of AS use and their positive feelings are activated. Reading a control message does not activate such positive feelings.

The changes on perceived advantages in the England/US study and the changes in attitudes and intentions among Australian adolescents was documented immediately following message exposure, but the extent to which such changes would last over time is not clear. Recent work suggests that one factor relevant when considering how long lasting changes in doping attitudes are is the amount of thought or deliberation that adolescents give to the message (Horcajo & De la Vega, 2014). In this study a sample of youth soccer players were provided with a message that discussed legalizing doping. Adolescents were randomly assigned to read a message in favor of legalization and others read a message against legalization. Furthermore, half of the adolescents were encouraged to give great thought to the issue (i.e., high deliberation) whereas the other half were not given such encouragement (i.e., low deliberation). Results showed that immediately after message exposure a main effect of condition on attitudes such that adolescents who were exposed to a message in favour of legalization reported significantly more favorable attitudes towards doping legalization than adolescents exposed to a message against of legalization. However, attitude change in response to message exposure remained at one-week later but only for high deliberators. Results of this study imply that adolescent's attitudes towards AS or doping can be impacted by message exposure and that the amount of thought adolescents give to the message can attenuate or enhance the stability of attitude change.

In both the Australia study and the England/US study many adolescents answered the manipulation check wrong suggesting they either did not read the message carefully or did not understand it. That adolescents randomly assigned to the comprehensive condition appeared to have the greatest problem with the manipulation check (44% of adolescents in Australia got it wrong; 50% of adolescents in England and the US got it wrong) speaks against the possibility that adolescents were not reading carefully. This is because if adolescents were skimming, they would be equally likely to skim in all three conditions thus showing similar deficits with respect to the manipulation check. However, this was not the case. Futhermore, while we cannot definitively rule out the possibility that adolescents failed to comprehend the message, that adolescents who got the manipulation check right were younger than those who got the manipulation check wrong seems inconsistent with this possibility. If inadequate understanding were the issue we would have expected that younger adolescents were more likely to get the manipulation check wrong, which is the opposite of what we found.

Another possibility for why adolescents struggled with answering the manipulation check could be that the content of the comprehensive message was more difficult to understand than information in the other conditions. One way to get a sense of this would be to see within the comprehensive condition, was to test whether age was related to the probability of getting the manipulation check correct. Assuming that older adolescents would be more capable of comprehending a complex message than younger adolescents, we would have expected to see that adolescents who get the manipulation check correct are older than adolescents who get the manipulation check wrong. This is not what the data showed as there were no differences in age for those who got the manipulation check right compared to those who got the manipulation check wrong in the Australia sample. In the England/US sample, there was an age difference

opposite of what would have been expected if message complexity were the issue as those who got the manipulation check correct were younger than those who got the manipulation check wrong.

In general, adolescent athletes from England and the US as well as those from Australia reported low attitudes, intentions, and willingness to use AS and this is consistent with other research that has found adolescent athletes to report generally low attitudes towards doping behaviors (Elbe & Brand, 2016). If adolescent athletes have relatively low attitudes to begin with, educating them about problematic health consequences associated with AS may be of limited utility. Moreover, intervention effects will be hampered by floor effects as the adolescents already demonstrated low values across the social cognitive factors explored; so there was little room to decline any further.

It may very well be that a long term perspective on early prevention efforts is needed. That is, implementing prevention programs for adolescent athletes may not be effective in the short term because the adolescents already feel unfavorable, or because early on they are in environments where they are not exposed to doping. Indeed, research has shown that athletes who are in environments where they are exposed to doping are in most need of intervention (Zucchetti, Candela, & Villosio, 2015). As adolescents progress in their sports they are more likely to encounter environments in which they will be exposed to doping. Therefore, a more expansive approach that includes establishing an environment that fosters an anti-doping perspective by targeting important others in the adolescent athletes' environment including parents, coaches, and other athlete support personnel (Dodge & Clarke, 2015; Mazanov, Backhouse, Connor, Hemphill, & Quirk, 2014; Patterson, Duffy, & Backhouse, 2014) might be more effective approach than a single-exposure intervention.

Limitations and Strengths

There are number of limitations of the present studies. One limitation is that we were unable to collect information about sports for the Australia study. This limits our understanding of the type of athletes represented in that study. Another limitation is that we did not utilize identical measures across studies which prevent us from drawing firm conclusions from differences that emerged across the two studies. Only a small percentage of adolescents were able to complete the IAT in the England/US study due to technical challenges. This prevented our ability to identify differences in implicit attitudes as a function of message exposure.

