

**Social Science Research Fund:**

**Incorporating Parents in the Anti-Doping Fight: A Test of the Viability of  
a Parent-Based Prevention Program**

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## Executive Summary

### Background

One understudied approach to anabolic steroid (AS) prevention programs is the inclusion of parents. Parents are in a unique position to send consistent messages about AS that transcend changes in coaches and team affiliation. Additionally, parents are in the position to create age-appropriate communications consistent with their own personal values. Despite the potential of parent-based approaches, there is very little research to guide the development of such programs. The purpose of the present study was to test whether parent-based programs may be a useful approach in the prevention of AS and performance enhancing nutritional supplement (NS) use.

### Methods

A sample of about 250 adolescent athletes from three high schools in the United States (US) completed a questionnaire. Three aspects of parent-adolescent communication were assessed: discussions about the performance effects (e.g., train harder), side effects and protective factors (e.g., morality) associated with AS use and NS use. Additionally, adolescents reported the extent to which they perceived their parents to be a good source of information (i.e., the quality of information) and whether they would go to their parents for information about AS and NS.

### Results

For adolescents who did not perceive their parents to be good sources of information or who would not go to parents for information, more parent-adolescent communication about AS was associated with greater intentions to use AS in the future. This was true for all aspects of communication: discussions about performance effects associated with AS use, side effects of AS use, and protective factors. In contrast, for those adolescents who perceived their parents to be good sources of information or who would go to their parents for such information, increased communication did not lead to an increase in intentions to use AS and may lead to decreased intentions to use AS.

With respect to NS use, results showed that discussions about performance effects were associated with higher intentions to use NS, while discussions about protective effects were associated with lower intentions to use NS. Discussions about side effects appeared to be unrelated to intentions to use NS. The quality of information offered by parents and whether the adolescent would consult his/her parents for this information had no effect on intentions to use NS.

### Conclusion

Results suggest that increasing communication about AS, which involves information about performance effects, side effects and protective factors, will not lead to increases in

intentions to use AS when adolescents perceive their parents to be a good source of information and are willing to go to parents to get such information. This implies that parents can convey information about AS without fear that such discussions will necessarily place adolescents at higher risk of using AS in the future.

However, results also indicate that increasing communication about AS, which involves information about performance effects, side effects and protective factors, may lead to increases in intentions to use AS when adolescents do not perceive their parents to be a good source of information and when they are not willing to go to parents for such information.

With respect to use of NS, discussions about performance effects were associated with higher intentions to use whereas discussions about protective factors were associated with lower intentions to use NS.

## Background

Doping agents are substances used by adolescents to help improve their athletic performance. In the United States (US) doping agents may be classified as either legal or illegal. In the US illegal doping agents are against the law to use unless prescribed by a physician to treat a medical condition. The sale, distribution, or use of these substances without a physician's prescription is against the law. Doping agents that are illegal in the US are banned by both the United States Anti Doping Agency (USADA) and the World Anti Doping Agency (WADA).

Anabolic Steroids (AS) are one of the most widely known illegal doping agents. 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 in their lifetime (Yesalis, 2000). AS use poses a number of health problems including increased blood pressure, kidney disease and risk of heart failure (National Institute on Drug Abuse, 2005).

Legal doping agents are sold in the US as performance enhancing nutritional supplements (NS) and are easily accessible. NS can be purchased over-the-counter, and many NS are not banned by USADA or WADA. Creatine Monohydrate is an example of a NS. Use of NS among adolescents is much more common than use of AS with 10-17% of boys and 1-5% of girls reporting current or prior use of a NS (Dodge & Jaccard, 2008; Dodge & Jaccard, 2007).

Unlike AS, there is considerable variability with respect to the safety of NS whereby some are believed to be relatively safe (e.g., Creatine), but others pose significant dangers, as was the case with ephedrine. In 2004, the US Food and Drug Administration banned the sale of ephedrine and products containing ephedrine because they were linked to serious health consequences like heart palpitations, nausea and anxiety (Shekelle et al., 2003). Additionally, studies have documented that a rather large percentage of NS sold in the US contain an illegal doping agent and are tainted with levels of illegal doping agents that might cause one to fail a drug test (Delbeke, Van Eenoo, Van Thuyne, & Desmet, 2003; Green, Catlin & Starcevic, 2001; Maughan, 2004). Finally, there is mounting evidence to suggest that use of NS increases the likelihood one will progress to the use of illegal AS (Dodge & Hoagland, 2011; Dodge & Jaccard, 2006; Hoffman, Faigenbaum, Ratamess, Ross, Kang, & Tenenbaum, 2008).

The information outlined above highlights the importance of developing prevention programs that target both the use of AS and NS among adolescents. One viable approach to prevention may be to develop parent-based programs. A parent-based approach to prevention offers several advantages over existing types of prevention programs. The existing programs and their limitations are discussed in the section below.

## Interventions Targeting AS Use

Literature on environmental factors that impact adolescents' decisions to use AS or NS has found that having a peer who uses a substance, exposure to media that highlights muscularity or athleticism and participating in sports are all positively related to the use of AS and NS (Litt & Dodge, 2008; Field et al., 2005). These studies have led some to conclude that the most effective anti-doping programs for adolescents will be those that improve body image or are delivered by coaches or peers. Two prevention programs developed in this tradition are reviewed below.

A health promotion program was developed and tested in a sample of Swedish adolescent males aged 16-17 years (Nilsson, Allebeck, Marklund, Baigi & Fridlund, 2004). The goal of the program was to reduce the misuse of AS by improving the confidence boys had in their bodies. Trained health care workers delivered the program which consisted of group discussions and lectures that stressed positive attitudes toward ones' self and highlighted negative qualities of those who misuse AS (e.g., aggression). Among boys aged 16 years, there was a statistically significant reduction in the percentage who reported misuse of injectable AS and a marginally significant reduction in the percentage that reported misuse of AS tablets following the program. Among boys aged 17 years, there were no statistically significant program effects. Although the intervention had some success reducing AS misuse among the 16-year old boys, it seems to have been less effective for 17-year old boys. It is possible that as boys get older they are less concerned with using AS to improve their appearance and use AS for other reasons like success in sports. To be most effective, intervention programs must be able to adapt the content to meet the changing needs or goals of the adolescent. Parent-based interventions have the advantage of allowing parents to tailor the content of discussions to meet the needs of their adolescent.

