

Bullying Victimization as a Predictor of Anabolic-Androgenic
Steroid Abuse in a Nationally Representative Sample of Adolescent Males

by

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Abstract

Due to their potential for negative physical, psychological, and social effects, both anabolic-androgenic steroid (AAS) misuse and bullying victimization are significant public health concerns confronting U.S. adolescent males. Previous research examining the link between bullying victimization and AAS abuse has been limited and most studies have had insufficient sample sizes to detect low base rate risks such as AAS abuse. The current study examined whether 1) bullying victimization on school property or 2) electronic bullying victimization was associated with increased risk of AAS misuse in adolescent males. Our study utilized a nationally representative sample drawn from the CDC's 2015 National Youth Risk Behavior Surveillance Survey (YRBS). Participants included 7,749 adolescent males in 9th-12th grade in U.S. public and private schools. Logistic regression analyses revealed a significant relationship between steroid misuse and bullying victimization, both in school and electronically. Specifically, post-hoc Chi-square analyses found that participants were 2.44 times more likely to misuse steroids if they reported school bullying victimization and were 3.91 times more likely to misuse steroids if they reported electronic bullying victimization. This is the first study with a nationally representative sample large enough to establish a link between a history of having been bullied and misuse of AAS. These results suggest the need for the development and evaluation of interventions to prevent bullying and to prevent steroid abuse. Future research should further investigate the link between bullying or teasing victimization, specifically about physical appearance, and AAS abuse.

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Bullying Victimization as a Predictor of Anabolic-Androgenic
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Bullying is defined as an intentional, repeated form of aggressive behavior or harm doing against peers resulting in an inequity of power (Wolke & Lereya, 2015). Lifetime prevalence of bullying victimization in childhood and adolescence is estimated to be 20.8-33% (Lanning, 2007; Lessne & Yanez, 2016; U.S. Department of Education, 2015). Bullying can take place directly as physical or verbal acts of aggression or indirectly through social exclusion or spreading rumors (Wolke & Lereya, 2015). Further, bullying by adolescents can fall into a more traditional form of interpersonal aggression such as calling other students names or physically assaulting them on school property. The development and advancement of the internet permits modern-day bullying to take the form of public aggression via social media such as Instagram and Snapchat, which can often be accomplished anonymously. Bullying is a major public health concern due to its potential to inflict physical, psychological, and social harm on victims (Hawker & Boulton, 2000; Hemphill, Tollit & Herrenkohl, 2014; Wang, Iannotti, & Nansel, 2009; Wolke & Lereya, 2015; Zwierzynska, Wolke, & Lereya, 2013).

Traditional bullying can take place in a variety of locations although the most prevalent location is a school setting (Nansel et al., 2001). This project will focus specifically on bullying that occurs at the high school level. Current estimates of the prevalence rate for high school students reporting victimization ranges from 20-55% (Center for Disease Control and Prevention [CDC], 2016a; Gan, Zhong, Das, Gan, & Tully, 2014). Bullying occurs in school settings when perpetrators seek to abuse power and establish a hierarchy to gain social status above their victims; it can also occur in settings where victims do not get to pick their social surrounding (Wolke & Lereya, 2015). The latter is often the case in high schools, as students do not decide

which peers they will have in their classes, which can result in feelings of confinement (Wolke & Lereya, 2015). In addition to settings with high prevalence of bullying, there are also certain populations who are at higher risk of victimization.

Gender Comparisons of Bullying. Gender differences are pertinent in the discussion of bullying perpetration and victimization. Overall, males have been found to be perpetrators and victims more often than females; this renders boys and men more likely to experience negative effects from sequelae of bullying victimization (Farrington, 1993; Wang et al., 2009). One possible reason why males perpetrate more often is due to the established social norm for males to be aggressive and display dominance over others (Lagerspetz, Bjorkqvist, & Peltonen, 1988). Since the principal motive of bullying is to create a hierarchy of power, males may be socially primed to bully more often as an attempt to assert dominance over others. Additionally, research has found that males and females perceive bullying behaviors differently based on their gender. Athanasiades and Deliyanni-Kouimtzi (2010) investigated how males and females interpret bullying differently and found that males typically attempted to justify their bullying as a joke. Further, males tended to not recognize the negative effects that bullying would have on their victim. This is in contrast to females, who focused on the negative effects and expressed disapproval of bullying (Athanasiades & Deliyanni-Kouimtzi, 2010). These results suggest that males may bully more often due to their interpretation of the act as being harmless. Finally, physical differences between males and females could account for gender differences. In men, high levels of the sex-hormone testosterone are associated with behavior intended to gain dominance over others (Mazur & Booth, 1998). The act of bullying could be externalization of the drive for dominance, resulting in engagement in aggressive behavior with the intention of

gaining social status over others. This is especially relevant for adolescent males, as during puberty the presence of testosterone in the body increases substantially.

Although males are prone to perpetration more often than females, females are also capable of victimizing others. When males bully others, they tend to do so directly and physically; on the other hand, females tend to utilize psychological bullying on their victims, indirectly harming them by damaging their relationships through gossip, exclusion, or name-calling (Farrington, 1993; Felix & McMahon, 2008; Olweus, 1978; Wang et al., 2009). While past research has demonstrated that males are more likely to be involved in bullying, both genders can be involved in the act of perpetration, victimization, or both.

Theories of Bullying. There are theoretical frameworks that clarify why bullying perpetration occurs. As previously stated, the central motive for bullying is the creation of a hierarchical imbalance of power. Bullying is a pervasive form of aggressive behavior that can take place in many social settings, regardless of cultural or geographical context; even non-human animals have been observed engaging in bullying behavior as a means of achieving dominance (Archer, 1988). From an evolutionary psychology perspective, bullying may be an evolutionary adaptation that aids in obtaining individual- and group-based benefits (Volk, Camilleri, Dane, & Marini, 2012). One example of a gained benefit is the preservation of one's genes through reproduction. Perpetration can prove to be useful in achieving this as bullying has been found to be positively correlated with increased sexual activity, which in turn translates to increased opportunities for reproduction (Volk, Dane, Marini, & Vaillancourt, 2015). Contrary to the more recent view of bullying as an adaptive behavior, perpetration has historically been regarded as maladaptive behavior resulting from the projection of one's own negative feelings unto others.