Despite these limitations there are several notable strengths of the studies. One is that our research design allowed us to isolate the effects of negative consequences message from those of a comprehensive on AS risk-cognitions. A second strength is that we sampled adolescents from different countries.

Summary

The present studies were aimed at testing whether a negative consequences-only approach or a comprehensive message would have similar or different effects on AS-related cognitions. Results of these studies were mixed. In the Australia study both the negative consequences-only message and the comprehensive message led to more positive intentions to use AS than a control message. However, the comprehensive message led to more positive attitudes than either the negative consequences message or the control message. These findings show that negative consequences message and a comprehensive message may be differentially or equally effective depending on the outcome variable under investigation. However, in contrast, in the study with adolescents from England or the US we found very few differences between a negative consequences, comprehensive, or control message.

When considered together the results of these studies imply that the effect of a negative consequences-only or a comprehensive approach to delivering information about AS depends on the outcome under investigation and the sample. Among competitive athletes delivering negative consequences information alone or in a more comprehensive context may inadvertently lead to increases in AS risk-cognitions. If such information is perceived as a threat to one's freedom (Quick & Bates, 2010). However, among adolescent athletes who may be less committed to sport presenting information about negative health consequences, either alone or in conjunction with reasons why individuals might use, had little impact on AS risk-cognitions.

Implications for Intervention Development

Findings of the present study imply that when developing anti-doping intervention programs, that we must be mindful of the target audience. Data from the present study suggest that providing basic information about either the consequences only or both potential benefits and consequences might have little effect at lowering attitudes or intentions to use among athletes who are more advanced in their sporting career or who have more experience with having tried Anabolic Steroids as was the case with the Australian sample.

The findings from the England and US sample imply that providing relatively brief, basic information about the negative consequences only can lead to an immediate reduction in perceived advantages than exposure to a comprehensive and control message. Finding that the messages had no statistically significant effect on any of the other outcome variables suggests that relatively brief, basic informational interventions may have little effect on attitudes, intentions or willingness. As a result, we would expect little effect of these messages on behavior.

Finally, the messages used in the present study were relatively brief and provided basic information. One direction for future research that has implications for intervention development is to create interventions that are more engaging. While we found some immediate effects of these messages the effects were not particularly robust (i.e., impact attitudes but not intentions; impacts perceived advantages, but nothing else). An interesting and possibly fruitful avenue for future research and program development would be to develop interventions that are more engaging, and personally relevant. For example, tailored interventions, where content of an intervention is designed for individuals based on their level of risk have shown promise in reducing alcohol consumption (Blow, et al., 2006; Canale, Vieno, Santinello, Chieco, & Andriolo, 2015).

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Appendix

Appendix 1. *US/England Negative Consequences Only Message*

Anabolic steroids are sometimes used by athletes and body builders. We will give you information about anabolic steroids. After you finish reading the information we will ask you some questions about what you have just read.

Are anabolic steroids the same thing as nutritional supplements?
NO. Nutritional supplements are available in many stores, but anabolic steroids should only be used if a doctor says it's okay.

Are there negative health problems of anabolic steroid use?
YES. Doctors and researchers have found that anabolic steroids may lead to health problems.

For guys, using anabolic steroids can lead to:

- Impotence (which is the inability to get an erection)
- The inability to have children
- Baldness
- Development of breasts
- Really bad acne
- Increased risk for some types of cancer

For girls, using anabolic steroids can lead to:

- Growth of facial hair
- Baldness
- Changes in or the stopping of the menstrual cycle
- Permanently deepened voice
- Really bad acne

For guys and girls, using anabolic steroids can lead to:

- Heart problems and heart attacks
- Depression
- Aggressiveness and violence
- Stunted growth when used by teenagers

Appendix 2. *US/England Comprehensive Message*

Anabolic steroids are sometimes used by athletes and body builders. We will give you information about anabolic steroids. After you finish reading the information we will ask you some questions about what you have just read.

Are anabolic steroids the same thing as nutritional supplements?
NO. Nutritional supplements are available in many stores, but anabolic steroids should only be used if a doctor says it's okay.