Another notable prevention program is The Adolescents Training and Learning to Avoid Steroids (ATLAS) program (Goldberg, et al., 1996). The ATLAS program is a peer-led, team-based program. The program consists of 7 classroom sessions led by the coaching staff and peer educators. The sessions provide information about risks of using AS and about alternatives to AS use like proper nutrition and weight lifting. Results of the ATLAS program have been mixed. For example, adolescents in the ATLAS program engaged in better alternative training methods like weight lifting and proper nutrition one year following the program (Goldberg, et al. 1996) suggesting that providing information about alternatives is important. However, there were no sustained program effects on use of AS one year later. Furthermore adolescents who received the program reported lower intentions to use AS at follow-up than those who did not receive the program but this was only true at the individual level, not at the program level and only true when certain covariates were entered in the model.

There are at least two reasons why results of the ATLAS program have been mixed. One reason for the mixed results may be that while adolescents in the ATLAS program were learning about the dangers of using AS they were probably also surrounded by teammates and coaches who acknowledged the importance of size and muscularity for success in sports. Thus, coaches may be sending conflicting information to adolescents. Another

potential challenge for team-based interventions like ATLAS is that adolescents typically change coaches. While a team-based intervention might be effective at creating a team norm that the use of doping agents is unacceptable, the adolescent will ultimately leave the team. As adolescents move up in the ranks and join new teams with different coaches, s/he will likely face an entirely different culture and set of norms regarding the use of doping agents. This may be particularly true for more elite athletes who move up quickly and sometimes leave their school teams to train with older, more experienced coaches and teams.

For anti-doping interventions to have the strongest and longest lasting impact, the interventions must transcend changes in coaches and/or team affiliation and allow adolescents to receive content relevant to him/her. Parents are in a good position to send consistent messages that transcend changes in team and to recognize the changing needs of their son or daughter. It seems that a parent-based intervention may address some of the shortcomings of existing AS prevention programs. Although a parent-based approach to prevention of AS use among adolescents holds much promise for prevention efforts, an empirically supported theoretical framework is needed to lay the groundwork for developing an effective parent-based prevention program.

### **Building Parent-Based Interventions: Considerations**

Over the past decade there has been growing recognition of the benefits of including parents in prevention programs aimed at reducing adolescent risk behaviors (Guilamo-Ramos, Jaccard, Dittus & Bouris, 2006; Jaccard, Dodge & Dittus, 2002). Studies have shown that improving parent-adolescent communication about risk behaviors can lead to a reduction in risk taking on the part of the adolescent (Guilamo-Ramos, Bouris, Jaccard, Gonzalez, McCoy & Aranda, 2011).

For such interventions to be effective, however, one must consider the content of the communication and the way in which the recipient perceives the communicator, or source of information. Indeed, social science research has found message content and source characteristics to be two classes of variables critical for developing effective communications (Chaiken, 1980).

#### **Message Content**

Studies have identified specific pieces of information relevant to adolescents' decisions to use AS and NS. Three of these pieces of information include: performance effects, side effects, and protective factors (Dodge & Jaccard, 2007; Dodge & Jaccard, 2008; Goldberg, et al., 1996). Performance effects refer to adolescents' beliefs regarding the beneficial effects substance use will have on athletic performance (e.g., allow one to train harder). Side effects refer to the negative health consequences an adolescent believes are associated with use of substances. Protective factors refer to the ethical issues of using (e.g., using an AS is wrong) and refusal skills.

Adolescents with the lowest intentions to use AS and NS are those who have the lowest expectancies regarding performance effects, believe using substances will lead to harmful side effects, have the skills to refuse offers and view use of performance enhancing substances as an ethical shortcoming (Dodge & Jaccard, 2007; Dodge & Jaccard, 2008; Goldberg, et al., 1996). Thus, parent-adolescent discussions that include information about performance effects, side effects, and protective factors should have an impact on adolescents' intentions to use AS and NS.

### **Source Characteristics**

Two characteristics of the source that can influence the effectiveness of a communication are expertise and trustworthiness. Sources that are most effective at communicating are those sources the recipient believes are expert and trustworthy (Chaiken, 1980). Expertise refers to whether or not the recipient believes the source can offer good information about the topic, and trustworthiness refers to whether or not the source is providing honest information and has the best interests of the recipient at heart (Chaiken, 1980). When a recipient believes the source to be expert and trustworthy, the source is likely to be viewed as providing good information. The theoretical framework presented below incorporates how good of a source of information the adolescent believes her/his parents to be about the topic of AS and NS.

Another aspect of the source that is important to consider is whether the adolescent feels s/he can go to a parent for information. Studies have found that adolescents report reluctance to communicate with their parents if they believe parents will punish them (Guilamo-Ramos, et al., 2011). That is, there are times when an adolescent is unlikely to consult a good information source. Therefore, in addition to considering whether a source is a good resource for information, one must also consider whether the adolescent is willing to consult the source for information.

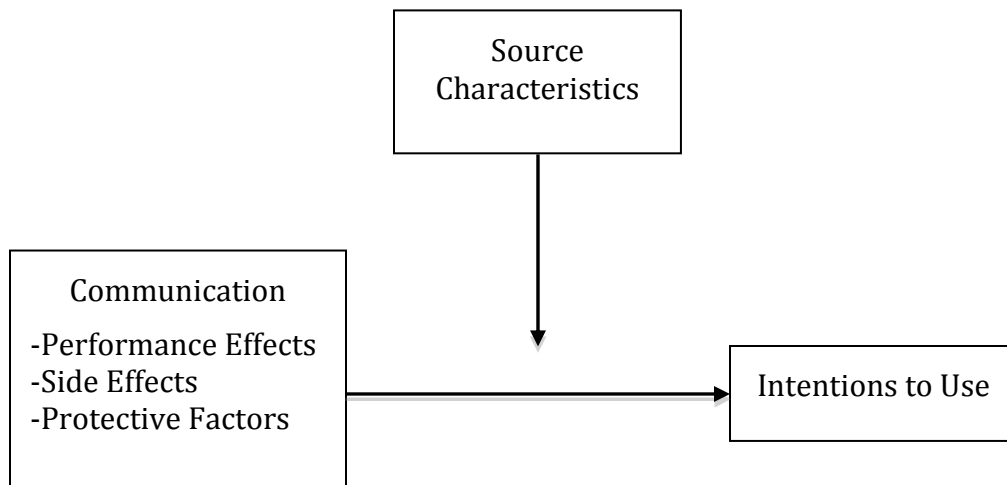
With respect to information about AS and NS, information conveyed by a source who is believed to be a good source of information about the topic and by one that the adolescent is willing to go to should be more influential than information conveyed by a source that is not perceived as providing good information or one who the adolescent is unwilling to consult for information.



