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Anabolic-Androgenic Steroids and Violent Behavior: A New Look

Through A Sociological Lens

by

Daniel P. Moody

A thesis

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COMMITTEE APPROVAL

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Thesis Abstract — Idaho State University (2018)

The current study estimates the relationship between anabolic-androgenic steroids and violent behavior. Data from The National Longitudinal Study of Adolescent to Adult Health is utilized as Wave III respondent answers from young adults ranging from 17-26 years old. Key demographic questions—age, race/ethnicity, Hispanicity, parental social status, and gender—are included as measures for analysis. Four additional measures derived from leading sociological theories are also included in the multivariate analysis to assess the hypothesis that the steroids/violence association is explained by social factors rather than the effect of steroids on brain functioning.

Binary logistic regression showed that a statistically significant association between anabolic-androgenic steroids and each of four different measures of violent behaviors exists. When included in the multivariate analysis, sociological and demographic measures accounted for a noteworthy reduction in the relationship but did not eliminate the association in its entirety. Limitations of the study are discussed, and avenues for future research are suggested.

Keywords: AAS, violent, steroids, testosterone, violence

INTRODUCTION

Previous research has demonstrated a clear, positive, and consistent relationship between anabolic-androgenic steroid (AAS) use and violent behaviors (Choi, Parrott, and Cowan 1990; Choi and Pope 1994; Parrott, Choi, and Davies 1994; Pope et al. 1996). Defined by the National Institute on Drug Abuse, anabolic-androgenic steroids are "synthetic variations of the male sex hormone testosterone. The proper term for these compounds is *anabolic-androgenic steroids*. "Anabolic" refers to muscle building, and "androgenic" refers to increased male sex characteristics."((NIDA) National Institute of Drug Abuse 2015) whereas "*violent behavior* is defined as intentional physically *aggressive behavior* against another person" (Volavka 1999). AAS use has been regarded as problematic to both the users themselves with alarming issues such as lasting organ damage, breast tissue formation (gynecomastia), male infertility (Bahrke, Yesa, and Wright 1990; Maravelias et al. 2005), and on a much grander scale, to society at large (Beaver et al. 2008) through involvement in violent behaviors. At one point in the United States, there was even a doubling of levels in increased AAS use by both 8th and 10th grade adolescents in 1999 (Miech et al. 1975) lending to the impression that adolescent use was becoming an issue.

The violent behavior and anabolic-androgenic steroid connection has almost exclusively been researched with the understanding that the positive relationship is due predominantly to physiological and biological effects on the human body (Clark and Henderson 2003; Kouri et al. 1995; Su et al. 1993) with most recent technical literature following suit (Ganesan and Pellegrini 2018). The present study contributes to the

literature on the effects of steroids by investigating the possibility that the link between AAS and violent heavier is spurious and due to social factors as hypothesized by established sociological theories (Cullen and Agnew 2003; Kaplan 1976; L. and Sellers 2012; Messerschmidt 2012).

The present study focuses on two primary hypotheses: 1. AAS will be positively associated with various measures of violent behaviors. 2. The link between AAS use and violent conduct will be reduced or even eliminated when social factors are included in multivariate models. These hypotheses will be tested using data collected from Wave III of Add Health, a nationally representative study (Harris, Udry, and Bearman 2013) administered to young adults and analyzed through logistic regression (Kremelberg 2011) with estimates generated from IBM SPSS statistical software. A Discussion section following results and research findings will be provided along with avenues for future research.

LITERATURE REVIEW

Theory

To address the two hypotheses proposed in the current study, specific and leading sociological theories will be employed. These include: Social Learning Theory, Social Bond Theory, Self-Esteem Theory, and Hegemonic Masculinity Theory (Cullen and Agnew 2003; Kaplan 1976; Messerschmidt 2012; Pratt, Franklin, and Gau 2008). Each of these individual theories is used as specific sociological tools to help offer explanations of the relationship between anabolic-androgenic steroid use and violent behaviors among young adults (ages 17 to 26 in the current study). The sociological theories selected for

this study are well-suited for the study of violence (Zimmerman 2001), and the subsequent section describes each of them in detail.

<u>Social Learning Theory</u>

The authors define the theory as "criminal behavior is learned in both social and nonsocial situations through combinations of direct reinforcement, vicarious reinforcement, explicit instruction, and observation" (Burgess and Akers 1966). According to the differential association tradition (Cullen and Wilcox 2010), violence *and* drug use are learned while young through interaction with pro-violent/pro-drug-use friends. More specifically, this theory predicts that violent behavior and AAS use both increase with the more drug-using friends one has. Social Learning Theory may explain both the use of AAS and participating in violent behaviors through observation, modeling, and reproduction of actions. Important to note is the distinction between the current study's utilization of Akers and Burgesses' Social Learning Theory in contrast to Albert Bandura's theory of the same name.

Warr has offered his own insights into Social Learning Theory and credits Sutherland's Differential Association theory as the most popular peer-influence theory in criminology (Warr 2002). However, he believes that it falters when tested for reliability and tests to prove its real-life efficacy. This is because when adolescents engage in delinquent acts with their friends, these same friends are who they associate with even when not involved in delinquency.

Warr also contributes the idea that the terms crime and delinquency are used interchangeably often but are indeed mutually exclusive in a legal sense. Warr elaborates

that delinquent offenses are those committed by minors whereas adults commit criminal offenses by definition (Warr 2002). He posits that adults typically begin committing delinquent offenses when they are young as juveniles, rendering the application of the terms to the *same people* but at different *life stages* (Warr 2002). Warr makes this distinction apparent to provide relevant consideration for age as it relates to crime and delinquency. Warr also makes the distinction between *peer influence* (i.e. bad kids influencing good kids) and *group delinquency* (i.e. any delinquent event that involves two or more offenders) (Warr 2002), indicating that they are not analogous as thought by the current literature. Most delinquent behavior, Warr states, is essentially a combination of both; committed by groups of adolescents and it is reasonable to suppose that the adolescents might be influenced by peers not even present during the delinquent event or peers that they haven't even met previously. Social Learning Theory would propose that the steroids-violence link takes place by way of associating with delinquent peers and modeling behaviors that are thought to be "rewarding" to the individual. In this case, that would be the use of anabolic-androgenic steroids and being involved in violent behaviors.

<u>Social Bond Theory, Social Control Theory</u>

In contrast to cultural deviance theorists such as Sutherland (Differential Association theory), Hirschi focused on beliefs that proscribe crime rather than focusing on beliefs that positively value crime. Originally developed by Travis Hirschi (Pratt et al. 2008), *Social Bond Theory* maintains that 1. Delinquency and social bonds are inversely related 2. There are four social bonds providing the integral concept of the theory and

therefore restraining criminal conduct – attachment, commitment, involvement, and belief (Cullen and Agnew 2003).

The first social bond, attachment, refers to an emotional connection to another person or a symbiotic linkage between a person and society (Cullen and Agnew 2003), not to be confused with early childhood attachment theory (Bowlby 1988). These persons could range from the less important peers, adults, and teachers to the more important parents that the youth emotionally connect to. Hirschi believed that when the youth genuinely cares about the thoughts of the person that they're emotionally attached to, they are less likely to act out in devious ways as to not lessen the opinion of oneself in that person's eyes. This is especially important because it's gathered that youth are frequently outside their parents' watchful eyes during the teenage years (Cullen and Agnew 2003). Keeping this in mind, parents are unable to physically watch over their children to make them behave in situations where opportunities delinquency may be present. Instead, they enact "indirect control" by way of strong attachment and are present psychologically in the children's minds, deterring the acts of delinquency. The children in this case take their parents preferences into account (Cullen and Agnew 2003).

Commitment is the second bond. Hirschi called this section of his concept a "rational component" to conformity (Cullen and Agnew 2003). A favored example of an institution that a juvenile is committed to would be exemplified as attending and performing well in school. If these young individuals in society are doing well in school, Hirschi believes this functions as a deterrent against the involvement of delinquent activities that the individual believes may jeopardize their future negatively. In the

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opposing argument, it could be said that juveniles not committed to doing well in institutions such as school, are more likely to be delinquent because they 'have nothing to lose and thus are freer to break the law' (Cullen and Agnew 2003:231).