According to the compensation model of aggression, bullying occurs due to a perpetrator's own dormant feelings of vulnerability, weakness, and self-doubt (Nail, Simon, Bihm, & Beasley, 2016; Staub, 1989). This theory posits that bullies are attempting to defend against their own negative feelings through the intimidation of their peers. Bandura's (1978) social learning theory can be utilized to explain the aggressive behavior between perpetrator and bullying. According to this theory, acquisition and expression of aggressive behavior is due to learning by observing and imitating others. Children bully others because they witness the reinforcement received by others who engage in aggressive behavior. For example, if a student were to observe a peer intimidating another for their money and the perpetrator won control by hitting the victim, then they have been rewarded for the aggression by gaining the money. Thus, the aggressive behavior of the perpetrator has been reinforced for the observer, which may lead to imitation of the aggressive behavior. Desire to imitate this aggression may lead to individuals utilizing modern technology to victimize their peers. Advancements in technology now allow children and adolescents who bully others to model aggressive behaviors to a much larger audience of their peers.

Electronic Bullying. A combination of modern technology along with the internet and social media serve as a medium for facilitating peer victimization of others. Cyberbullying, also known as electronic bullying, is defined as bullying occurring through the use of technology (Kowalski, Limber, & Agatston, 2012). Bullying that takes place over social media, e-mail, online games, text messages, and other electronic means of communication all fall under this definition. As compared to traditional, schoolyard bullying, electronic bullying is especially troubling due to several factors at play in the bully-victim power dynamic. As a result of widespread social media use, the prevalence of bullying perpetration through media has increased because of modern-day technology such as computers and smart phones. Patchin and Hinduja (2006) found that more

than 29% of adolescents have reported being victimized online, and more than 47% have witnessed electronic bullying. Advancements in technology and social media have made the act of bullying substantially easier to accomplish.

The high prevalence of electronic bullying in contemporary society can be attributed to several factors. The potential anonymity that online bullying gives a perpetrator makes them less likely to be caught in the act and confronted, thus making it easier to aggress against others without consequences to themselves. Further, this anonymity that perpetrators have may result in them saying things online that they would not say when face-to-face with their victim. Second, electronic bullying can take place at any time, as opposed to traditional bullying which occurs in a school setting during the school day (Nansel et al., 2001). Since it is relatively easy to contact someone via smartphones and computers, this means perpetration can be committed straightforwardly. Finally, a large proportion of adolescents utilize social media. Lenhart et al. (2011) found that 95% of 12-17-year-old adolescents report using the internet. The vast number of individuals who use social media may increase the likelihood that adolescents will be affected by this form of interpersonal aggression in modern culture. Moreover, this may also translate into a large audience for witnessing bullying. Relative to traditional bullying, this larger online audience may cause victims more stress because they know that other peers have seen them publicly criticized. Thus, cyberbullying can serve as a double assault. This may be why these victims have higher chances of experiencing externalizing symptoms such as aggression and lower levels of peer self-esteem (Campfield, 2008).

Effects of Bullying Victimization. Bullying has the capability of resulting in a severe negative impact on adolescents both psychologically and socially. Bullied adolescents have lower life satisfaction and self-esteem, and higher social isolation as compared to bullied adults

(Tariq & Tayyab, 2011). Victimization is also associated with depression, low self-esteem, anxiety, poorer relationships with classmates, increased loneliness, and difficulty effectively making friends (Hawker & Boulton, 2000; Hemphill, Tollit & Herrenkohl, 2014; Wang et al., 2009; Zwierzynska et al., 2013). Victims also struggle with poor self-worth, lack of school engagement, and less academic achievement as compared to their non-bullied peers (Cho & Choi, 2017). The literature demonstrates that victimization has clear, negative psychological and social effects on adolescents. Further, the impact of bullying extends past the psychosocial realm into negative somatic effects. For example, victims have been found to be at higher risk for colds, headaches, problems with sleeping and have also been found to be more likely to begin habitual smoking (Wolke & Lereya, 2015). Victims are also at higher risk of self-harming, especially if they experienced frequent bullying (Fisher et al., 2012). Because the consequences of being victimized by bullying are significant, it is important to study the context in which it occurs with the ultimate public health goal of being able to reduce or eliminate this form of aggression.

Bullying Perpetrator Characteristics. Previous research has uncovered personality traits and characteristics that perpetrators of bullying share. Bullies tend to view violence positively (Lagerspetz, Bjorkqvist, Berts, & King, 1982; Olweus 1993, 2001a, b), be impulsive (Ahmed, Harris, Braithwaite, & Braithwaite, 2001; Berkowitz 1993), lack empathy (Olweus, 1993), and are prone to resorting to aggressive strategies when dealing with interpersonal problems (Slee, 1993). The link between personality traits and bullying also extends into the Big-Five Factor model of personality. The tendency to bully is associated with higher levels of Machiavellianism (Sutton & Keogh, 2000) and extraversion (Tani, Greenman, Schneider, & Fregoso, 2003), along with lower levels of agreeableness (Tani et al., 2003). Psychopathy, sadism, and psychoticism

have also been found to be related to bullying (Slee & Rigby, 1993; van Geel, Goemans, Toprak, & Vedder, 2017).

Parenting styles and family environment have a significant influence on the development of bullies. Children who bully others tend to have parents who employ either authoritarian, permissive, or indifferent styles of parenting (Baumrind, 1968; Kawabata, Alink, Tseng, van Ijzendoorn, & Crick, 2011; Lereya, Samara, & Wolke, 2013). Further, being physically disciplined by parents who use methods including punching, slapping, or the use of objects to beat their children is linked to children's aggression against others (Duong, Schwartz, Chang, Kelly, & Tom, 2009; Espelage, Bosworth, & Simon, 2000; Lereya et al., 2013). Finally, Duncan (2011) found that bullies' family environment usually has little warmth, low cohesion, high power needs, acceptance of aggressive behavior, and they often have absent fathers.

Additional individual and contextual risk factors beyond the family environment are associated with increased bullying. Individual risk factors such as having more friends (Wang et al., 2009), being raised in low socioeconomic status (Harachi et al., 2006), and engaging in a pattern of aggressive, disruptive, noncompliant, and other defiant behaviors are associated with increased perpetration (Cook, Williams, Guerra, Kim, & Sadek, 2010). The peer group that individuals are a part of is also relevant; negative peer influences, such as deviant peer group affiliations and reinforcement for inappropriate behaviors, have been found to be predictive of involvement in bullying (Cook et al., 2010). Furthermore, the type of school setting that children are in is germane to perpetration. An unsupportive, negative, and unhealthy school environment has been found to be conducive to high levels of bullying (Kasen, Johnson, Chen, Crawford, & Cohen, 2011). Holt, Keyes, and Koenig (2010) found that a climate where adults in the school system ignore bullying or undermine the seriousness of it is associated with higher levels of

bullying. Identifying both individual and contextual risk factors may help professionals be able to identify those at higher risk of becoming involved in bullying.