## A Parent-Based Framework to Prevent AS and NS Use

A theoretical framework to guide the development of parent-based prevention programs targeting AS and NS use is shown below in Figure 1. The framework draws from the communication literature (Chaiken, 1980) and the literature on parent-based interventions (Guilamo-Ramos, et al., 2006; Guilamo-Ramos, et al., 2011; Jaccard et al., 2002).

**Figure 1.** *Model for Parent-Adolescent Communication about AS and NS Use*



According to this model, parent-adolescent communication about AS will influence intentions to use AS in the future. However, the strength of the relationship will vary as a function of the characteristics of the source. Using protective factors to illustrate this idea, there will be a negative relationship between communication about protective factors and intentions to use AS such that greater communication about protective factors will be associated with lower intentions to use AS. However, this will be stronger for adolescents who view their parents as a good source of information and when the adolescent is willing to go to his/her parents for such information. A similar logic can be extended to the other dimensions of communication.

## Study Aims

Before developing a parent-based intervention that targets improving parent-adolescent communication about AS or NS, one must first establish that such improvements in communication are associated with lower risk. Therefore, the overall objective of the present study was to test whether parent-adolescent communication about AS or NS is associated with lower risk of using AS and NS. This general objective was accomplished by testing the following specific study aims:

### ***Anabolic Steroid Use***

#### **Communication about Performance Effects**

*Specific Aim 1a.* Does the affect of communication about performance effects on intentions to use AS vary as a function of how good of a source of information parents are perceived to be?

*Specific Aim 1b.* Does the affect of communication about performance effects on intentions to use AS vary as a function of whether the adolescent would go to their parents for information?

#### **Communication about Side Effects**

*Specific Aim 2a.* Does the affect of communication about side effects on intentions to use AS vary as a function of how good of a source of information parents are perceived to be?

*Specific Aim 2b.* Does the affect of communication about side effects on intentions to use AS vary as a function of whether the adolescent would go to their parents for information?

#### **Communication about Protective Factors**

*Specific Aim 3a.* Does the affect of communication about protective factors on intentions to use AS vary as a function of how good of a source of information parents are perceived to be?

*Specific Aim 3b.* Does the affect of communication about protective factors on intentions to use AS vary as a function of whether the adolescent would go to their parents for information?

### ***Nutritional Supplement Use***

#### **Communication about Performance Effects**

*Specific Aim 4a.* Does the affect of communication about performance effects on intentions to use NS vary as a function of how good of a source of information parents are perceived to be?

*Specific Aim 4b.* Does the affect of communication about performance effects on intentions to use NS vary as a function of whether the adolescent would go to their parents for information?

#### **Communication about Side Effects**

*Specific Aim 5a.* Does the affect of communication about side effects on intentions to use NS vary as a function of how good of a source of information parents are perceived to be?

*Specific Aim 5b.* Does the affect of communication about side effects on intentions to use NS vary as a function of whether the adolescent would go to their parents for information?

### **Communication about Protective Factors**

*Specific Aim 6a.* Does the affect of communication about protective factors on intentions to use NS vary as a function of how good of a source of information parents are perceived to be?

*Specific Aim 6b.* Does the affect of communication about protective factors on intentions to use NS vary as a function of whether the adolescent would go to their parents for information?

## **Methods**

A total of 244 adolescent athletes ages 13-19 years ( $M=15.8$ ,  $SD=1.3$ ) in grades 7-12 completed a questionnaire. Athletes were sampled from three high schools in the state of New York (in the US). The schools reflected small and large schools with the number of students ranging from about 750 to about 2,800 (High-schools, n.d.). The percentage of students who qualified for free or reduced priced lunches ranged between 34-67%, where the national average of US students who qualify for free or reduced priced lunches is about 39% (High-schools, n.d.).

Of the 239 students who reported gender, 118 were male (48.4%) and 121 were female (49.6%). About 6% of the students were Hispanic. The sample was 74.2% white, 12.3% black, 0.8% Asian, 0.8% Middle Eastern, 5.3% mixed race, 2.9% American Indian, and 3.3% described their race as "other."

Questionnaires were distributed during the fall sports season at one high school and during the spring sports season at two high schools. All athletes on the roster for an in-season sport were invited to participate. Parental consent forms were sent out several days before the scheduled data collection, and adolescents were instructed to return signed parental consent forms if they wanted to participate. Only athletes with a signed parental consent form were allowed to participate.

The questionnaire was passed out to athletes either just before or immediately following practice, and the timing was determined in consultation with coaches and school staff. Coaches were not involved in the distribution or collection of questionnaires. Adolescents provided assent prior to completing the questionnaire. Adolescents did not put their names or other identifiable information on the questionnaire and were given a \$15 gift card to a retail sporting goods store for participating. Schools were provided with a \$1,000 stipend for helping to coordinate the project.

The most commonly played sports by females in the sample included basketball ( $n=41$ ), cross country ( $n=11$ ), field hockey ( $n=20$ ), soccer ( $n=38$ ), softball ( $n=68$ ), tennis ( $n=7$ ), volleyball ( $n=29$ ), track ( $n=30$ ), and other ( $n=15$ ). The most commonly played sports by males included baseball ( $n=49$ ), basketball ( $n=29$ ), cross country ( $n=21$ ), football ( $n=54$ ),

lacrosse (n=10), soccer (n=17), tennis (n=8), wrestling (n=8), track (n=38), and other (n=12). These do not total the N in the sample because adolescents could report participating in more than one sport and only the most commonly reported sports are listed above.

## *Measures*

**Behavioral Intentions.** One item assessed intentions to use AS, and one item assessed intentions to use NS. The item read “I intend to use Anabolic Steroids [a performance enhancing nutritional supplement] within the next 6 weeks. Responses ranged from 1 = *strongly disagree* to 7 = *strongly agree*.”

**Communication with Fathers and Mothers.** Three subscales were used to assess parent-adolescent communication about AS and NS. The subscales reflected communication about performance effects, side effects and protective factors. At the beginning of the communication section for mothers, adolescents were asked to think about their mother, stepmother, or female guardian and were instructed to place an “X” over the section if they did not have a female caregiver. At the beginning of the communication section for fathers, adolescents were asked to think about their father, stepfather, or male guardian and were instructed to place an “X” over the section if they did not have a male caregiver.