Why do people use anabolic steroids?
People use anabolic steroids to help make them stronger and reduce their fat. For example, if a person used anabolic steroids, he or she may be able to lift more weight in the bench press. Also, using anabolic steroids may make a person feel more confident. So, in general, athletes use anabolic steroids because they may help the athlete:

- Bulk up their body
- Lower their body fat
- Feel good about themselves
- Feel more confident

Are there negative health problems of anabolic steroid use?
YES. Doctors and researchers have found that anabolic steroids may lead to health problems.

For guys, using anabolic steroids can lead to:

- Impotence (which is the inability to get an erection)
- The inability to have children
- Baldness
- Development of breasts
- Really bad acne
- Increased risk for some types of cancer

For girls, using anabolic steroids can lead to:

- Growth of facial hair
- Baldness
- Changes in or the stopping of the menstrual cycle
- Permanently deepened voice
- Really bad acne

For guys and girls, using anabolic steroids can lead to:

- Heart problems and heart attacks
- Depression
- Aggressiveness and violence
- Stunted growth when used by teenagers

Appendix 3. *US/England Control Message*

Athletes competing at the national or international level are sometimes tested for the use of anabolic steroids. The process of testing for anabolic steroids is called doping control. There are a set of rules that must be followed during this process. We will give you information about doping control, and after you finish reading we will ask you some questions about what you have just read.

How does an athlete know if he or she has been chosen for testing?
A doping control officer will tell an athlete when he or she has been chosen for drug testing.

What happens after the athlete has been chosen?
There are several steps.

Step 1: After the athlete has been told that he or she has been chosen for testing, the athlete must go to the doping control area within 1 hour.

Step 2: The athlete chooses a sealed empty cup out of a box. This cup is used to collect a urine sample. The sample will be tested for drugs.

Step 3: The doping control officer is always the same gender as the athlete. The athlete goes to the toilet to provide a sample of urine. The doping control officer watches the athlete while the athlete gives his or her sample. The athlete must provide at least 90 ml of urine (or about 1/3 of a cup).

Step 4: The athlete selects a sealed kit out of a box with lots of sealed kits. The kits have two sealed bottles. One marked “B” and one marked “A.” The athlete pours some of his or her urine from the cup into each of the bottles.

Step 5: The athlete seals the bottles.

What happens after the athlete has finished giving his or her urine sample?
The samples are packed for shipping. They are packed in a way that makes sure the sample is secure and can be tracked. When the samples arrive at the lab, the sample in the bottle marked “A” is tested first for drugs. The sample in the bottle marked “B” can be tested to double-check the results of the “A” sample.

The lab reports the results of the test to the country’s Anti-Doping organization and to the World Anti-Doping Agency.

Appendix 4. *Australia Negative Consequences Only Message*

Steroids are substances that imitate the hormone testosterone. Steroids are often used by athletes and body builders. The technical name for steroids is anabolic-androgenic steroids, but we will call them steroids.

Please read the information below carefully. After you are finished reading the information about steroids we will ask you questions based on what you have read to check you have understood the information.

How does a person take steroids? A person can take steroids in pill form, can apply creams that contain steroids or by injections with a needle.

What do steroids do? Taking steroids increases the amount of testosterone a person has inside his or her body.

Are there negative health effects of steroid use?
Yes, doctors and researchers have found that there are many negative health effects of steroid use. These health effects are described below.

Because the body is getting a lot of testosterone through steroids, it stops producing testosterone.

A person who uses steroids makes their heart work much harder than a person who does not use steroids. For example, when people use steroids their heart thickens. The thickening of the heart is bad because the heart fails to pump blood through the body with as much force as a heart that is healthy (or not thickened). As a result, a steroid user's heart has to work much harder. Because their heart has to work much harder, steroids users are more likely than non-users to have a heart attack or develop other life-threatening heart conditions.

People who use steroids are more likely to experience problems with their reproductive functioning. The use of steroids for males can lead to lower sperm count and smaller testicles. The use of steroids for females can lead to disruptions in the menstrual cycle and an enlargement of the clitoris.

People who use injectable forms of steroids are at risk of getting infections like: bacterial sores, HIV and hepatitis because the needles are sometimes dirty.

People who use steroids are also more likely to develop acne.

Using steroids can make a person feel and behave more aggressively. When a person stops using steroids he or she is at an increased risk for depression and even suicide.