Involvement touches upon the idea that youths being actively involved in various activities throughout the day limit the possibility of crime by essentially 'staying busy.' This is assuming that idleness on the part of the young person would leave time for getting into trouble, an issue which would be impacted by filling their schedules with wholesome activities such as school and recreational pursuits (Cullen and Agnew 2003). These wholesome activities exert some sense of control on the young individuals just from simply being involved

The last bond facilitating Hirschi's Social Bond Theory is that of belief. Fundamentally, this is explained as youths who believe that they should obey the rules of society become less likely to violate them (Cullen and Agnew 2003) and in addition, believe that these rules apply to everyone and benefit society. As described above, it's important to note that beliefs, or definitions, were also an integral function in Differential Association theory or what Hirschi referred to as "cultural deviance" theory (Cullen and Agnew 2003). This social bond of belief tends to be typically more abstract than the previously mentioned bonds, and summarized most accurately by Hirschi himself: "Delinquency is not caused by beliefs that require delinquency, but rather made possible by the absence of effective beliefs that forbid delinquency (Cullen and Agnew 2003:231)." These effective beliefs may include norms such as saving sexual conduct for matrimony.

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Sampson and Laub contributed to the conversation of social bonds in their work 'A General Age-Graded Theory of Crime: Lessons Learned and the Future of Life-Course Criminology' (Sampson and Laub 2004) with an additional interest in both childhood *and* adulthood rather than primarily focusing all attention on juvenile offending. Addressed in their book are several main themes: 1. Structural context is mediated in fundamental respects by informal family and school social controls, which in turn explain delinquency in childhood and adolescence (Sampson and Laub 2004) 2. There is strong continuity in antisocial behavior running from childhood through adulthood across a variety of life domains (Sampson and Laub 2004) and 3. Informal social control in adulthood explains changes in criminal behavior over the life span, independent of prior individual differences in criminal propensity (Sampson and Laub 2004).

Sampson and Laub strongly view adult social bonds as significant influencers on childhood pathways to crime and conformity over the life course. They link delinquency and adult crime to childhood and adolescent characteristics as well as socializing influences in adulthood (Sampson and Laub 2004). Sampson and Laub argue that early delinquency does not accurately predict adult social bonds and also that weak social bonds in adulthood may predict concurrent and later adult crime and deviance. Sampson and Laub offer an explanation that important life events in adulthood can even counteract certain instances of early life that the individual may have been influenced by (Sampson and Laub 2004). Pertaining to young adulthood, Sampson and Laub indicate that a new theoretical perspective is needed to explain delinquency and create an age-graded

formulation mentioning key factors such as informal social controls that may have shifted and transformed through the aging of the individual (Sampson and Laub 2004).

Two largely significant contributing factors that Sampson and Laub noticed in the context of changes in adult crime were both job stability and marital attachment (Sampson and Laub 2004). Stronger ties to family and work resulted in less crime and deviance when tested in the delinquent and control groups. Further, marital attachment inhibited crime and deviant behavior completely independent of that spouse's own deviance (Sampson and Laub 2004). Also reported was that poor job stability fostering crime even when alcohol was excluded (Sampson and Laub 2004). It's important to note the findings that incarceration as a juvenile and as adults reduced later job stability, which in turned raised the odds of continued involvement in crime through later adulthood. For both 500 delinquents and 500 non-delinquent controls, it was also found that strong adult bonds to work and family kept men away from involvement in crime (Sampson and Laub 2004).

In terms of the steroids-violence link, Social Bond Theory would predict that the weaker the social bonds held by the individual, the more likely they are to partake in the use of anabolic-androgenic steroids *and* concurrent involvement in violent behaviors. In other words, when social bonds are taken into account, the association between AAS and violent behavior should disappear.

Self-Esteem Theory

Proposed by Howard B. Kaplan in his work *Self Attitudes and Deviant Response* (Kaplan 1976), deviant behaviors (or responses) are increased in probability by the

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possession of negative self-attitudes (Kaplan 1976). Self-esteem or self-image in the

current study uses Gardner Murphy's definition as "the individual known to the

individual" (Murphy 1947). The guiding hypothesis of Kaplan's theory seeks to explain

deviant behavior by examining the 1. Individual's lost motivation to conform to society's

normative behaviors and 2. Acquire motivation to depart from society's normative

behaviors (Kaplan 1976).

Kaplan postulates that negative self-attitudes facilitate delinquent behavior by two

different routes. The first by leading to the experience of conformity to membership

group patterns as intrinsically distressing (Kaplan 1976), and secondly by influencing the

person's need to seek alternatives to the now intrinsically devalued normative patterns in

order to satisfy the self-esteem motive (Kaplan 1976). Kaplan discounts other theorized

relationships between negative self-attitudes and deviance imagined by colleagues such

as cheating, drug abuse, felonies, alcoholism, and homicide. These are not considered

legitimate to Kaplan based on a lack of broad deviant response patterns, important

exceptions requiring explanations, and the lack of longitudinal designed study methods

(Kaplan 1976).

Framing his idea on negative self esteem and delinquent actions, Kaplan

hypothesizes that those with more negative self-attitudes will be significantly more likely

to perform subsequently each of a range of specified deviant acts (Kaplan 1976) with the

caveat being that these specified deviant acts he mentions have not been previously

adopted (before negative self attitudes were present). This would present a problem in

determining which acts the individuals in fact considered deviant given the fact that they

might have already adopted the behavior pattern (Kaplan 1976). Another issue is the

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individual consciously or unconsciously deciding if the assumed deviant behaviors are deviant to them or not; instead, the individual possibly learns the behavior as an appropriate response meant to be performed at a later time through anticipatory socialization (Kaplan 1976).

Summarizing Kaplan's theory and finding on negative self-derogation (self-image in this context), there are two possible pathways linking the relationship between self-derogation and deviant behavior. Kaplan's first claim is that deviant behavior is a response to the experience of being repeatedly demeaned by one's group and internalizing that degradation (Kaplan 1976). The second pathway explains that the relationship between negative self-attitudes and deviant behavior is by observation of antecedent self-derogation as an alternative explanation (Kaplan 1976), or that the individual first puts himself down before or in place of group derogation.

Rosenberg and colleagues (Simmons and Rosenberg 1973) expanded our understanding of low self-esteem when they examined several dimensions of self-image development in adolescent children using a cross-sectional study of grades 3-12; it was ultimately found that adolescents experienced a definite disturbance in self-image, some dimensions persisting in later adolescence (Simmons and Rosenberg 1973). Results showed that the adolescents experienced: heightened self-consciousness, greater instability of self-image, slightly lower global self- esteem, lower opinions of themselves with regard to the qualities they valued, and a reduced conviction that their parents, teachers and peers of the same sex held favorable opinions of them (Simmons and Rosenberg 1973). In addition to the negative self-image and self-esteem observations of the adolescents, they were also shown to more likely experience a high depressive affect.

Winch and Rosenberg examine the adolescent self-image in a different light, the neurosis element of anxiety. It is suggested that "anxiety is manifested by (1) "interference with thinking processes and concentration," (2) "a frequently object-less feeling of uncertainty and helplessness," (3) "intellectual and emotional preoccupation," and (4) "blocking of communication" (Winch and Rosenberg 1965:149). The question arises if anxiety is a precursor to low self-esteem, or if the opposite is true with the authors concluding that anxiety produces a self-hatred and self-contempt in the individual set in motion along with other psychological events and consequences (Winch and Rosenberg 1965) such as adverse circumstances in the family or a fear that is fundamentally retained by the individual.

They conclude that once an individual experiences this anxiety; it's concluded that he then creates an imaginary world in order to essentially "escape," leaving his past self behind and forgotten. Not only is this an attempt to become extradited from the anxious personality, but an idealized image is created giving the individual a new sense of strength and confidence (Winch and Rosenberg 1965) which had previously been weak and pale in comparison. The individual begins to hate this past self and holds contempt for his former anxious personality. Rosenberg and company list four factors: (1) instability of self-image; (change in an individual's self-esteem level over time), (2) the "presenting self" (a claimed identity of the individual); (3) vulnerability (how vulnerable the individual is); and (4) feelings of isolation (individual's experience of being isolated from peers and family) (Winch and Rosenberg 1965) and contends that low self-esteem contributes to their formation which in turn create anxiety in the individual.