Preventive and Protective Factors of Victimization. Modifiable protective factors are significant in the efforts to prevent bullying from taking place. Wang et al. (2009) found that having more friends is associated with less victimization for physical, verbal, and relational bullying. Sterzing (2012) showed that sexual minority youth with higher levels of classmate support and positive school climate experienced lower victimization. Further, eating breakfast every day, playing on sports teams, being physically active, along with sibling support is associated with lower levels of victimization (Cluver, Bowes, & Gardner, 2010; Merrill & Hanson, 2016).

Understanding mitigating factors that protect victims from the adverse, long-term impact of bullying are important for the development of interventions to help those who have been targeted by bullying. The presence of more friends is not only beneficial regarding less victimization but can also be helpful in reducing the impact of bullying. For example, social support by a similar, vulnerable group, has been shown to be a protective factor for LGBTQ and overweight victims (Eisenberg, McMorris, Gower, & Chatterjee, 2016). Bullies seem to prey on individuals who appear to be more socially isolated. Conversely, individuals in a similar vulnerable group are more likely to stand up and support their fellow friends in potential bullying situation. In addition to social support, achieving high academic performance and developing coping strategies for stress have been associated with reduced depressive symptoms for young adults who were victims as adolescents (Hemphill, Tollit & Herrenkohl, 2014). Increased levels of problem-solving coping skills are also a protective factor against being a victim of bullying (Baldry &

Farrington, 2005). Efforts to teach coping strategies to victims in order to reduce adverse sequelae from bullying seem in line with the above findings.

There has been extensive empirical research covering major areas of bullying perpetration and victimization including but not limited to those stated here. As a public health matter, bullying warrants significant research due to its significant impact on all individuals involved, particularly adolescents. Anabolic-androgenic steroid misuse is another public health concern that has implications on the U.S. adolescent population and is likely linked with bullying.

Anabolic-Androgenic Steroids

Anabolic-androgenic steroids (AAS) are synthetic derivatives of the male sex hormone testosterone (Pope & Brower, 2009). AAS promote the development of male sexual characteristics, as well as the growth of muscle, by increasing protein synthesis. AAS are legally prescribed to induce puberty and stimulate muscle growth for treatment of conditions in which there is low production of testosterone or muscle atrophy (Bagatell & Bremner, 1996; Bhasin et al., 2000; Bhasin et al., 2010). The issue of nonmedical AAS misuse without prescription has remained a steadily documented public health concern throughout the years.

The prevalence of steroid misuse for male U.S. high school students has been estimated to range from 2.6%-11% (American Academy of Pediatrics Committee on Sports Medicine and Fitness, 1997; Bahrke, Yesalis, Kopstein, & Stephens, 2000; Buckley et al., 1988; Durant, Escobedo, & Heath, 1995; Elkins, King, Nabors, & Vidourek, 2017; Scott, Wagner, & Barlow, 1996; Tahtamouni et al., 2008; Terney & McLain, 1990; Yesalis, Barsukiewicz, Kopstein, & Bahrke, 1997). AAS abuse has been found to be more prevalent among males as compared to females (Bahrke et al., 2000; Buckley et al., 1988; DuRant et al., 1995; Elkins et al., 2017; Irving, Wall, Neumark-Sztainer, & Story, 2002). Moreover, research has found adolescence to be

the prime time for males to begin experimenting with AAS use, with almost one-third of users beginning use before the age of 15 (Bahrke et al., 2000; Blashill & Safren, 2014; Buckley et al., 1988; Elkins et al., 2017; Parkinson, & Evans, 2006; Tahtamouni et al., 2008). Steroid misuse has received concern from the public for many years due to its widespread prevalence alongside health risks associated with usage.

AAS can be administered either orally or by injection directly into muscle tissue (Smith & Perry, 1992). Recreational users prefer the injectable version of AAS as it ensures a high dose being delivered directly to chosen muscle, though it can be taken by mouth if an individual expects drug testing, as it is cleared more rapidly from the body (American Academy of Pediatrics Committee on Sports Medicine and Fitness, 1997). Nonetheless, a significant portion of users take AAS by intramuscular injection and this increases their risk of transmitting infectious diseases including HIV or hepatitis if they practice risky injection behaviors (Ip, Yadao, Shah, & Lau, 2016). DuRant, Rickert, Ashworth, Newman, and Slavens (1993) conducted a study with ninth-grade male and female students and examined the use of multiple drugs along with AAS misuse and the percentage that reported sharing needles if they used injectable drugs. They found that almost 25% of participants who reported using AAS also reported sharing needles. These results demonstrate that users underestimate the risk of HIV transmission, possibly because they judge the individuals they share needles with as people who are not “real” drug users (i.e., heroin users; DuRant et al., 1993). Moreover, Al-Falasi et al. (2008) found that 59% of members in 18 gyms, who were not necessarily athletes, believed the benefits of using AAS outweigh the risks. Kimergård (2014) conducted a qualitative study of gym goers who used AAS and found that users generally did not express anxiety over possible side effects because they hear of other users also minimize the side effects. By seeking the

advice of peers, in conjunction with their own personal opinion, users viewed the harms of AAS to be manageable and thus considered AAS safe to consume (Kimergård, 2014). The findings of these studies support the belief that recreational users of AAS are ready to abuse steroids to obtain their benefits regardless of potential harmful side effects and health risks.

Users of AAS may manipulate their intake into one of several patterns. “Stacking” involves the simultaneous use of two or more types of steroids, while “pyramiding” means increasing dosage and/or frequency of steroid intake at routine intervals. “Cycling” involves taking doses of steroids for a period of time, stopping for a certain time length, then restarting. In addition to participating in different intake patterns, people who abuse steroids take well above the therapeutic dosage; past literature has documented some users reporting using upwards of 10 to 50 times the medical dosage (Goodman, Gilman, Hardman, Gilman, & Limbird, 1996; Perry, Andersen, & Yates, 1990; Swonger & Matejski, 1998). Individuals who abuse high dosage AAS in certain intake patterns do so because they believe they can maximize drug effects while also minimizing side effects, though there is a lack of research that proves this to be true (Committee on Sports Medicine and Fitness, 1997).