Adolescents were each asked a set of questions with respect to how much they communicated with their mothers and fathers separately. The stem of each question read “I have discussed with my mother [father] how...” Adolescents responded using a scale that ranged from 1 = *not at all*, 2 = *somewhat*, 3 = *a moderate amount*, 4 = *a lot*. Communication with mothers and fathers was highly correlated, so a mean was computed using items about communication with mothers and fathers. Therefore three communication scales were computed for each of the topics (i.e., AS and NS) for a total of 6 scales, where higher numbers indicated more communication.

*Performance effects.* Communication about performance effects was assessed with 6 items for AS and 6 items for NS. Sample items included “...using Anabolic Steroids [a performance enhancing nutritional supplement] could make me faster,” and “using Anabolic Steroids [legal nutritional supplements] could give me more energy.” The scales demonstrated acceptable reliability for both AS and NS  $\alpha = .89$  and  $.91$ , respectively.

*Side effects.* Communication about the side effects associated with using substances was assessed with 8 items for AS and 8 items for NS. Sample items included: “...using Anabolic Steroids [a performance enhancing nutritional supplement] would cause me to have problems with my heart.” “...using Anabolic Steroids [a performance enhancing nutritional supplement] would prevent me from knowing my true level of ability.” The scales demonstrated acceptable reliability for both AS and NS  $\alpha = .93$  and  $.92$ , respectively.

*Protective factors.* Communication about protective factors was assessed with 10 items for AS and 10 items for NS. Sample items include: “...using Anabolic Steroids [a performance

enhancing nutritional supplement] is wrong,” “...I would feel like a cheater if I used Anabolic Steroids [a performance enhancing nutritional supplement],” and “...how to turn down a friend who offers me Anabolic Steroids [a performance enhancing nutritional supplement].” The scales demonstrated acceptable reliability for both AS and NS  $\alpha = .95$  and  $.94$ , respectively.

**Source Characteristics.** The source characteristics measure assessed the two dimensions described above, whether the adolescent believed the parent would provide good advice and whether the adolescent would go to the parent for this information. Responses ranged from 1 = *strongly disagree* to 7 = *strongly agree*.

*Good source of information.* Two items assessed whether the adolescent believed his or her mother and father were good sources of information. These statements read: “If I were to talk with my mother/stepmother or female guardian about Anabolic Steroids [performance enhancing nutritional supplements], she would give me good advice.” If I were to talk with my father/stepfather or male guardian about Anabolic Steroids [performance enhancing nutritional supplements], he would give me good advice.” The items for mother and father were combined. The inter-item correlations between the items for AS and NS were  $r = .52$  and  $.51$ ,  $ps < .01$ , respectively.

*Go for information.* Two items assessed whether the adolescent would go to his or her parents for information. These statements read: “If I needed advice about Anabolic Steroids [performance enhancing nutritional supplements], I would go to my mother/stepmother or female guardian,” and “If I needed advice about Anabolic Steroids [performance enhancing nutritional supplements], I would go to my father/stepfather or male guardian.” The items for mother and father were combined. The inter-item correlations between the items for AS and NS were  $r = .34$  and  $.24$ ,  $ps < .01$ , respectively.

**Past Use of Substances.** Adolescents were asked to report how often they had used AS during their lifetime. A separate question asked adolescents to report how often they had “used a legal performance enhancing nutritional supplement” during their lifetime. Responses ranged from 0 = *never* to 5 = *40 or more times*.

**Demographic Information.** Adolescents were asked to report the highest level of education achieved by their mothers as an indicator of socioeconomic status. Adolescents also self-reported age, gender, ethnicity and race.

**Sports Participation.** Adolescents were provided with a list of sports and were asked to check all sports teams to which they belonged.

### *Analytic Plan*

Study Aims 1-6 were tested with linear multiple regression analyses where intentions to use AS were regressed onto the communication scale of interest, the scale of interest regarding source (i.e., good source or would go to source) and the interaction between the

two. Past NS use was entered as a covariate in all regression analyses because previous studies have suggested it is a risk factor for future AS use (Dodge & Hoagland, 2011; Dodge & Jaccard, 2006; Hoffman, et al., 2008). Because there were gender differences in intentions to use NS, gender was entered as a covariate in regression analyses where intentions to use NS served as the dependent variable. Because the specific aims were tested running three separate regressions, adjusted p-values were established by using the modified bonferroni method (Jaccard, 1998). The adjusted p-values for the three study aims testing AS use and the three study aims testing NS use were set to .017, .025 and .05. The percentage of missing data was minimal for variables in the study ranging from 0-2%.

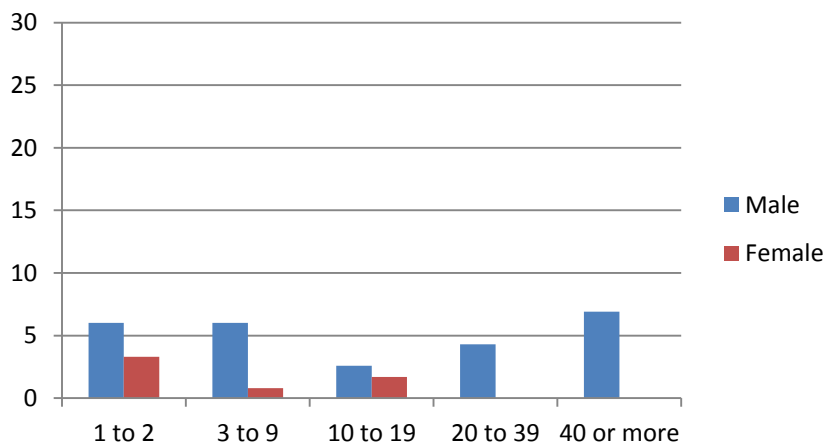
## Results

### Descriptive Statistics

#### Past use of AS and NS

Less than 1% (N=2) of adolescent athletes reported having ever used AS. About 17% of adolescent athletes reported having ever used a NS. Of those who had used a NS, 4.6% reported having used a NS 1 or 2 times, 3.8% reported having used a NS 3-9 times, 2.1% reported having used a NS 10-19 times, 2.1% reported having used a NS 20-39 times and 4.2% reported having used a NS 40 or more times. Consistent with previous research (Dodge & Jaccard, 2008; Dodge & Jaccard, 2006), males were more likely to report use of NS than were females and the percentages broken down by gender are shown below in Figure 2. There were no differences in past NS use across the three data collection sites ( $\chi^2 = 16.74$ ,  $df = 10$ ,  $p > .05$ ). The number of AS users was too low to test for gender or site differences.