Implied in self-esteem theory is the prediction that the negative attitudes a young person holds about oneself will lead to a range of self-destructive behaviors such as drug use and violent conflict. The association between AAS use and violent actions can possible be explained in terms of a negative self-attitude leading to both types of problematic behavior.

<div align="center">Hegemonic Masculinity Theory</div>

James Messerschmidt illustrates the concept of hegemonic masculinity (Carrigan, Connell, and Lee 1985) in his article 'Engendering Gendered Knowledge: Assessing the Academic Appropriation of Hegemonic Masculinity' (Messerschmidt 2012). Referred to as the form of masculinity in a given historical and society-wide setting that structures and legitimates hierarchical gender relations between men and women (Carrigan et al. 1985), Messerschmidt reformulates the term while keeping basic principles of the concept withstanding.

Messerschmidt argues that the relationship between masculinity and femininity is a pattern of hegemony, or a pattern of combined leadership or dominance, not a pattern of simple domination (Messerschmidt 2012). Messerschmidt's reformulation encompasses the understanding of gender hierarchy and subordinated groups (Messerschmidt 2012). In the past, social dynamics such as class, race, age, sexuality, nation, and even whole subordinate groups were not given adequate understanding and attention. The final addition to the reformulation of hegemonic masculinity by Messerschmidt is the inclusion of three new levels rather than the previous and isolated society-wide level (Messerschmidt 2012). These newly reformulated levels are as follow: local (constructed

in arenas of face-to-face interaction of families, organizations, and immediate communities), regional (constructed at the society-wide level of culture or the nation–state), and global (constructed in such transnational arenas as world politics, business, and media) (Messerschmidt 2012).

Upon observation of a quantitative online data source regarding gay male sex workers (Messerschmidt 2012), Messerschmidt found that the role of a dominant, masculine, and muscled man was preferred whereas overweight or skinny men were unsuccessful and unpopular. This was considered to be consistent with the description of hegemonic masculinity, particularly because masculine physical norms are well-rewarded in the market (Messerschmidt 2012) highlighting maleness and dominance at the forefront, muscularity being a specific example used.

Messerschmidt invokes Smith et al. with the article, "I've been independent for so damn long!' Independence, Masculinity and Aging in a Help Seeking Context." (Smith et al. 2007) with the purpose to provide an example of hegemony in the context of masculine attitudes and attributes separate from physicality. It is conveyed that traits such as being tough, strong, and in control were associated with independence (Smith et al. 2007) and reflected masculinity by the twenty two men interviewed by Smith and colleagues.

In the article 'Comparing Center and Marginal Athletes and Nonathletes in a Collegiate Setting' authored by Elizabeth Gage (Gage 2008), student athletes were questioned based on gender attitudes, hegemonic masculinity (toxic character traits in this context), sexual behavior, and sexual aggression (Messerschmidt 2012). Based on the collection of data from 148 college-aged males, it was found that the athletic group of

football players scored significantly higher on toxic character traits such as hypermasculinity and sexual aggression when compared to nonathletes (Gage 2008) displaying the role of masculine attitudes in the context of a testosterone-dominated activity. This study suggests that masculine attitudes might attract people to intensive athletic activities — contexts in which steroids are sometimes used. It was concluded that the research indicated a 'more nuanced understanding of the relationship between hegemonic masculinity, attitudes toward women, and violence against women' (Gage 2008) although according to Messerschmidt, Gage's work primarily attempted to display hegemonic masculinity as "toxic, hypermasculine character traits as ''negative attitudes toward women,'' ''violence as manly,'' and ''calloused sex attitudes toward women'' (Messerschmidt 2012).

In the context of the link between steroids and violent behavior, Hegemonic Masculinity theory would hypothesize that a pattern of masculine attitudes would motivate someone to turn to AAS use to enhance a masculine image, and at the same time would raise the risk that someone would commit acts of violence to demonstrate one's manliness. Specifically, if masculine attitudes were taken into account, the association between AAS use and violent behavior would disappear.

<u>AAS and Violent Behaviors</u>

Supplementing the sociological theoretical framework in the current study, a specific review of the literature on AAS and violent behavior is warranted and helps to examine the steroids-violence link in greater detail. Several heavily cited studies are included with a focus on sample size, methods, and results. In conjunction with the

previously documented sociological theories, this review on AAS and violent behavior

literature provides a comprehensive foundation for the present study.

Choi, Parrot, and Cowan (Choi, Parrott, & Cowan, 1990) conducted both a 72-

question survey (Profile of Mood States) as well as a 75-question survey (Buss-Durkee

Hostility Inventory) to ascertain the behaviors and feelings between anabolic steroid

users and non-users. Sample item statements from the Buss-Durkee Hostility Inventory

include "I have known people who pushed me so far that we came to blows" (Fernandez,

Day, and Boyle 2015). Profile of Mood States asks individuals to rate themselves using a

scale of 0-4 in areas such as anger and unhappiness (Spielberger 1972). The anabolic

steroid user individuals sampled: A 22-year-old competitive bodybuilder training for ten

years, a 28-year-old competitive weightlifter training for eight years, and a 21-year-old

non-competitive bodybuilder training for four years. The anabolic steroid non-user

individuals sampled: A 28-year-old non-competitive weightlifter training for 11 years, a

29-year old non-competitive weight lifter training for nine years, and a 24-year-old

competitive bodybuilder and power lifter training for six years. The results found that the

steroid users were more likely to be aggressive while on-cycle, as well as a significant

difference in the hostile-agreeable factor regarding the POMS questionnaire compared to

the steroid non-users. They also found that anabolic steroid users have increased hostility

while on-cycle. In regards to the Buss-Durkee inventory scale, the anabolic steroid users

were found to be both more aggressive and hostile when compared to the controls

throughout the entirety of the study. Similarly, it was reported that all three anabolic

steroid users noticed increased aggression while on-cycle.

A limited participant study (Kouri, Lukas, Pope, & Oliva, 1995) examined the relationship between steadily increased doses of testosterone and aggressive responses by male volunteers. Six reportedly healthy men between the ages of 20-39 were selected to receive either exogenous testosterone injections or placebo in a 24-week crossover designed study. The subjects receiving testosterone injects gradually worked up dosing every two weeks up to six weeks, going from 150mg, 300mg, and 600mg of pharmaceutical grade testosterone cypionate each week. Responses were recorded using the following instruments: the Young Manic Rating Scale, the Aggression Questionnaire, the Symptom Checklist-90, and the Point Subtraction Aggression Paradigm. A nonaggressive answer would be recorded by pressing an 'A' labeled button while an aggressive answer was reported from the pressing of a 'B' labeled button. The total number of button 'B' responses (aggressive) was significantly higher than both placebo and baseline measures. Testosterone administered participant 'B' button responses were also higher than baseline per point subtraction, indicating that aggressive responses were the result of "provocation" questions given to the testosterone-administered recipients. Mean values from the Young Manic Rating Scale and Aggression Questionnaire also showed a notable increase in scores, particularly the physical aggression subscale from the Aggression Questionnaire compared to baseline. Results from this study are non-generalizable due to the limited number of participants.

An article examining anabolic steroids examined anabolic steroids from the neuropsychiatric perspective (Su et al., 1993). They used a volunteer sample of 20 normal, healthy, male men to observe moods and behaviors as a 2-week long double blind, placebo-controlled, fixed-order crossover intervention trial. Subjects were as

follows: eleven white, nine black, ages ranging from 18-42 and none having any athletic background or history using anabolic steroids. Methyltestosterone was administered to the subjects both in 40 mg/dl (low) and 240 mg/dl (high) doses alongside placebo baseline and placebo withdrawal groups. Objective and subjective measures were collected from the participants during each drug-administration condition using a visual self-rating scale (VAS), the Beck Depression Inventory (BDI), and the Spielberger State Trait Anxiety Inventory (STAI). In addition to these instruments, fifteen subjects completed the Symptoms Checklist (SCL-90). Objective behaviors and moods were measured with a modified 24-item Brief Psychiatric Rating Scale (BPRS), the Hamilton Depression Rating (HAM-D), and the Mini-Mental State Examination (MMSE). Symptoms related to negative moods such as irritability, mood swings; violent feelings, and hostility were found to be significantly increased during the treatment of high-dose methyltestosterone (240mg) compared to the baseline placebo group.