Motive for AAS Abuse. In contemporary society, some people are willing to take great risk to excel in sports and perform their jobs better. Additionally, our modern society places great value on beauty and, as a result, physical appearance is paramount to people. Evolutionary psychology scholarship suggests that humans’ preference for beautiful individuals is hard wired and that even infants prefer attractive over unattractive faces (Langlois et al., 2000), regardless of cultural biases about beauty and appearance. Thus, the consumption of performance enhancing drugs, including anabolic steroids, is a choice some individuals make in order to achieve societal expectations of physical appearance.

The main motive behind misusing AAS is the alteration one's physical appearance through increasing muscle mass. This alteration can be for either performance reasons, which is indicated in athlete users of AAS, or for appearance concerns, which is the case for non-athlete users. Most non-athlete individuals who abuse AAS do so because of body image concerns including low self-esteem about their appearance (Kanayama, Pope, Cohane & Hudson, 2003), dissatisfaction with their body type (Blashill & Safren, 2014; Blouin & Goldfield, 1995), and a desire for improved looks (Blouin & Goldfield, 1995; Jampel, Murray, Griffiths & Blashill, 2016). The act of misusing steroids in spite of health risks demonstrates the strides some individuals are willing to take in order to achieve their goal of improved physical appearance.

Adolescent athletes may consume performance-enhancing substances such as AAS in order to enhance physical or athletic performance (Dodge & Clarke, 2015; Miller, Barnes, Sabo, Melnick, & Farrell, 2002). A meta-analysis by Diehl et al. (2012) found that adolescent athletes were at higher risk of steroid misuse than non-athletes. Additionally, researchers found that adolescent athletes in strength training and weight-dependent sports were more likely to consume steroids relative to athletes involved in other kinds of sports (Diehl et al., 2012). It is important to keep in mind that excellent performance in sports can carry incentives, such as university scholarships. Some adolescents may consume AAS in order to become stronger, thereby improving performance in their respective sports in order to achieve these rewards (Martens, 2017). Although historically AAS has been associated with competitive and recreational athletics, at least four out of five users are not competitive athletes, but instead utilize AAS to gain what they perceive to be an improved appearance in anticipation of self-esteem and interpersonal rewards (Blouin & Goldfield, 1995; Sagoe, Molde, Andreassen, Torsheim, & Pallesen, 2014).

Risk Factors for AAS Abuse. While improved physical appearance and performance are prime motives for use of AAS, there are several risk factors for AAS abuse that are not related to self-perceived body image. Adolescents who abuse AAS are more likely to misuse other drugs including alcohol and tobacco (Bahrke et al., 2000; Durant et al., 1995), and be student athletes (Bahrke et al., 2000). A study done by Tahtamouni et al. (2008) found prevalence of AAS misuse to be 26% among athletes, while a literature review by Hall and Hall (2005) found that one in five American athletes use a form of AAS. Frison, Vandebosch, and Eggermont (2013) found that exposure to certain fitness and appearance-focused media is associated with intent to use AAS in adolescent males. These studies indicate that dissatisfaction with self-perceived appearance or performance are not the sole risk factors prompting abuse of steroids.

As previously mentioned, males are more likely to misuse steroids compared to females (Bahrke et al., 2000; Buckley et al., 1988; DuRant et al., 1995; Elkins et al., 2017; Irving et al., 2002). More specifically, males who identify as a sexual minority such as gay or bisexual are at higher risk of AAS abuse (Blashill, Calzo, Griffiths & Murray, 2017), and bullying victimization (O'Malley Olsen, Kann, Vivolo-Kantor, Kinchen, & McManus, 2014). Sexual minority males have been found to experience higher body dissatisfaction compared to heterosexual males, which in turn places them at higher risk of steroid abuse because body dissatisfaction has been found to be a predictor of misuse (Blashill & Safren, 2014; Blouin & Goldfield, 1995; Peplau et al., 2009).

Objectification theory could potentially explain why up to 32% of sexual minority men experience body dissatisfaction (Peplau et al., 2009). Objectification theory posits that heterosexual women are acculturated to internalize how others view their bodies as the principal

view of how they view themselves (Fredrickson & Roberts, 1997). Sexual minority men have been found to share similar body image issues as heterosexual women, thus this theory can be applicable to them as well (Beren, Hayden, Wilfley, & Grilo, 1996). Sexual minority men and heterosexual women may internalize this perspective of appearance values that would attract a male partner. Since men have been found to place a strong emphasis on physical appearance regardless of sexual orientation (Feingold, 1990; Stroebe, Insko, Thompson, & Layton, 1971), sexual minority men are expected to achieve a lean, muscular appearance as a result of the internalization of other males' views. Further, this internalization leads to frequent monitoring of one's body and assessment of how it looks, which then may lead to body dissatisfaction if their body is perceived as discrepant from their internalized ideal body image (Blashill et al., 2016).

Side Effects of Abuse. Although users of AAS do so because of perceived benefits such as improved body strength and increased body mass, many overlook the risky side effects resulting from the drug (Al-Falasi et al., 2008; DuRant et al., 1993; Kimergård, 2014). With the misuse of AAS comes the risk of side effects; while some are general to any user, others are gender specific. Males may experience development of breasts, testicular atrophy, and reduced fertility and impotence (Gober, McCabe, & Klein, 2006; Mazzeo & Ascione, 2013). Women are at risk of excessive facial hair growth, deepening of voice, menstrual irregularities and male pattern baldness (Gober et al., 2006; Mazzeo & Ascione, 2013). Somatic side effects general to both male and female users include increased risk of cardiovascular problems such as myocardial infarction, strokes, and hypertension, and increased risk for liver problems including tumors, jaundice and liver cancer (George, 2003; Hoffman & Ratamess, 2006; Mazzeo & Ascione, 2013). Psychological and behavioral side effects are also evident with the use of AAS, such as increased aggressiveness and irritability, mood swings, and increases in psychotic episodes

(a.k.a., “Roid rage”; George, 2003; Hoffman & Ratamess, 2006; Pope & Katz, 1994; Silvester, 1995). As compared to other age groups of users, adolescents are at risk for stunted height or stunted growth, dependent on whether they commence AAS misuse before or during their growth spurt (George, 2003; Mazzeo & Ascione, 2013). Side effects of AAS abuse continue even after discontinuation of use. For example, depression can accompany withdrawal from use especially if an individual has become dependent upon the substance (George, 2003; Gober et al., 2006).

Bullying and AAS

As separate topics of studies, both bullying and AAS abuse have accumulated considerable attention. However, there is a dearth of research regarding the possible association between the two, as well as the risk factors that could mediate between having been bullied and abuse of AAS. One possible mediator is mental illness.