**Figure 2.** Past Use of NS



#### Behavioral Intentions

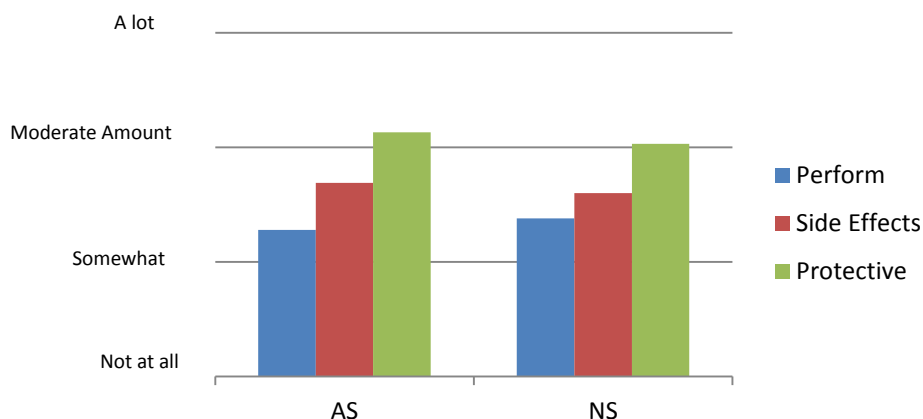
Consistent with past research (Dodge & Jaccard, 2008), intentions to use AS and NS were relatively low with means below the mid-point of the scale ( $M = 1.30$ ,  $SD = 1.09$ ;  $M = 1.80$ ,  $SD = 1.67$ , respectively). There were no statistically significant gender differences in

intentions to use AS ( $F_{1,236} = p > .60$ ), but boys reported higher intentions to use NS ( $M = 2.12, SD = 1.93$ ) than did girls ( $M = 1.41, SD = 1.18; F_{1,236} = 11.68, p < .01$ ). There were no differences in intentions to use AS or NS across data collection sites ( $F_s < 2.00, p_s > .14$ ).

### *Parent-Adolescent Communication about AS and NS*

Overall level of communication between adolescents and their parents about the topic of AS and NS is relatively low. Inspection of means shows that adolescents reported discussing performance effects and side effects somewhat, and reported discussing protective factors a moderate amount. The mean levels of communication are shown below in Figure 3.

**Figure 3.** Amount of Parent-Adolescent Communication about AS and NS



A one-way Analysis of Variance (ANOVA) was conducted to test whether there were gender differences in reported levels of communication. Results of the analyses indicated that boys reported discussing performance effects of NS with their parents significantly more ( $M = 1.48, SD = 0.62$ ) than did girls ( $M = 1.27, SD = 0.56; F_{1,237} = 7.47, p < .01$ ). There were no other statistically significant gender differences in communication ( $F_s_{1,237} < 2.00, p_s > .05$ ).

### *Parents a Good Source of Information*

Adolescents perceived their parents to be relatively good sources of information about AS ( $M = 5.97, SD = 1.35$ ) and NS ( $M = 5.97, SD = 1.20$ ) as evidenced by means above the midpoint of the scales. A one-way ANOVA was conducted to test whether these means differed as a function of adolescents' gender. Means and results of the ANOVA are shown below in Table 1.

**Table 1.** *Perceptions of Source Characteristics*

	Girls	Boys	Total	
	M (SD)	M (SD)	M (SD)	
Good Source				
AS	6.11* (1.22)	5.82* (1.46)	5.97 (1.35)	$F_{1,238} = 2.86, p < .10$
NS	5.85 (1.29)	6.09 (1.11)	5.97 (1.20)	$F_{1,238} = 2.37, p > .12$
Go to Source				
AS	5.26* (1.60)	4.57* (1.75)	4.92 (1.71)	$F_{1,238} = 10.09, p < .01$
NS	5.26* (1.51)	4.85* (1.57)	5.05 (1.55)	$F_{1,238} = 4.30, p < .05$

Note: rows with \* indicate statistically significant gender differences

### *Go to Parents for Information*

Overall adolescents reported they would go to their parents for information about AS ( $M = 4.92, SD = 1.71$ ) and NS ( $M = 5.06, SD = 1.55$ ) as evidenced by means above the midpoint of the scales. However, girls reported they would go to their parents to a greater extent for information about AS and NS than would boys. Means are shown above in Table 1.

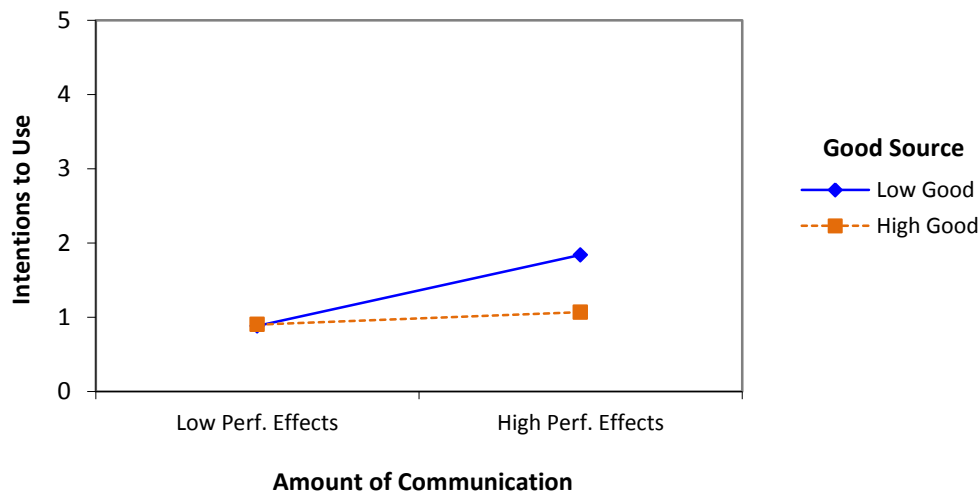


## Anabolic Steroids

### Specific Aim 1a

Does the affect of communication about performance effects on intentions to use anabolic steroids vary as a function of how good of a source of information parents are perceived to be? A multiple regression analysis was run where intentions to use AS were regressed onto past NS use, communication about performance effects, how good of a source of information parents were perceived to be and the performance effects-good information source interaction. Results of the analysis showed that past use of a NS ( $b = 0.13, p < .05$ ) were a statistically significant predictor of intentions. Communication about performance effects was also a statistically significant predictor, but was qualified by a statistically significant interaction ( $b = -0.25, p < .01$ ; Adjusted  $R^2 = 0.16, p < .01$ ). The nature of the interaction indicated that when adolescents failed to perceive their parents to be good sources of information, increased communication about performance effects were associated with increased intentions to use AS. However, when adolescents perceived their parents as good sources of information, increased communication about performance effects had little effect on intentions to use AS. The interaction is shown below in Figure 4.