Parrott and company (Parrott, Choi, & Davies, 1994) further examined the link between anabolic steroids, hostility, and aggressive behaviors. Twenty-one male subjects were selected to participate, all weight-training individuals using high doses of anabolic steroids between the ages of 19-42 with a primary goal to gain muscle mass. Aggression and hostility measures were recorded using the Buss-Durke Inventory and were administered at two times. The first questionnaire administered measured reported feelings while on-cycle of anabolic steroids, and the second for off-cycle. Subsequently, another questionnaire was given to participants to obtain feelings of psychological feeling states; most importantly, looking at aggression in more detail. These questions included aggression towards objects, toward people, and also verbal aggression. Subjects were

using various anabolic steroids including testosterone cypionate, deca durabolin, sustanon, methandienone, and primobolan. The data compiled from the Buss-Durke Inventory and questionnaire were calculated and statistically compared using a paired t-test for both on-cycle and off-cycle responses. The results indicated that feelings of aggression, aggression against objects, and verbal aggression were all significantly higher when participants were on-cycle with anabolic steroids. Items from the psychological questionnaire were also significantly higher while the participants were on-cycle. This included: irritability, suspiciousness, negativism, and anxiety.

Miller and colleagues (Miller et al. 2013) examined anabolic-androgenic steroid use and its effects on adolescent problem behaviors with. The authors preface their study by stating that even though anecdotal evidence suggest that AAS increases violence, the experimental evidence for the causal relationship is weak (Miller et al. 2013). Miller and colleagues took data from the Youth Risk Behavior Survey, a nationally represented survey used to assess the prevalence of health-risk behaviors in adolescents in the United States. Students completed 16,262 questionnaires with ages ranging from '14 and younger' to '18 and older' and with a race-ethnicity breakdown of: 4,558 black respondents, 5,554 white respondents, 4,547 Hispanic/Latino respondents, and 641 Asian America/Pacific Islander respondents. Three additional variables were added to control for athlete, strength-bodybuilding, and strenuous exercise activity for independent measures. It was found that in comparison to non-users of AAS, both male and female users had a reportedly higher prevalence of nearly all problem behaviors (Miller et al. 2013). Aggression is included in problem behaviors as '*Fought, past year*' and '*Injured in a fight, last year*.' Also to note is that both male and female AAS users found to be

more likely to engage in problem behaviors in the context of assessed health-risk domains. This was also true for all gender-sport categories (male nonathletes, male athletes, female nonathletes, female athletes) in accordance to AAS use.

Lundholm and colleagues ((Lundholm et al. 2013) examined prison populations in a case crossover study with regards to violent crime and illicit drug use including AAS. After exclusionary criteria, the 194 participants selected were older than 18 years of age and detained for a violent crime; assault being the most suspected crime for both men and women (Lundholm et al. 2013). Participants were required to take the Mini-International Neuropsychiatric Interview in order to fully describe the population (Lundholm et al. 2013). Results showed that only one participant had been under the influence of AAS during a 24-hour period prior to the index crime and that just 20% of men and none of the women had ever used AAS in any capacity. With only one participant under the influence of AAS at the time of the index crime and a very small percentage (20% male, 0% female respectively) of other participants having used AAS in their lifetime, these results do not suggest that AAS use is common among violent-prone populations and thus not a common cause of violence.

Another study within prison populations conducted by Isacsson et al. (Isacsson et al. 1998) enlisted epidemiological methods to asses anabolic-androgenic steroid use and violent crime. After fulfilling inclusion criteria and providing urine samples, 50 violent offenders were selected to participate in the survey with ages ranging from 16-52 and a median age of 27. Violent crime was classified as the following: unlawful threat, assault and battery, man-slaughter, murder, robbery, and rape (Isacsson et al. 1998). Participants were all arrested within one day of the crime being committed. Although none of the 50

urine samples contained traces of AAS, one participant claimed that he was "off-cycle" and another admitting that he had in fact used AAS recently and was surprised to see the test come back as negative. This study, like Lundholm et al. (2013), provides little evidence that AAS use is a major cause of violence.

In a related type of study, Pope and colleagues (Pope et al. 1996) interviewed 133 prisoner participants to assess whether or not steroids influence criminal acts. These men ranged from 17 to 57 years old, many having been convicted of crime and serving prison sentences in the past. The following breaks down race/ethnicity demographics of the prisoners: 67 white volunteers, 31 black volunteers, and 27 Hispanic volunteers. Nine of these men had admitted to using AAS in some capacity during their lifetime. Participants were asked questions from the Structured Clinical Interview for a historical look into their substance abuse (Pope et al. 1996), and were also asked to elaborate more on their AAS use (doses, drugs, duration) if it was found that they had used in their lifetime. Only two of 133 prisoners believed that their criminal behavior was influenced by AAS. One other prisoner suggested that AAS may have influenced bouts of violence that he had demonstrated, but he was never apprehended. The remainder of the prison participants reported no violent behaviors or psychiatric changes due to AAS use.

According to Choi and Pope (1994), steroid users were reported to be involved in many more fights while on a cycle of anabolic-androgenic steroids than when off-cycle. Choi and Pope selected 23 AAS users as participants and found 17 to be more verbally aggressive towards their significant others throughout the course of the study. Some of the violent actions reported by the AAS users were: throwing a brick at girlfriend,

slapping girlfriend, fractured bones of girlfriend, and flinging girlfriend across the room. (Choi and Pope 1994)

Beaver and colleagues (Beaver et al. 2008) analyzed data from the National Longitudinal Study of Adolescent Health (Add Health) to determine the effects of AAS on serious violent behavior. Approximately, 2.6% males of 20,000 participants in the national study had used anabolic-androgenic steroids at least once in their entire lifetime, and 2.3% of males had used AAS in the past year. Violent behaviors were self-reported and determined by an 8-point scale similar to violence measures used previously (Beaver et al. 2008). Questions in this scale helped to capture involvement of participants in serious violent acts such as physical fighting. A poly-drug scale was additionally given to help separate anabolic-androgenic effects on participants from other drugs. It was shown that males that had used anabolic-androgenic steroids at least one point in their life had greater involvement in violent behaviors as opposed to males that had never previously used AAS. This existed with the controls added for violence (model 2), polydrug use (model 2), and with both control measures combined (model 4) (Beaver et al. 2008). Similar results were found with males who had used AAS in the previous year; males who had used AAS in the previous year scored significantly higher than males who had not used AAS in the previous year (Beaver et al. 2008). These effects were noted after being controlled for the different models of violence, polydrug use, and combined measures. Although results from this research suggest that there is a relation between AAS use and violent behaviors, limitations are present; unlike previous research on AAS, data was taken from self-report questionnaires provided through Add Health and were not

direct measures. In addition to this, measures of violent behavior also were provided from self-reported data.

To summarize, few studies have examined the link between AAS use and violent behavior, and while there is some evidence of a link, the small clinical samples and reliance on inmate samples makes it difficult to generalize findings and to have confidence in an AAS/violence association. Although cited heavily by other anabolic steroid researchers, these studies do not consider sociological factors and tend to assume that AAS increases violence only through pharmacological means (though this relationship may be spurious). These heavily cited studies were included in the present study to document the limitations in the AAS – violent behavior body of research such as small sample sizes, issues with generalizability and reproducibility and ignoring the potential role of social factors — issues the present study addresses.