Body dysmorphic disorder (BDD) is a psychological disorder characterized by excessive preoccupation with perceived defects in one’s physical appearance that are either nonexistent or slight and exaggerated (American Psychiatric Association, 2013). An afflicted individual’s concern about body image is associated with rituals such as comparing their own body or body parts to other people, or mirror gazing (Mufaddel, Osman, Almagaddam, & Jafferany, 2013). BDD usually originates early in adolescence; one study by Dyl, Kittler, Phillips, and Hunt (2006) found that 6.7% of adolescent inpatients met DSM-IV criteria for definite or probable BDD (Phillips & Diaz, 1997). DSM-V data predicts the prevalence rate of BDD in U.S. males to be 2.5% (American Psychiatric Association, 2013). Individuals with BDD suffer from a distorted body image, which may result from bullying during adolescence (Mufaddel et al., 2013). When bullying involves teasing about a physical trait, victims could become hyper focused on the trait

that they are harassed about. This hypersensitivity could lead to BDD due to distortion of perceived body image, resulting in body dissatisfaction or low self-esteem, which are prime motives for AAS misuse (Blashill & Safren, 2014; Blouin & Goldfield, 1995; Kanayama et al., 2003). Further, lowered self-esteem has been found to be a potential result of bully victimization as well as a predictor for AAS misuse.

Another possible mediator between bullying and AAS is the Adonis complex, a collective term referring to a variety of body image concerns prevalent in modern society specific to males. The overarching theme consistent in all males affected by the Adonis complex is poor or negative body image. The ideal male body image has become so extreme in recent years that it has become increasingly more difficult for boys and men to achieve. Pope, Olivardia, Gruber, and Borowiecki (1999) studied male body image by analyzing action toys and found that each generation of male action figures is more muscular than their predecessor to the point that the look is not humanly achievable. The findings of Pope et al. (1999) demonstrate that this ideal appears to influence males as young as in childhood. Such influences could be why 95% of American male report the desire to be more muscular (Murray et al., 2012).

The prime motive driving AAS abuse in adolescent males can also be categorized as a facet of the Adonis complex. As previously stated, individuals misuse steroids in order to alter their physical appearance by increasing muscle mass. It can be reasoned that adolescents are consuming appearance- and performance-enhancing drugs in order to combat the negative body image concerns perpetuated by the Adonis complex in our modern society. These feelings of dissatisfaction can be exacerbated by bullying. Many perpetrators of bullying chose to attack their victims by making fun of particular aspects of their physical appearance; in fact, research has linked weight-based stigmatization with peer victimization (Gray, Kahhan, & David, 2009;

Strauss & Pollack, 2003). Bullying could leave some victims feeling small and powerless, thus enhancing an Adonis complex and leading to illicit AAS use as a potential remedy.

Lastly, it has been well established that negative psychological effects such as depressive symptoms or diagnosable major depression can arise due to bullying victimization. Interestingly, Blashill (2014) found that depressive symptoms and victimization are mediators in the relationship between self-perceived underweight status and AAS misuse among adolescent males (Hawker & Boulton, 2000; Tariq & Tayyab, 2011; Zwierzynska et al., 2013). Blashill (2014) also found that boys who perceive themselves as underweight report higher levels of bullying victimization, while self-perceived underweight status along with body image dissatisfaction has also been found to be associated with AAS misuse (Blashill & Safren, 2014; Jampel et al., 2016; Kanayama et al., 2003; Parkinson & Evans, 2006). Thus, the literature has found associations between being a victim of bullying and body image dissatisfaction and a link between body dissatisfaction and AAS. The current study will examine if there is a direct association between having been bullied and use of AAS.

Research has documented the widespread prevalence and health risks of bullying victimization, especially in school settings, and there is ample research documenting the harmful somatic and psychological effects of steroid abuse. Thus, we believe that studying whether there is a possible association between bullying victimization and AAS is an important research endeavor due to the public health implications for adolescent males.

Present Study

To our knowledge, there have been no studies exploring the link between traditional schoolyard bullying victimization, electronic bullying victimization, and steroid misuse. Through the current study, we hope to expand on the current literature and investigate the possible link

between the variables. This study improves upon previous research because that we have a large nationally representative sample of adolescents in public and private schools in the U.S. providing us with heightened statistical test sensitivity. This enhanced statistical power allows us to detect relationships between low prevalence behavioral risks such as the percentage of individuals who have misused steroids and the prevalence of those who have been victims of bullying.

The Youth Risk Behavior Surveillance Survey (YRBS) is a biennial survey conducted by the Centers for Disease Control and Prevention in the U.S; the survey is a national, school-based survey developed in 1990 in order to monitor health risk behaviors among adolescents and young adults in the United States (CDC, 2016a). The YRBS utilizes a national, school-based population of 9th-12th grade students in both public and private schools. By using a national school population, the data collected by the YRBS is representative of high school students throughout the United States. Our current study will utilize data from the results of the 2015 national YRBS that contained items about bullying victimization and AAS. Our study will examine the relationship between bullying victimization and AAS abuse. Specifically, we will investigate whether or not being a victim of bullying is a significant predictor for the misuse of AAS.

Hypothesis

We hypothesized that male adolescents who report bullying victimization either on school property or electronically will be at higher risk of taking AAS pills or injections that have not been prescribed by a medical doctor.

Method

Participants

For the purposes of our study we focused on male participant information from the 2015 national YRBS. The demographic information of male participants was obtained based on two weighted variables, grade level and race/ethnicity. Of the 15,624 total participants in the sampling frame, 7,749 were male. The majority of participants were between the ages of 14 and 18 years old or older (10% 14 years old, 24.3% 15 years old, 25.9% 16 years old, 24.5% 17 years old, and 14.9% 18 years old or older). Race/ethnic composition of participants was 44.5% White, 11% Black, 15.5% Hispanic, 18% multiple races where one race is Hispanic and 11% Other. “Other” consists of participants who identify as American Indian or Alaska Native, Asian, Native Hawaiian or Pacific Islander, or multiple race where one race is not Hispanic (CDC, 2016a). For detailed information on administration procedures and weighting of participant data, please refer to the June 10 issue of the CDC Morbidity and Mortality Weekly Report (CDC, 2016a). IRB exemption for our study was received on October 6, 2017 (IRB #18-0056; see Appendix).

Measure

The 2015 national YRBS questionnaire contains 99 questions including six demographic questions and three questions that assessed height, weight, and asthma. The remaining questions measured behaviors either practiced or experienced by participants (CDC, 2016a). Our study defined both the predictor variable of **Bullying victimization** and outcome variable of **Steroid use** through utilization of the questionnaire items on the 2015 national YRBS.