So, using steroids places a person at considerable risk for experiencing a wide-range of negative health outcomes. Doctors and researchers believe that the side effects of steroids are even more dangerous for young people than adults because young people are still growing.

Appendix 5. *Australia Comprehensive Message*

Steroids are substances that imitate the hormone testosterone. Steroids are often used by athletes and body builders. The technical name for steroids is anabolic-androgenic steroids, but we will call them steroids.

Please read the information below carefully. After you are finished reading the information about steroids we will ask you questions based on what you have read to check you have understood the information.

How does a person take steroids? A person can take steroids in pill form, can apply creams that contain steroids or by injections with a needle.

What do steroids do? Taking steroids increases the amount of testosterone a person has inside his or her body.

Why do people take steroids?
Steroids are used because they can help make a person stronger. For example, steroid users can lift more weight in the bench press and can squat more than non-users.

People who use steroids have more lean body mass and less body fat than people who do not use steroids. For example, the triceps and leg area of steroid users is bigger than the triceps and leg area of non-users.

So, in general, people use steroids to help make them stronger, to help lose body fat or to increase muscle.

Are there negative health effects of steroid use?
Yes, doctors and researchers have found that there are many negative health effects of steroid use. These health effects are described below.

Because the body is getting a lot of testosterone through steroids, it stops producing testosterone.

A person who uses steroids makes their heart work much harder than a person who does not use steroids. For example, when people use steroids their heart thickens. The thickening of the heart is bad because the heart fails to pump blood through the body with as much force as a heart that is healthy (or not thickened). As a result, a steroid user's heart has to work much harder. Because their heart has to work much harder, steroids users are more likely than non-users to have a heart attack or develop other life-threatening heart conditions.

People who use steroids are more likely to experience problems with their reproductive functioning. The use of steroids for males can lead to lower sperm count and smaller testicles. The use of steroids for females can lead to disruptions in the menstrual cycle and an enlargement of the clitoris.

People who use injectable forms of steroids are at risk of getting infections like: bacterial sores, HIV and hepatitis because the needles are sometimes dirty.

People who use steroids are also more likely to develop acne.

Using steroids can make a person feel and behave more aggressively. When a person stops using steroids he or she is at an increased risk for depression and even suicide.

So, using steroids places a person at considerable risk for experiencing a wide-range of negative health outcomes. Physicians and researchers believe that the side effects of steroids are even more dangerous for young people than adults because young people are still growing.

Appendix 6. *Australia Control Message*

Athletes competing at the national or international level are sometimes tested for the use of steroids. The process of testing for steroids is called doping control. There are a set of rules that must be followed during this process.

Please read the information below about the doping control process carefully. After you are finished reading the information about steroids we will ask you questions based on what you have read to check you have understood the information.

How is the athlete notified?
An athlete is notified by a doping control officer that he or she has been chosen for testing. An athlete may be chosen at random or because he or she was a top finisher in their event.

What happens after an athlete has been notified?
Once an athlete has been notified the athlete must report to the doping control area right away. The doping control officer may allow the athlete to delay reporting to the doping control area if the athlete has a press conference, must finish a workout or continue competing in an event. But, the doping control officer must follow the athlete everywhere the athlete goes.

When the athlete reports to the doping control area s/he is given a choice of sealed empty cups. The athlete must choose one of the cups. This cup is used to collect the urine sample.

The doping control officer is always the same gender as the athlete. The athlete and the doping control officer are the only two people allowed into the restroom (unless the athlete is a minor or disabled). The doping control officer watches the athlete at all times to ensure that the urine is from the athlete.

The doping control officer must make sure that the athlete provides at least 90ml of urine. Once the athlete has produced that much urine s/he is given a choice of sealed kits. The athlete is asked to choose one of the kits. The sealed kit contains two sealed bottles one labeled “B” and one labeled “A.” The athlete is asked to pour a certain amount of urine into each of the bottles. Then the athlete seals the bottles.

What happens after the athlete has finished giving a sample?
The urine samples are packed for shipping. The urine samples are packed in a way that makes sure the sample is secure and can be tracked. As soon as the samples arrive at the testing lab, the lab examines the samples to make sure there is no evidence of tampering. The “A” sample is analyzed for substances that are banned. The “B” sample is securely stored at the lab and can be used to double-check the results of the “A” sample.

The lab reports the results of the analysis to the appropriate Anti-Doping Organization and to the World Anti-Doping Agency.