METHODOLOGY

Data Collection

Data for the current study was originally collected through the National Longitudinal Study of Adolescent to Adult Health (Add Health), a nationally representative and longitudinal survey administered to adolescents enrolled in 7th through 12th grades in the United States originally during the 1994-95 school year (Add Health 2018)(Harris et al. 2013). A stratified sample of 80 high schools were chosen by Add Health researchers from the primary selection frame of 26,666 high schools included from the Quality Education Database (QED) with 52 junior high and middle schools

"feeder" schools participating alongside (Harris et al. 2013). Important to note is that the schools selected were stratified by region, urbanicity, school type (public, private, parochial), ethnic mix, and size (Harris et al. 2013). The communities housing the schools were located in urban, suburban, and rural areas of the country (Harris et al. 2013) with school sizes varying from fewer than 100 students to more than 3,000 students (Harris et al. 2013). Questions asked to the participants encompassed multitudes of areas including: social, economic, psychological and physical well-being with contextual data on the family, neighborhood, community, school, friendships, peer groups, and romantic relationships (Add Health 2018).

Specifically, the current study is utilizing data from the third wave of Add Health. It was collected from the original respondents, now young adults (from 1994-95 cohort), in 2001-2002 during in-home interviews. In addition to the previous questions, the third wave of Add Health offered new installments with questions on relationship status, marital, childbearing, and educational histories, and to date key labor force events (Add Health 2018) as well as including sections predominantly focusing on the now young adults in order to improve longitudinal measures (Add Health 2018). For example, college and work questions were reworked and added to account for the different change in social context and maturation of study participants. It's important to note that during this wave, peer groups have become smaller networks and with more diversity based on school location. A pertinent topic explored in Wave III was romantic and sexual relationships and beyond, indicated by the following: "Relationships with romantic partners likely are more influential as respondents approach decisions about cohabitation and marriage" (Add Health 2018).

Changes over time in the dataset are expected, and Add Health prepared for this by tailoring questions to the young adult population with the new subject matter. To retain confidentiality, participants were administered the questions in-home using an encrypted laptop (similar to earlier waves) and given the choice to provide input either directly by hand or to the interviewer is the information was deemed to be appropriate (Add Health 2018). The Wave III public-use dataset encompasses a total of 4,882 (n = 4,882) of the original Wave I respondents who were re-interviewed between August 2001 and April 2002 and were between 18 and 26 years old at the time of interview (Add Health 2018).

The current study will utilize questions from the Add Health Wave III dataset regarding basic demographic information from participants, violent behaviors and attitudes, dating and relationship statuses, anabolic-androgenic steroid use, perceived masculinity, peer attitudes toward binge drinking, self-esteem, employment, and school enrollment for data analysis. Within the context of demographic information pertaining to participants, the following questions will be utilized for data analysis:

- [H3OD4A] What is your race (check all that apply): white

- [H3OD2] Are you of Hispanic or Latino origin?

- [H3OD4B] What is your race (check all that apply): black or African American

- [H3OD4C] What is your race (check all that apply): Native American

- [H3OD4D] What is your race (check all that apply): Asian or Pacific Islander

- [H1RM1] How far in school did she [resident mother] go?

- [W3, BIO_SEX3] Respondent's Gender

- [W3, H3OD1Y] What is your birth date?

(Add Health 2018). These questions will be used in the current study's data analysis as demographic controls once logistic regression is utilized for multivariate analysis.

Questions of interest that will be included in data analysis accounting for violent behaviors, attitudes, and anabolic-androgenic steroid use are as follow:

- [H3DS17] In the past 12 months, how often did you hurt someone badly enough in a physical fight that he or she needed care from a doctor or nurse?

- [H3DS7] In the past 12 months, how often did you take part in a physical fight where a group of your friends was against another group?

- [H3DS] Which of the following things happened in the past 12 months? You shot or stabbed someone

- [H3TO107] In the past year, have you used anabolic steroids or other illegal performance enhancing substances for athletes?

(Add Health 2018). The aforementioned questions will participate as proxies in the role of the current study's primary variables, anabolic-androgenic steroid use as the independent variable and behaviors of violence acting as dependent variables.

Questions of interest involving self-attitudes, masculinity, social attachment, delinquent peer behaviors, education, and employment status for data analysis are as follow:

- [H3SP2] In the past 12 months, how often have you cried a lot?

- [H3TO104] Of your three best friends, how many binge drink at least once a month?

- [H3SP21] Do you agree or disagree that you like yourself just the way you are?

- [H3DA28] Do you currently have a job?

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- [H3ED23] Are you currently attending regular school? If you are enrolled but on school break or vacation, count this as attending

(Add Health 2018). This series of questions will be utilized as proxy measures for the social theories (Social Learning Theory, Social Bond Theory/Social Control Theory, Self-Esteem theory, and Hegemonic Masculinity theory during the data analysis portion of the present study.

Social Learning Theory uses "binge drinking friends" as a proxy measure based on Durkin, Wolfe, and Clark's findings that "*The social learning model explains approximately 45 % of the variance in the binge drinking of these students. The results indicate that differential peer associations are by far the best predictor of this behavior*" (Durkin et al. 2016:256), consistent with the theory's premise that differential association with peers impacts an individuals behavior regarding delinquent acts. Drug-using friends has been used a measure in previous research (Akers et al. 1979) for delinquent association.

Social Bond Theory (commitment) uses the appropriate questions regarding employment and schooling seen by Hart and Mueller "*Results indicate that social bond measures account for a significant variance in school delinquency*" (Hart and Mueller 2013:116) as well as Salvatore and Taniguchi *"having strong social bonds to agencies such as employment and marriage can explain desistance in adulthood even in an individual previously engaged in crime and delinquency"* (Salvatore and Taniguchi 2013:2), both studies indicating a relationship between delinquency and their respective measures. It's been noted in the literature that 'commitment to education' has been used an association to delinquency (Chapple, McQuillan, and Berdahl 2005).

Self-esteem is measured in the current study with Add Health item "Do you agree or disagree that you like yourself just the way you are?" which is consistent with the literature; foe example, Rosenberg's Self-Esteem Scale item 10: "*I take a positive attitude toward myself*" (Winch and Rosenberg 1965) has been used to measure participants self-esteem.

Masculinity in the present study is measured as a denial of frequent crying. This is seen to be consistent with Magovcevic and Addis, "*For example, depressive affect and behaviors that accompany depression (e.g., crying) have been stereotyped as feminine (Warren, 1983) and may be particularly aversive to a man who adheres to the norms of stoicism and toughness*" (Magovcevic and Addis 2008). Denying crying has been used as a measure of masculinity in the literature (Haley 2009), referred to as restrictive male emotionality. Single-item measures were used due to a limited number of questions available, a limitation for the present study.

<div align="center">Statistical Methods</div>

Data analysis for the present study will be performed using logistic regression as multivariate output through the utilization of IBM SPSS statistical software. Logistic regression is appropriately used in the present study, indicated a quote from Kremelberg in Practical Statistics; "logistic regression is used when your dependent variable is binary, or only has two outcomes, and can be coded as simply 0 or 1" (Kremelberg 2011:236). All of the dependent measures in the present study are dichotomous, so logistic regression will be used for all multivariate models.

In case readers are not familiar with the interpretation of logistic regression coefficients, Kremelberg states that, "A positive value would indicate a positive or direct relationship between the independent variable and the dependent variable, while a negative value would indicate a negative or inverse relationship between the two variables" (Kremelberg 2011) so that "in a positive or direct relationship, as the value of the independent variable increases, so does the value of the dependent variable... in the case of a negative or inverse relationship, as the value of the independent variable increases, the value of the dependent variable decreases accordingly" (Kremelberg 2011).

In addition to multivariate analysis provided by logistic regression, descriptive statistics will be provided along with bivariate correlations from variables of interest. Due to the aforementioned dichotomous variables in use, a cross tabulation table must be used in place of a bivariate table utilizing Pearson's R correlation due to appropriateness. Specifically, this method of finding correlatives between variables is referred to as Cramer's V (Gau 2015). From 'Statistics for Criminology and Criminal Justice' authored by Jacinda Gau, Cramer's V is defined as "a statistical measure of association that quantifies the strength or magnitude of a relationship between two nominal-level variables" (Gau 2015) and is used as a post-test after chi-squared has determined significance on strengths of association.

For variables 'amount of binge-drinking friends' and 'assessment of liking oneself,' Spearman's rank order correlation is performed (Spearman 1904) to obtain correlation coefficients denoting the strength and relationship of the two variables. Differing from other variables in the current study, 'amount of binge-drinking friends' and 'assessment of liking oneself' are continuous (ordinal in this context), therefore

appropriately utilized through the use of Spearman's rank-order correlation as opposed to the similar correlation-calculating Pearson's R (Bollen and Barb 1981).