Bullying victimization. The YRBS defines bullying as, “when 1 or more students tease, threaten, spread rumors about, hit, shove, or hurt another student over and over again. It is not

bullying when 2 students of about the same strength or power argue or fight or tease each other in a friendly way” (CDC, 2016a). The questionnaire asks, “during the past 12 months, have you ever been bullied on school property,” to measure traditional victimization. It also asks participants if, “during the past 12 months, have you ever been electronically bullied? (Count being bullied through e-mail, chat rooms, instant messaging, websites, or texting.)” (CDC, 2016a). We constructed dichotomous variables for both forms of bullying victimization consisting of either **School bullying victimization** or **No victimization**, and **Electronic bullying victimization** or **No victimization**. If a participant reported being a victim of either bullying on school property or electronic bullying they were placed in the **Bullying victimization** category. If they did not report victimization of either category of bullying, they were present in the **No victimization** variable.

Steroid use. The YRBS has a question to measure steroid use in participants that asks, “During your life, how many times have you taken steroid pills or shots without a doctor's prescription?” (CDC, 2016a). If a participant reported no lifetime usage of steroid pills or never using steroid shots without a doctor’s prescription, they were counted in the **No steroid use** variable. If a participant reported ever having misused steroids, they were counted in the **Steroid use** variable.

YRBS Psychometrics

The CDC conducted a study in 2000 in order to examine the test-retest reliability of the national questionnaire (Brener et al., 2002). In the study, the 1999 questionnaire was administered on two separate occasions to a sample of 4,619 high school students. Although several items indicated significantly different prevalence rates at times of administration, overall results demonstrated reliable reporting of health risk behaviors over time (Brener et al., 2002).

Items that showed discrepancies in prevalence rates were revised or deleted from later versions of the national questionnaire. Brener, Collins, Kann, Warren, and Williams (1995) conducted an earlier study in a similar fashion to investigate the test-retest reliability of the 1991 national questionnaire. No significant differences were found between the prevalence rates at time 1 and time 2 of questionnaire administration. Both studies provide support for the reliability of the national YRBS questionnaire items.

Data Management

As stated previously, a statistical software package is required in order to analyze the results of the 2015 national YRBS. The ASCII zip file was obtained and downloaded from <https://www.cdc.gov/healthyyouth/data/yrbs/data.htm>. For further information on data management properties of the YRBS, refer to the 2015 YRBS Data User's Guide (CDC, 2016b).

Statistical Analyses

Analyses were carried out on the 2015 YRBS national data to investigate the prevalence of male adolescents who reported bullying victimization and steroid misuse. First, we determined the national base rate percentage of adolescent males for the predictor variables (**Electronic bullying victimization** and **School bullying victimization**) and outcome variable (**Steroid use** or **No steroid use**). We utilized a logistical regression analysis to determine the effect of **Electronic bullying victimization** and **School bullying victimization** as predictor variables on the dichotomy AAS. If a significant effect was discovered, the direct relationship between each predictor and the outcome using relative risk ratios was examined.

Results

Stage 1: Analysis of Variable Base Rates

In order to examine the hypothesis, first the base rate values for electronic victimization, school victimization, and steroid misuse were assessed. Analysis of base rate values yielded the following results. The prevalence of bullying in school for male participants was 15.5%.

Electronic bullying frequency was 9.4% among participants. Finally, the base rate of steroid misuse among participants was 4.5%. We utilized base rate percentages uncovered during our initial analyses to conduct further analyses in order to determine whether there was a significant relationship between our predictor and outcome variables.

Stage 2: Analysis Examining Association between Bullying Victimization and Steroid Misuse

Logistic regression examined how the predictor variables of bullying victimization were associated with the outcome variable of steroid abuse. Apart from testing for a significant association, analyses also produced relative risk ratios where a value over 1.0 indicated that participants who reported victimization were at an increased risk for steroid misuse. Conversely, a risk ratio below 1.0 indicated that individuals were at a lower risk for abusing steroids relative to those who reported no victimization. Logistic regression analyses disclosed a significant association between steroid misuse and electronic bullying victimization, $X^2(1, N = 7432) = 150.83, p < .001$. Participants who reported electronic victimization were also 3.91 times more likely to misuse steroids. School bullying victimization and steroid misuse were also found to have a significant relationship, $X^2(1, N = 7420) = 61.19, p < .001$. Participants that reported in-school bullying victimization were 2.44 times more likely to misuse steroids. See *Figure 1* for illustration of risk ratio outcomes in participants.

Discussion

The purpose of the current study was to explore the relationship between bullying victimization and anabolic-androgenic steroid misuse in adolescent males. Our study investigated this relationship in a nationally representative sample of adolescent males by utilizing results of the CDC's 2015 national YRBS. Results of the analyses supported our hypothesis that participants who reported bullying victimization would be at higher risk of abusing AAS. Because this data set was robust and weighted by the CDC, these results are generalizable to male adolescents nationwide in 2015. Further, because anabolic steroid abuse is a low percentage base rate, our sample size allotted us with ample statistical power to detect the relationship between bullying and misuse of these performance- and appearance-enhancing drugs. The percentage of males who reported misuse of anabolic steroids was 4.5%, which is consistent with previous research (American Academy of Pediatrics Committee on Sports Medicine and Fitness, 1997; Bahrke et al., 2000; Buckley et al., 1988; Durant et al., 1995; Elkins et al., 2017; Scott et al., 1996; Tahtamouni et al., 2008; Terney & McLain, 1990; Yesalis et al., 1997). Reports of in-school or traditional bullying were highest at 15.5%, and prevalence rates of those who reported being bullied electronically (i.e., "cyberbullied") were 9.4%. Participants who had been bullied in school had 2.44 times the use of anabolic steroids compared to those who had not endured bullying in school. Further, those who had been cyberbullied were nearly four (RR = 3.91) times more likely to also report misuse of anabolic steroids. Thus, although being a victim of online, cyberbullying is less common than traditional, in-school bullying victimization, it is a more powerful predictor of anabolic steroid misuse.