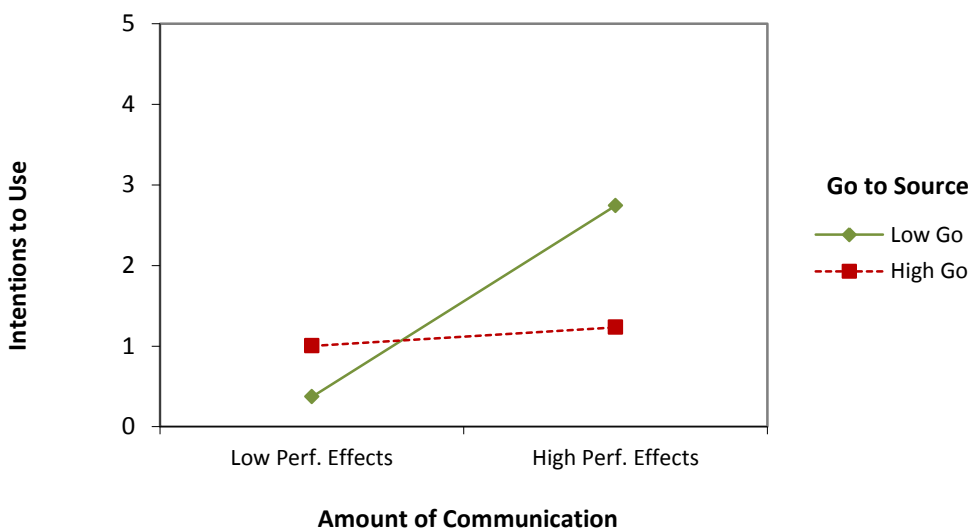
**Figure 4.** Interaction between Communication about Performance Effects and Quality of Information Provided by Parents Predicting Intentions to Use AS



### Specific Aim 1b

Does the affect of communication about performance effects on intentions to use anabolic steroids vary as a function of whether the adolescent would go to their parents for information? A multiple regression analysis was run where intentions to use AS were regressed onto the communication about performance effects, whether the adolescent would go to parents for information, past NS use and the go-performance effects interaction. Past NS use ( $b = 0.14, p < .01$ ) was a statistically significant predictor of intentions to use AS in the future. Whether the adolescent would go to his or her parents and communication about performance effects were also statistically significant predictors, but were qualified by a statistically significant interaction ( $b = -0.53, p < .01$ ; Adjusted  $R^2 = 0.25, p < .01$ ). The interaction indicated that as the amount of communication about performance effects increased, intentions to use AS increased for those adolescents who would not go to their parents for information. However, as the amount of information about performance effects increased, intentions to use AS was relatively unaffected for those adolescents who would go to their parents for information. The nature of the interaction is shown in Figure 5.

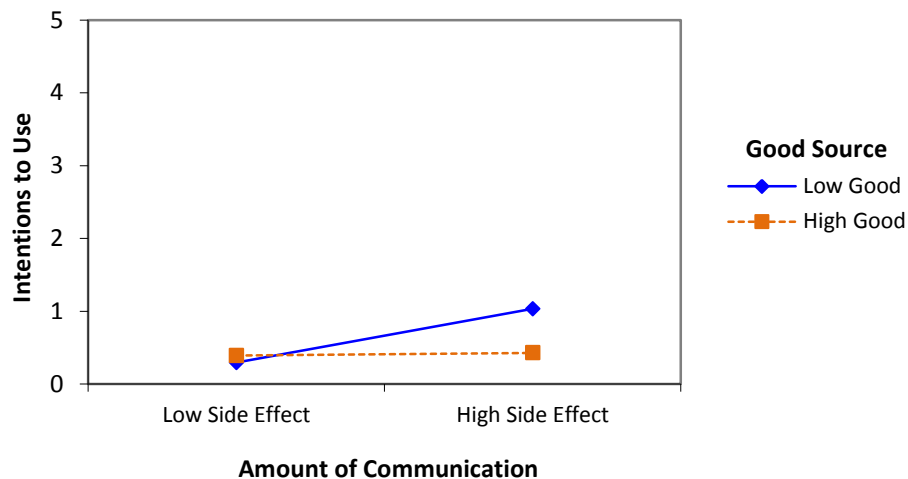
**Figure 5.** Interaction between Communication about Performance Effects and whether Adolescents Would Go to Parents Predicting Intentions to Use AS



### Specific Aim 2a

Does the affect of communication about side effects on intentions to use anabolic steroids vary as a function of how good of a source of information parents are perceived to be? A multiple regression analysis was run where intentions to use AS were regressed onto past NS use, communication about side effects, how good of a source of information parents were perceived to be and the side effects-good information source interaction. Results of the analysis showed a marginally significant effect of past supplement use ( $b = 0.10, p < .07$ ). The interaction was also statistically significant ( $b = -0.15, p < .01$ ; Adjusted  $R^2 = 0.10, p < .01$ ) such that for adolescents who failed to perceive their parents as good sources of information, greater communication about side effects was associated with higher intentions to use. However, when adolescents perceived their parents to be good sources of information, as communication about side effects increased intentions to use were relatively unchanged. This is shown below in Figure 6.