Multivariate analysis tables will include data provided from the following resources via IBM SPSS statistical software: Variables in the Equation, Omnibus Tests of Model Coefficients (Chi-square hypothesis test, degrees of freedom, p-value significance), and Model Summary (Nagelkerke R Square). Nagelkerke's R-squared is considered a pseudo R-squared formula (Kremelberg 2011) as there is no direct equivalent of the R-squared value from the likes of linear regression. Including this variation indicator in the multivariate portion of the present study provides an estimate of the linear regression R-squared value. However, Pseudo R-squared formulas do not directly calculate the percent variance in the dependent variables explained by independent values and therefore should not be interpreted as doing such (Kremelberg 2011). Unstandardized coefficient values are included in each multivariate table as signifiers of constant effect and p-values to signify the significance of the relationship between the dependent and independent variable(s) (Kremelberg 2011).

Included in each logistic regression multivariate table, three groups will be displayed along with the values associated with each individual entity. The 1st group in the multivariate tables consists of anabolic-androgenic steroid use (as the independent variable) and selected violent behavior (separate tables will be produced for 'involvement in group fighting in the past 12 months', 'hurting someone badly in the past 12 months', 'shooting or stabbing someone in the past 12 months', as well as a violence index. This violence index is a composite of the aforementioned questions to create an indexed variable).

The 2nd group presented in the multivariate tables consists of AAS use along with demographic control variables (mother's education, age of respondent, gender of respondent, race/ethnicity of respondent) with selected dependent variable (involvement in group fighting in the past 12 months, hurting someone badly in the past 12 months, shooting or stabbing someone in the past 12 months, and a violence index). Important to note, demographic variable 'white' is omitted from each multivariate table due to skewness of the Add Health dataset. Remaining and appropriate race/ethnicity variables include the following: Black/African American, American Indian/Native American, Hispanic, and Asian American/Pacific Islander.

The 3rd group included in the multivariate tables consists of AAS use, demographic controls (mother's education, age of respondent, gender of respondent, race/ethnicity of respondent) as well as sociological theory variables (frequency of crying, assessment of liking oneself, employment status and schooling enrollment, amount of binge-drinking friends). This of course is in addition to the selected dependent variable (involvement in group fighting in the past 12 months, hurting someone badly in the past 12 months, shooting or stabbing someone in the past 12 months, and a violence index).

Ethical considerations

No concerning ethical limitations are identifiable in the current study. Research participant information collected originally by National Longitudinal Study of Adolescent to Adult Health (Add Health 2018) and participants themselves were not subjected to harm in any way and respect for the dignity of research participants was

prioritized to the best of observable knowledge (Bryman and Bell 2015). The original

data collection conforms to Bryman & Bell's ten most important principles related to

ethical considerations for research (Bryman and Bell 2015).

Important to note is that Add Health participants provided written informed

consent for participation in all aspects of Add Health in accordance with the University of

North Carolina School of Public Health Institutional Review Board guidelines that are

based on the Code of Federal Regulations on the Protection of Human Subjects

45CFR46: (Add Health 2018).

RESULTS

Table 1 displays minimum, maximum, means, standard deviations and skewness

for each continuous variable. For this purpose, skewness (Doane and Seward 2011) is

included as a measure of the asymmetry of the probability distribution and it's mean, and

is listed as either positive, negative, or undefined.

Table 1. Descriptive Statistics—Continuous Variables

Variable	Minimum	Maximum	Mean	SD	Skewness
Binge drinking	.00	6.00	1.10	1.20	.640
Self-esteem	1.00	5.00	4.10	.85	-1.001
Age	18.00	27.00	21.98	1.75	-.009
Mother's education	1.00	10.00	6.79	2.19	-.474

ABBREVIATION: SD = standard deviation.

As indicated by the descriptive statistics table, the mean value for age (21.98) is remarkably higher than the accompanying three variables due to the range of responses from participants answering between 18 years of age to 27 years of age from the Add Health questionnaire item (Add Health 2018). Skewness (Doane and Seward 2011) was highest for the Self-esteem measure, indicating a skew to the left of a distribution if visualized as normally distributed.

The second highest value, Binge drinking, indicates a skewness of .640. However, neither of these variables' skewness is of concern. This is recognizable by the rule of any value registering below -1 or above 1+ as problematic (Doane and Seward 2011). With respect to variance (Kremelberg 2011), binge drinking friends has a standard deviation larger than its mean, which indicates that adolescents vary a great deal in terms of the number of binge drinking friends they have.

Table 2. Descriptive Statistics—Non-Continuous Binary Variables

Variable	Category	% Yes	N
Steroid use	Yes, no	1.28	62
Shot or stabbed someone	Yes, no	.48	23
Involved in a group fight	Yes, no	8.34	407
Hurt someone badly	Yes, no	5.60	273
Violence index	Yes, no	14.42	704
Gender - male	Male, female	47.16	2302
Ethnicity - White	Yes, no	66.27	3235
Ethnicity - Black	Yes, no	22.92	1119
Ethnicity – American Indian	Yes, no	5.48	268
Ethnicity - Asian	Yes, no	8.36	408
Ethnicity - Hispanic	Yes, no	16.30	796
Crying frequently	Yes, no	22.09	1078
Go to work and school	Yes, no	54.59	2665

Table 2 displays variable names, percentages of response frequencies, the categories of response from participants, means, standard deviations, and skewness (Doane and Seward 2011). Differing from the accompanying binary variables, "Gender – male" is isolated as the single variable in this grouping to have been answered by the Add Health participants as "male or female" rather than "yes or no (Add Health 2018)."

Percentages indicate participants' frequency of marked responses according to each question, I.E; anabolic-androgenic steroid use item "yes" responses constituted 1.28% of the total valid participant responses. Evidenced by the table, the "Ethnicity – white" percentage is noticeably higher than accompanying race/ethnicity variables indicating a much higher white respondent base when compared to percentages such as Ethnicity – American Indian (5.48) or Ethnicity – Asian (8.36).

Table 2 indicates that a multitude of these binary variables exhibit strong variation (Kremelberg 2011), IE: "Shot or stabbed someone," "Violence index," "Ethnicity – American Indian," and "Ethnicity – Asian." Standard deviations are higher than their respective means in all variables but "Go to work and school," "Ethnicity – White," and with "Gender – male" on the cusp. Skewness values were added to the table as supplementary reference, but are not of importance regarding dichotomous variables (Doane and Seward 2011). As assumed, measures of violent behavior are particularly skewed; "Shot or stabbed someone" exemplifies this notion by a reading of 16.13, well beyond the typical limitation of 1 (Doane and Seward 2011).

Correlations between selected violent behaviors (shot or stabbed, hurt someone badly, group fight, and violence index) and AAS use with the addition of sociological theories variables are displayed in Table 3 as Cramer's V crosstabulation correlates

(Gingrich 2004). A small effect (df* = 1) is indicated by the range .10 - .29, a moderate

effect by range .30 - .49, and a large effect by .50 and beyond (Gingrich 2004). Viewing

strictly from a fundamental standpoint, steroid use is significantly correlated with all

types of violent behaviors as already predicted. While many of the correlations are

identifiable as weak or moderate (Gingrich 2004), several are of interest such as the

relationship between self-esteem and denying crying which is a small effect (.121**) but

statistically significant at $p < .01$. This observation indicates that the higher the self-

esteem of an individual, the higher the likelihood is to deny crying.