Although it could not be determined with this data set, we have some hypotheses as to why electronic bullying was 1.6 times a more powerful predictor of anabolic steroid abuse than

traditional in school bullying. The latter typically involves face-to-face contact so that the victim often can identify the perpetrator. Electronic bullying, on the other hand, can be conducted on social media anonymously, leaving the victim wondering who wishes them harm. Moreover, since cyberbullying is public, the victim can experience more breath of humiliation as bystanders witness the insults and aggression. Finally, electronic bullying can feature pictures or images of the victim that may accentuate their perceived flaws (e.g., pointed to skinny, non-muscular arms). Because this was a cross-sectional, epidemiological YRBS survey, we cannot determine if the associations between having been the victim of either form of bullying and reported use of anabolic steroids are linked in a causal fashion. If there is causality, it is more intuitive to reason that being bullied results in worsened self-esteem and worsened body image, which then leads to the drastic coping response of anabolic steroid abuse. It makes less sense that using anabolic steroids results in being more vulnerable to being bullied. However, future research will need to examine these risks using longitudinal designs to examine specific directional effects.

Additionally, future research could complete more in-depth studies of adolescent males or males further in adulthood to carefully assess the retrospective developmental events that triggered the drastic coping response of steroid misuse.

Implications

Our study indicates a significant relationship between bullying victimization and steroid misuse; these results demonstrate the need for interventions to reduce both bullying and to reduce the misuse of performance- and appearance-enhancing substances by adolescent males in the U.S. As an example, the intervention program called Athletes Training and Learning to Avoid Steroids (ATLAS) is the principal intervention program utilized to prevent and reduce use of steroids among adolescent males. It is an educational intervention program aimed at reducing

misuse of drugs, particularly steroids, and promoting healthy behaviors among adolescent high school athletes (Goldberg et al., 1996). This program is comprehensive, school-based, and sex-specific to males. An experimental evaluation conducted by Goldberg et al. (1996) utilized a sample of 1,506 male football players in high school and found statistically significant differences between a control group provided with an antisteroid informational pamphlet and an experimental group assigned to the ATLAS program. Participants in the experimental group had increased understanding of steroid effects, greater belief in personal vulnerability to negative side effects of steroid usage, reduced intentions to misuse steroids, and improved drug refusal skills (Goldberg et al., 1996). Significant differences between the control and experimental group were maintained over the period of one year. An additional study to examine the efficacy of the ATLAS program conducted by Goldberg et al. (2000) also found similar results. In this study, the ATLAS intervention was associated with significantly reduced intention to use and actual use of steroids, though reduced use of steroids was non-significant at a 1-year follow up (Goldberg et al., 2000). These studies provide support for the effectiveness of the ATLAS intervention program amongst a sample of predominantly white, middle-class high school football players.

Studies aimed at evaluating ATLAS have attested to its effectiveness, nevertheless there are opportunities for improving existing interventions and developing additional multi-dimensional intervention programs. Although the association between recreational use of steroids and adolescent athletes has been well established (Diehl et al., 2012; Dodge & Clarke, 2015; Miller et al., 2002), our results shed light on bullied individuals as another subpopulation of adolescent males at significant risk of steroid abuse. The current study suggests the demand for development of comprehensive steroid interventions that not only target athletes but are also inclusive of other social groups. Conversely, effective efforts at reducing bullying victimization

in the high school setting could also have a significant effect upon the relationship between bullying and steroid misuse uncovered in our study.

The Olweus Bullying Prevention Program (OBPP) is the most well-known bullying intervention program and a number of other intervention programs have been developed from this model. Dan Olweus implemented the intervention program in Norwegian schools in 1983 with the overarching goals of reducing and preventing bullying from occurring. This intervention targets both the social context in which bullying occurs as well as individual behaviors by incorporating a multi-level component which targets individual-, classroom-, school-, and community-level factors. Data for evaluating the effectiveness of this program was drawn from a longitudinal study of 2500 students in 42 elementary and junior high schools (Olweus, 1997). There was a 50% reduction in bullying instances in addition to reduction in number of new victims (Olweus, 1997). The OBPP was able to achieve favorable results by employing comprehensive measures built on four key principles including creating a school environment characterized by warm, positive interest, adult involvement, and imposing firm limits on unacceptable behavior. Further, non-hostile and non-physical sanctions were placed when a student violated limits or rules, and adults at school and home were encouraged to act as authorities. Additional sub goals of the program consisted of increasing awareness of and advancing knowledge about the issue of bullying, achieving active involvement from adults, developing clear rules against bullying, and providing support and protection to victims (Olweus, 1997). Research-based evaluations of the OBPP have provided limited support for its effectiveness, (Olweus, Limber, & Mihalic, 1999; Smith & Sharp, 1994). The major shortcoming of this program is its target audience; the OBPP is primarily designed for students in elementary through middle school. Although the program can be adapted for use in high school, there is a

lack of research of its effectiveness in high school settings (Losey, 2009). This gap in research is illustrative of the shortage of bullying intervention programs that are specifically developed for high schools. Implementation of evidence-based intervention programs in high school settings could reduce the magnitude of the relationship uncovered in our study between victimization and steroid misuse.

Although considered similar to traditional bullying, cyberbullying is a distinct form of interpersonal aggression capable of more damaging sequela due to a combination of potential anonymity, larger audience, and ease of perpetration through social media (Lenhart et al., 2011; Nansel et al., 2001; Patchin and Hinduja, 2006). Also, cyberbullying is a more novel form of aggression relative to in-school bullying, as it has recently become a more widely studied topic due to the rapid advancement of technology. Research on the efficacy of interventions that target cyberbullying is a relevant topic. Cantone et al. (2015) conducted a literature search with the aim of evaluating randomized-controlled trials used to assess the effectiveness of school interventions on bullying. Results of the study provide support for the success of the KiVa program in reducing electronic perpetration and victimization, as well as internalization symptoms, such as anxiety and depression (Cantone et al., 2015). The KiVa antibullying program is a school-based invention that has shown to be effective at reducing electronic bullying and its adverse effects (Williford et al., 2013). Recommendations for preventing cyberbullying include school-wide efforts at defining cyberbullying, implementing, enforcing, and training staff on policies addressing cyberbullying, and employing internet filtering technology to insure enforcement (Notar, Padgett, & Roden, 2013). Similar to intervention efforts at reducing in-school bullying, there is a dearth of existing research regarding effective ways to reduce electronic bullying. Effective anti-bullying programs that are informed by science

are needed to help improve the quality of life for victims and prevent victimization from occurring in high school settings.

Limitations

Our findings should be considered in light of the limitations of the present study. Principally, and as mentioned above, this study does not allow us to deduce causality between the association found. Further, we are not able to determine directional effects in the established relationship between bullying victimization and AAS misuse. The possibility of there being an additional, unknown variable accounting for the relationship between bullying victimization and steroid misuse cannot be dismissed (e.g., body dysmorphia; access to anabolic steroids; fear of death threats). While utilization of the 2015 national YRBS affords us good external validity by allowing us to generalize findings unto a national scale, the archival nature of the dataset prohibited us from control over the YRBS test items. As such, this study did not examine many of the risk factors previous literature has associated with bullying or steroid misuse.