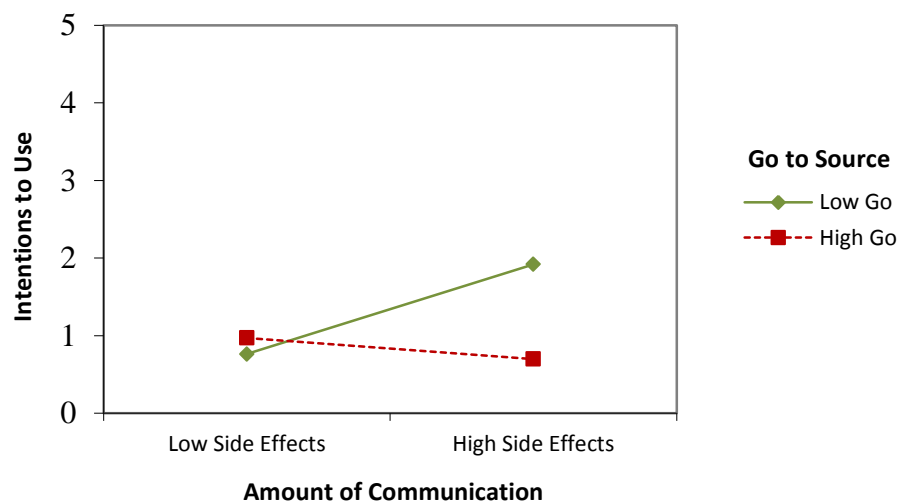
**Figure 6.** Interaction between Communication about Side Effects and Quality of Information Provided by Parents Predicting Intentions to Use AS



### Specific Aim 2b

Does the affect of communication about side effects on intentions to use anabolic steroids vary as a function of whether the adolescent would go to their parents for information? A multiple regression analysis was run where intentions to use AS were regressed onto communication about side effects, whether the adolescent would go to parents for information, past NS use, and the go-side effects interaction. Communication about performance effects and whether the adolescent would go to his or her parents were also statistically significant predictors, but were qualified by a statistically significant interaction ( $b = -0.24, p < .01$ ; Adjusted  $R^2 = 0.12, p < .01$ ). The interaction indicated that for those adolescents who would not go to their parents for information, as the amount of communication about side effects increased so too did intentions to use AS. However, for adolescents who would go to their parents for information as communication about side effects increased intentions to use tended to decrease. The nature of the interaction is shown in Figure 7.

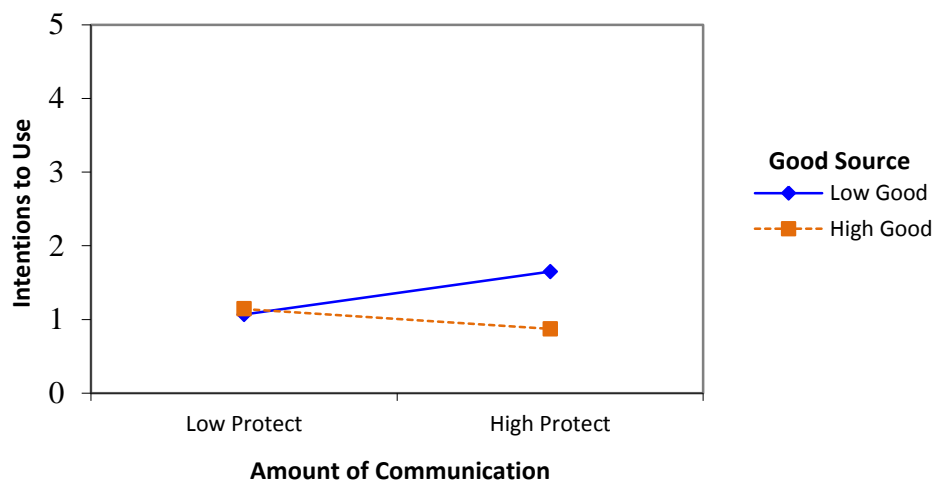
**Figure 7.** Interaction between Communication about Side Effects and whether Adolescents Would Go to Parents Predicting Intentions to Use AS



### Specific Aim 3a

Does the affect of communication about protective factors on intentions to use anabolic steroids vary as a function of how good of a source of information parents are perceived to be? A multiple regression analysis was run where intentions to use AS were regressed onto past NS use, communication about protective factors, how good of a source of information parents were perceived to be and the protective effects-good information source interaction. Results of the analysis showed that NS use was a statistically significant predictor of intentions ( $b = 0.11, p < .05$ ). Communication about protective factors was also a statistically significant predictor of intentions, but this was qualified by a statistically significant interaction ( $b = -0.15, p < .01$ ; Adjusted  $R^2 = 0.08, p < .01$ ). The nature of the interaction indicated for adolescents who failed to perceive their parents as good sources of information that more extensive communication about protective factors was associated with greater intentions to use. However, for adolescents who perceived their parents to be good sources of information, more extensive communication about protective factors was associated with lower intentions to use AS. The nature of this interaction is shown below in Figure 8.

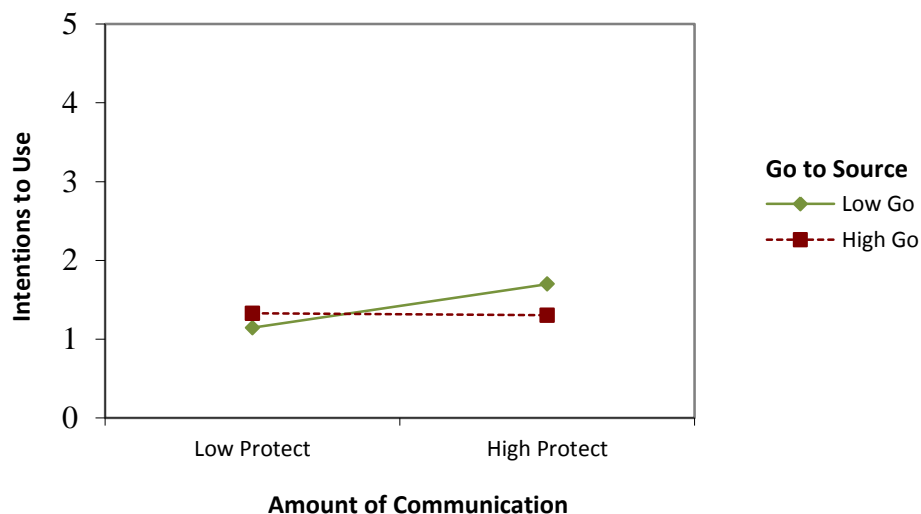
**Figure 8.** *Interaction between Communication about Protective Effects and Quality of Information Provided by Parents Predicting Intentions to Use AS*



### Specific Aim 3b

Does the affect of communication about protective factors on intentions to use anabolic steroids vary as a function of whether the adolescent would go to their parents for information? A multiple regression analysis was run where intentions to use AS were regressed onto communication about protective factors, whether the adolescent would go to parents for information, past use of a supplement and the go - protective factors interaction. Past use of a NS ( $b = -0.13, p < .01$ ) was a statistically significant predictor of intentions to use AS. Communication about protective effects was also a statistically significant predictor, but the effect was qualified by a significant go - protective effects interaction ( $b = -0.08, p < .05$ ; Adjusted  $R^2 = 0.04, p < .01$ ). The interaction indicated that more extensive communication about protective effects was associated with lower intentions to use AS, but the decrease was greater for adolescents who reported they would go to their parents than for adolescents who would not go to their parents for information. The nature of this interaction is shown in Figure 9.