Table 3. Cramer's V Correlations Between Violent Behaviors, AAS use, and Sociological Measures

	Steroid use	Denying crying	Shot or stabbed	Group fight	Hurt someone badly	Violence index	Self esteem	Work and school	Friend binge
Steroid use	0.00	.067**	.073**	.053**	.137**	.097**	.014	.018	.038
Denying crying	.067**	0.00	.017	.056**	.086**	.083**	.121**	.010	.103**
Shot or stabbed	.073**	.017	0.00	.148	.235	.182**	.024	.039	.028
Group fight	.053**	.056**	.148**	0.00	.401	.863**	.028	.053**	.162**
Hurt someone badly	.137**	.086**	.235**	.401**	0.00	.690**	.047	.071**	.131**
Violence index	.097**	.083**	.182	.863	.690	0.00	.038	.066**	.178**
Self esteem	.014	.121**	.024	.028	.047	.038	0.00	.063	.031
Work and school	.018	.010	.039	.053	.071	.066	.063**	0.00	.063
Friends binge	.038	.103**	.028	.162	.131	.178	.031	.063	0.00

*p < .05; **p < .01 (two-tailed test).

Also of interest is the relationship between "Violence index" (composite of violent behaviors) and "Friends binge." At a statistically significant ($p < .01$) correlation of .178**, this observation indicates that the likelihood of having friends who binge drink is elevated when individuals participate in violent behaviors such as shooting or stabbing someone, being involved in a group fight, or hurting someone badly enough to require medical attention.

Turning to the multivariate analysis, the logistic regression model in Table 4 clearly shows that the AAS – violent behavior (shot or stabbed someone in the past 12 months) relationship remains statistically significant when demographic variables ($\beta = .719$) and sociological theory variables ($\beta = .776$) are added. A slight influence can be seen from the two groups and most noticeably the demographic controls, as indicated by the reduced AAS coefficient. Also to be noted is that no group explains the variance in the model strongly; group three holding the largest R^2 at 17.4%.

Table 4. Logistic Regression Model Using AAS use, Mother's Education, Age, Gender, Race/Ethnicity, and Social Theories to Measure Shooting and Stabbing Relationship

	1		**2**		**3**	
Variables	**β**	**Sig.**	**β**	**Sig.**	**β**	**Sig.**
Steroid use	1.072	.002**	.719	.030*	.776	.000***
Mother's education			.005	.854	.010	.712
Age			-.178	.000***	-.201	.000***
Gender			1.761	.000***	1.823	.000***
Ethnicity - Black			.259	.042	.391	.010**
Ethnicity – Native Am			.421	.067	.175	.529
Ethnicity - Asian			.032	.903	.087	.761
Ethnicity - Hispanic			.343	.044	.533	.005**
Denying crying					-.242	.082
Work and school					-.541	.001**
Friends binge					.274	.000***
Self-esteem					-.094	.201

∗$p < .05$; ∗∗$p < .01$; ∗∗∗$p < .001$ (two-tailed test).

Table 5 displays a similar pattern: the significant association between steroid use and group fighting is reduced but not eliminated with the inclusion of demographic variables (Model 2) and social variables (Model 3). Variance of the models is accounted for similarly in both Tables 4 and 5. In group 3, R^2 indicates that 17.3% of the variance is explained in the model.

Table 5. Logistic Regression Model Using AAS use, Mother's Education, Age, Gender, Race/Ethnicity, and Social Theories to Measure Group Fight Involvement Relationship

	1		2		3	
Variables	**β**	**Sig.**	**β**	**Sig.**	**β**	**Sig.**
Steroid use	2.165	.000***	1.754	.000***	1.481	.000***
Mother's education			.006	.850	-.012	.724
Age			-.173	.000***	-.155	.001**
Gender			1.811	.000***	1.845	.000***
Ethnicity - Black			.722	.000***	.739	.000***
Ethnicity – Native Am			.447	.111	.219	.530
Ethnicity - Asian			-.993	.054	-.778	.137
Ethnicity - Hispanic			.237	.280	.281	.257
Denying crying					-.011	.948
Work and school					-.750	.000***
Friends binge					.285	.000***
Self-esteem					-.037	.687

*p < .05; **p < .01; ***p < .001 (two-tailed test).

In Table 6, the connection between AAS use and the violent behavior of hurting someone badly enough to receive medical attention is examined. Based on the results of the logistic regression model, the steroid use coefficient in Model 1 (2.52) is not reduced much by the inclusion of demographic controls, but it becomes noticeable smaller (1.438) and drops to statistical non-significance (p = .187) when the social variables are entered in Model 3. In other words, the social variables eliminate and completely explain the bivariate correlation between AAS use and hurting someone badly.

Table 6. Logistic Regression Model Using AAS use, Mother's Education, Age, Gender, Race/Ethnicity, and Social Theories to Measure Hurting Someone Badly Relationship

	1		2		3	
Variables	**β**	**Sig.**	**β**	**Sig.**	**β**	**Sig.**
Steroid use	2.522	.003**	2.444	.004**	1.438	.184
Mother's education			-.028	.800	-.062	.644
Age			-.020	.878	.140	.415
Gender			1.075	.045*	1.594	.056
Ethnicity - Black			1.348	.007**	.575	.375
Ethnicity – Native Am			.999	.206	.828	.444
Ethnicity - Asian			.743	.482	.864	.422
Ethnicity - Hispanic			.651	.336	-.250	.816
Denying crying					.293	.640
Work and school					-1.183	.425
Friends binge					-.053	.062
Self-esteem					-.247	.831

< .05; ∗∗p < .01; ∗∗∗p < .001 (two-tailed test).

Table 7. Logistic Regression Model Using AAS use, Mother's Education, Age, Gender, Race/Ethnicity, and Social Theories to Measure Violence_Index Relationship

	1		2		3	
Variables	**β**	**Sig.**	**β**	**Sig.**	**β**	**Sig.**
Steroid use	1.593	.000***	1.193	.000***	.975	.004**
Mother's education			.010	.667	.009	.737
Age			-.174	.000***	-.178	.000***
Gender			1.709	.000***	1.773	.000***
Ethnicity - Black			.455	.000***	.525	.000***
Ethnicity – Native Am			.393	.068	.140	.601
Ethnicity - Asian			-.101	.686	.013	.961
Ethnicity - Hispanic			.311	.049	.446	.013
Denying crying					-.162	.208
Work and school					-.513	.001**
Friends binge					.289	.000***
Self-esteem					-.103	.131

< .05; ∗∗p < .01; ∗∗∗p < .001 (two-tailed test).

The overall conclusion drawn from Table 7 demonstrates that even when all previous violent behavior measures are summed into a composite variable

(Violence_index), the inclusion of demographic and sociological variables reduce but do not eliminate the link between steroids use and an index of violent behavior. Modest and statistically significant unstandardized coefficients are reported, (1.193 and .975 respectively) and moderate R^2 values indicate that the model does not explain much of the variation in the dependent variable.

Lastly, interesting to note is that the most influential effects were observed in Table 5 (group_fight relationship) with a significant reduction in relationship strength (β = 1.481) when demographic and sociological variables were included, whereas the most comprehensive violent behavior measure (Violence_index) was only slightly less influenced by the same variables. In this specific case, it's shown that certain single violent behaviors are more easily influenced than a combination of several behaviors.

DISCUSSION

Social Learning Theory asserts that delinquent behaviors are learned through operant conditioning both in social and nonsocial situations (Burgess and Akers 1966), with most principle parts of learning occurring in groups; the strength of criminal behavior is determined by the frequency and probability of reinforcement (Burgess and Akers 1966). The present study shows similar findings in each violent behavior measure from the logistic regression models. In all but the "hurting someone badly in the past 12 months" model's weak finding, the social learning variable of "binge drinking friends" displays a significant but does not eliminate the AAS use and violent behavior relationship, in any of the regression models.

According to Social Bond/Social Control Theory, a lack of strong bonds to society and individuals helps to explain delinquent behaviors (Pratt et al. 2008). Bonds such as attachment (family, friends, community) and commitment (career, success, personal goals) particularly are noted (Pratt et al. 2008); these bonds are exemplified in the present study by employment and being enrolled in school (work/school variable). Findings indicate that, similar to binge-drinking friends, commitment to work and school is significant related to violence in three out of four models. However, the steroids/violent link is only reduced, not eliminated, when involvement in work and school are considered.

In contrast to drinking friends and commitment to work and school, low self-esteem, derived from Self-Esteem theory (Kaplan 1976) and denying crying, derived from Hegemonic Masculinity (Messerschmidt 2012) were not significantly related to measures of violence in the multivariate models. Given the limitations of the measures employed in this study, improved tests of these theories should be conducted.