Additional limitations of the study are manifested within the method used to gather participant information. The YRBS is a school-based survey and thus cannot be applied to adolescents who do not attend high school; in 2012, it was estimated that 3% of individuals aged 16-17 years old were not enrolled in and had not completed high school (Stark, Noel, & McFarland, 2015). Additionally, the YRBS is a self-report measure and thus relies on the accuracy of survey takers. Although the test-retest reliability of survey questions has been evaluated and established to be acceptable (Brener et al., 1995; Brener et al., 2002), the degree of under- or over reporting of certain health related behaviors by survey-takers cannot be determined with certainty. Also, not all states and large urban school districts included all of the

standard questionnaire items on their survey. Finally, due to our choice of solely examining male participant information, results of our study cannot be generalized to include female adolescents.

Future Research

Future research is a requisite for uncovering the exact relationship between bullying victimization and steroid abuse. Although ethical guidelines prevent the manipulation of the two variables examined in the present study, future longitudinal studies could determine the direction of the relationship between victimization and steroid misuse. Further, case-control studies could provide an in-depth, retrospective view of adult males who have misused steroids matched to a comparable control group in order to examine differences and/or similarities in developmental histories. Future research should also expand upon the variables examined in our studies to include other risk factors for bullying victimization and steroid misuse that past literature has found to be significant. Also, allowing participants the opportunity to disclose whether the interpersonal aggression they have experienced was appearance-focused could help elucidate whether a specific type of victimization is placing victims at increased risk of steroid abuse. Finally, further study of other populations that have historically been overlooked when researching steroid abuse, such as females, would be beneficial.

Conclusion

This study provides evidence of a significant relationship between bullying victimization and steroid misuse in adolescent males. Results indicate that adolescent males that have been bullied are at increased risk of abusing steroids. Findings of this study indicate the need for increased awareness of an overlooked population, in this case victims of bullying, who are at increased risk of steroid misuse. The clinical significance of our study encourages mental health and medical professionals, as well as steroid intervention programs, of the need for more

comprehensive screenings and prevention measures in order to better respond to the misuse of steroids in adolescent males.

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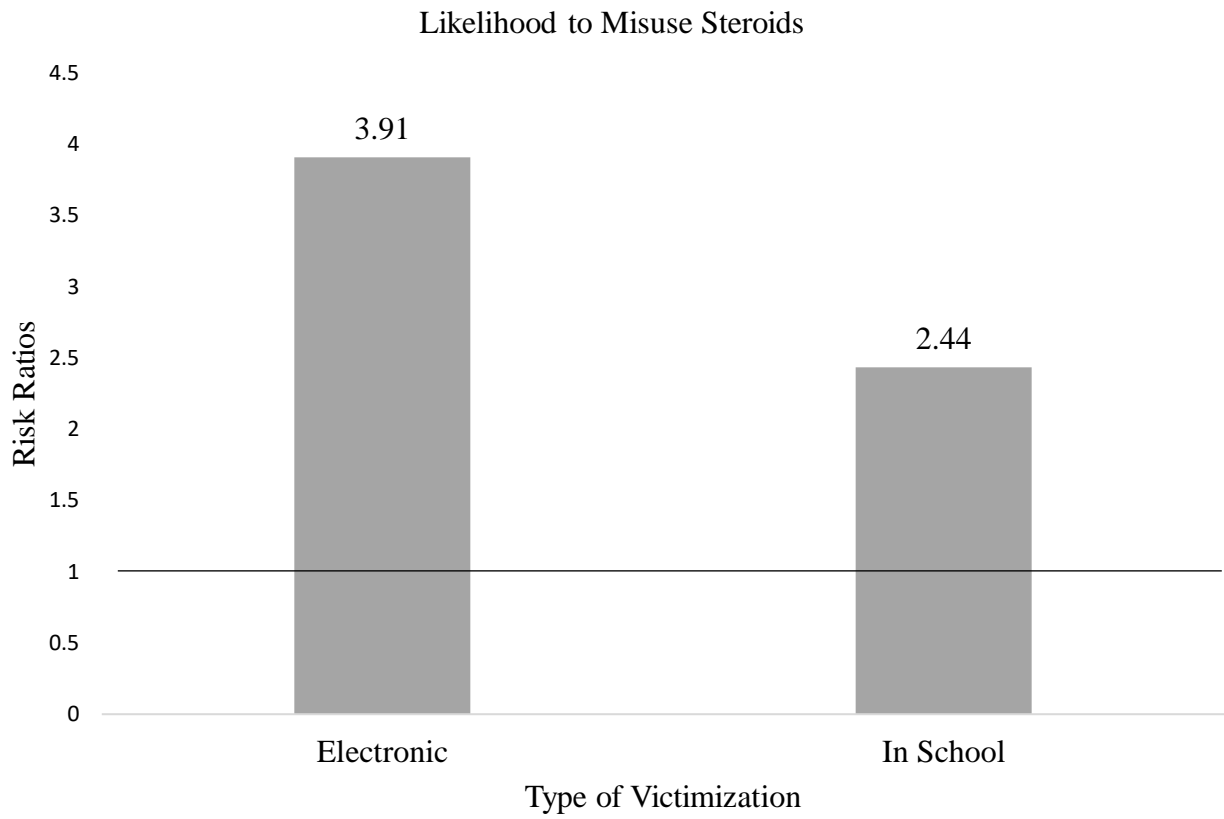


Figure 1. Risk ratios in study participants. This figure illustrates the odds of male adolescents reporting steroid misuse given each type of bullying victimization.

Appendix

To: Angelo Cruz Loeza
Psychology
CAMPUS EMAIL

From: IRB Administration

Date: 10/06/2017

RE: Determination that Research or Research-Like Activity does not require IRB Approval

STUDY #: 18-0056

STUDY TITLE: Bullying victimization as a predictor of anabolic-androgenic steroid abuse in adolescent males

The IRB determined that the activity described in the study materials does not constitute human subject research as defined by University policy and the federal regulations [45 CFR 46.102 (d or f)] and does not require IRB approval.

This determination may no longer apply if the activity changes. IRB approval must be sought and obtained for any research with human participants.

If you have any questions about this determination, please contact Robin Tyndall at 262-2692; or irb@appstate.edu. Thank you.

CC:
Denise Martz, Psychology