**Figure 9.** Interaction between Communication about Protective Factors and whether Adolescents Would Go to Parents Predicting Intentions to Use AS



## Performance Enhancing Nutritional Supplements

### Specific Aims 4a-6b

Does the affect of communication (about performance effects, side effects and protective factors) on intentions to use performance enhancing nutritional supplements vary as a function of source characteristics? A series of multiple regression analyses were run to test the study aims, but none of the interactions reached statistical significance using the modified bonferroni adjusted p-values.

### **Ancillary Analysis**

Because there were only main effects of communication on intentions to use NS, a supplemental analysis was run to investigate which aspects of communication were the strongest predictors of intentions to use NS when considering all aspects of communication simultaneously. In this analysis, intentions to use a NS were regressed onto NS use, communication about performance effects, side effects and protective factors. Results of the analysis indicated that past NS use ( $b = 0.84, p < .01$ ), communication about performance effects ( $b = 0.59, p < .01$ ) and communication about protective factors ( $b = -0.22, p < .05$ ) were statistically significant predictors of intentions to use a NS in the future. Inspection of the standardized betas showed that communication about performance effects ( $\beta = 0.16, p < .01$ ) and protective factors ( $\beta = -0.13, p < .01$ ) were about equivalent in their ability to predict intentions to use a NS. The Adjusted  $R^2 = 0.49, p < .01$ .

### **Conclusion**

Overall, adolescents report relatively low levels of communication with their parents about the topic of AS and NS, yet adolescents generally report their parents to be relatively good sources of information and report they would generally consult parents for this information. There were some differences with respect to how girls and boys perceived their parents as information sources whereby girls reported their parents would give somewhat better information about AS than did boys. Girls also reported a greater tendency to go to their parents for information about AS and NS than did boys.

Results of this study suggest that increasing communication about AS, which involves information about performance effects, side effects and protective factors, will not necessarily lead to increases in intentions to use AS when adolescents perceive their parents to be good sources of information and are willing to consult parents for this information. However, results also indicate that increasing communication about AS could lead to increases in intentions to use AS for adolescents who do not perceive their parents to be good and who are reluctant to go to their parents for this information.

With respect to use of NS, discussions about performance effects were associated with greater intentions to use whereas discussions about protective factors were associated with lower intentions to use NS. In the present sample, discussions about side effects of NS use were not associated intentions to use NS in the future.

### **Limitations**

There are several limitations of the current study that should be mentioned. One such limitation is that the primary outcome variables in the study were intentions to use AS and NS, and not use of AS and NS.

In addition, the sample relied on a convenience sample of adolescent-athletes from the US. While the sports represented in the sample are popular in the US, they do not reflect all

sports in the US and nor do they reflect the most popular sports in other countries. Therefore, generalizing these results to other nations and sporting contexts must be done with caution.

Finally, the study was correlational, so inferences about causal relationships should not be drawn. For example, while it is proposed herein that parent-adolescent communication can lead to changes in intentions to use NS, it is also plausible that an adolescent's intentions to use or not use NS leads him/her to consult information from parents that is consistent with this view. That is, an adolescent who does not intend to use NS in the future might go to his/her parents and ask about ways to turn down offers (i.e., protective factors). However, the interpretation of the results presented herein is consistent theoretical frameworks on persuasive communications and with a large body of research showing that communication can indeed lead to changes in attitudes, intentions and behavior (Albarracín, McNatt, Klein, Ho, Mitchell & Kumkale, 2003; Chaiken, 1980; Wilson & Sherrell, 1993).

### **Directions for Future Research**

Despite the limitations outlined above, the present study provides a number of important directions for future research. Although the present study did not test the effect of parent-adolescent communication on actual use of AS and NS, studies have established that intentions are associated with behavior change (Dodge & Jaccard, 2007; Webb & Sheeran, 2006). Therefore the results of this study suggest parent-adolescent communication might be a useful approach to preventing AS and NS use. These data support the development and testing of an intervention that improves parent-adolescent communication about AS and NS use. A project that develops and tests improvements in parent-adolescent communication would be advantageous for two reasons. It would provide the opportunity to evaluate the effectiveness of a parent-based program on intentions and behavior, and it would also provide a test of the causal link between parent-adolescent communication and use of AS and NS.

Adolescent-athletes appear to perceive their parents as relatively good sources of information and are generally open to going to their parents for this information. Given that communication can protect against intentions to use AS when adolescents perceive parents to be good sources of information and are willing to go to parents for such information, future research should identify ways of improving adolescents' perceptions of their parents as sources of information regarding AS.

These data indicate that the overall levels of communication about the topics of AS and NS use are relatively low. Future research should examine what types of barriers exist with respect to parent-adolescent communication about AS and NS use. Identifying such barriers will provide important insights for the development of parent-based programs to prevent AS and NS use.

Interestingly, for the present sample, when parents were viewed as good sources of information and when adolescents would go to parents for information about AS,



communication about performance effects of AS did not lead to large increases in adolescent athletes' reported intentions to use AS. This suggests the design of parent-based prevention programs targeting AS that include information about the potential performance gains associated with AS will not necessarily increase the likelihood adolescents will want to use AS. The approach of developing two-sided communications that include information about performance effects in addition to information about side effects and protective factors might lead adolescents to perceive their parents as being more credible. Future research is needed to further support the use of two-sided communications and to investigate whether such communications about AS lead adolescents to perceive their parents to be more credible than adolescents who receive only a one-sided communication about AS.

### **Implications for Building Programs**

Results of the present study provide a number of implications for building parent-based AS and NS prevention programs. These data indicate that when building parent-based AS prevention programs the following should be kept in mind:

- Information about performance effects, side effects and protective factors are important to incorporate.
- Adolescent athletes must perceive their parents to be good sources of information and must be willing to go to their parents for information to lead to lower intentions of using AS.
- For adolescent athletes who do not perceive their parents to be good sources of information or who are unwilling to go to their parents for information, improving communication about AS may lead to greater risk for using AS.

With respect to building parent-based NS prevention programs, the present data suggest:

- Increasing parent-adolescent communication about performance effects of NS use is associated with higher intentions to use NS in the future.
- Increasing parent-adolescent communication about protective factors is associated with lower intentions to use NS in the future.
- Including information about side effects of NS in parent-adolescent communications is not associated with adolescents' intentions to use NS in the future.

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