Regarding the two hypotheses outlined previously in the study, (1. AAS will be positively associated with various measures of violent offending. 2. The link between AAS use and violent offending will be reduced or even eliminated when social factors are included in multivariate models) the following can be concluded. Consistent with the previous literature (Choi et al. 1990; Choi and Pope 1994; Parrott et al. 1994; Pope et al. 1996), these findings indicate that AAS use is positively and associated with various measures of violent offending. The magnitude of the AAS/violence correlation reported in the current study is comparable to that found in the previous research (Beaver et al.

2008). The link between anabolic-androgenic steroid use and violent behaviors was reduced but not erased with the addition of theory-based social factors.

It can be concluded from the reduction of the coefficient in the binary logistic regression models that the hypothesis of AAS use and violent behaviors experiencing a reduction (though not eliminated) when sociological factors are implemented is supported. These findings indicate a shared role of social factors in addition to the previously documented pharmacological and biological evidence in the relationship between AAS and violent behaviors.

Strengths and Limitations

The use of quantitative methods for data collection elicits several strengths and limitations, particularly secondary data. Strictly from a quantitative method perspective, strengths included in this type of methodology include: relying on secondary data collected by Add Health, research findings are generalizable from the well-designed selection process of a representative sample. By the use of statistical methods employed through IBM SPSS, the data is adequately simple to analyze. Lastly, the data tends to be consistent, precise and reliable (Universitet 2018).

Contributing to the strengths of this particular research design is that of the diverse sampling population provided by Add Health. Race and ethnicity data is robust in this dataset, an attribute that may be found lacking in other national surveys or simply too skewed for proper data analysis (I.E. Asian/Pacific Islander demographic variable). Add Health as stated previously is nationally representative (Harris et al. 2013) by including an impressive amount of male and female participants, again avoiding an issue of

possible skewness due to a lack of inclusivity or sheer lack in number of participants. It's

also worth mentioning that the current study findings produced through this data set are

highly consistent with robustness due to the high level of statistical power.

Strictly from a quantitative method perspective, the limitations found in the

present study: there are instances in which questions from the secondary dataset cannot

be accessed or substituted with separate proxy variables (in Add Health, this means

selecting from a different wave) in addition to the unavailability of several pre-screening

questions. Other issues associated with quantitative data methods are the possibilities that

it may be "difficult to understand context of a phenomenon" (Universitet 2018) and that

the "data may not be robust enough to explain complex issues" (Universitet 2018)

although this concern is not of utmost importance due to the extensive dataset provided

by Add Health (Harris et al. 2013).

One of the central limiting factors in the present study is the sheer lack of

anabolic-androgenic steroid users (n = 62) in the Add Health dataset, presenting the

statistical issue of skewness. Furthering this limitation is the even more apparent lack of

female anabolic-androgenic steroid users, which renders findings in the current study for

female participants non-representative; however, the results are still interpretable and

greater than the previous literature total sample sizes (n = 23) (Choi and Pope 1994), (n =

21) (Parrott et al. 1994), (n = 12) (Choi et al. 1990). On the positive side, the total sample

was large, which generates the sort of statistical power that is capable of detecting even

weak association

Another concern worth noting is the ambiguity of the term steroids in both the

literature and particularly the Add Health question used for data analysis. Anabolic-

androgenic steroids, or simply steroids, is used singularly but encompasses a broad range of testosterone-derivatives (Wedro; MD 2018). This could very well include compounds that are typically ingested orally such as 17-alpha-alkalated steroids but also encompasses steroids that are injected intra-muscularly such as testosterone cypionate or nandrolone decanoate (Wedro; MD 2018).

In addition to the broad ambiguity of anabolic-androgenic steroid reference, measurement of AAS use is problematic in the Add Health dataset. It's well-documented that AAS effects and side effects are not acute and rather are gradual depending on the ester (cypionate, decanoate, phenyl-propionate, acetate, etc.) responsible for delivery (Wedro; MD 2018). Therefore, Add Health question [H3TO107] "In the past year, have you used anabolic steroids or other illegal performance enhancing substances for athletes?" is also ambiguous, providing a limitation by leaving a suitable reference time of AAS administration to be desired.

The utilization of self-report data may raise concern regarding validity and reliability (Huizinga and Elliott 1986) due to possible inefficiencies of accuracy by survey respondents. The present study utilizes cross-sectional data from Add Health (Harris et al. 2013) as opposed to a superior longitudinal study design creating an issue of causality; possibility that violent behaviors caused individuals to use anabolic-androgenic steroids. Wave III of Add Health introduced questions specifically targeting the young adult respondent's relationship, dating, sexual, and romantic behaviors; many of these questions were found to be unavailable and could not be used for data analysis. In view of the fact of that this unavailability exists, a pertinent question for Social Bond Theory (Pratt et al. 2008) within the context of romantic relationships was omitted. A further

limitation regarding Social Bond Theory was the sole use of only one bond, commitment, due to the lack of other suitable items from Wave III of Add Health.

Future Research

Further research is needed to fully determine the social effect on the relationship between AAS use and violent behavior. Utilization of a longitudinal dataset in the future would address and account for issues regarding validity and reliability. In the context of data collection, a more varied group of participants would be preferable; females are not representative and generalizable to the population due to the aggressively skewed participant pool. Social Bond Theory's attachment bond (Pratt et al. 2008) is well-suited for use as a sociological control variable, but was not included in the analysis due to unavailability in the Wave III dataset from Add Health.

A question encompassing the romantic involvement of a participant would prove useful in further research, particularly those involving young adults. Future research on AAS use and violent behaviors may also want to consider a more appropriate screening question for anabolic-androgenic steroid use as the all-encompassing "steroid" label may be too unspecific and ambiguous to draw clear conclusions from as different AAS compounds elicit different behaviors and attitudes.

REFERENCES

(NIDA) National Institute of Drug Abuse. 2015. "DrugFacts: Nationwide Trends | National Institute on Drug Abuse (NIDA)." *National Institute of Drug Abuse* 3. Retrieved (https://www.drugabuse.gov/publications/drugfacts/anabolic-steroids).

Akers, Ronald L., Marvin D. Krohn, L. Lanza-Kaduce, and M. Radosevich. 1979. "Social Learning and Deviant Behavior: A Specific Test of a General Theory." *American Sociological Review* 44(4):636–55.

Anon. 2018. "Add Health." Retrieved (http://www.cpc.unc.edu/projects/addhealth).

Bahrke, Michael S., Charles E. Yesa, and James E. Wright. 1990. "Psychological and Behavioural Effects of Endogenous Testosterone Levels and Anabolic-Androgenic Steroids Among Males A Review '." *Sports Medicine* 10(5):303–37.

Beaver, Kevin M., Michael G. Vaughn, Matt DeLisi, and John Paul Wright. 2008. "Anabolic-Androgenic Steroid Use and Involvement in Violent Behavior in a Nationally Representative Sample of Young Adult Males in the United States." *American Journal of Public Health* 98(12):2185–87.

Bollen, Kenneth A. and Kenney H. Barb. 1981. "Pearson's R and Coarsely Categorized Measures." *American Sociological Review* 46(2):232. Retrieved (http://www.jstor.org/stable/2094981?origin=crossref).

Bowlby, J. 1988. *A Secure Base: Clinical Applications of Attachment Theory*. Retrieved (http://books.google.com/books?hl=en&lr=&id=vQiKxEjjqmgC&oi=fnd&pg=PR9&dq=A+secure+base:+Clinical+applications+of+attachment+theory&ots=9ThI8YvNdc&sig=bUb15kHkrEnePW6GGfKN8JtQoL8).

Bryman, Alan and Emma Bell. 2015. *Business Research Methods*.

Burgess, Robert L. and Ronald L. Akers. 1966. "A Differential Association-Reinforcement Theory of Criminal Behavior." *Social Problems* 14(2):128–47. Retrieved (http://www.jstor.org/stable/798612%5Cnhttp://www.jstor.org/page/info/about/policies/terms.jsp%5Cnhttp://www.jstor.org).

Carrigan, Tim, Bob Connell, and John Lee. 1985. "Toward a New Sociology of Masculinity." *Theory and Society* 14(5):551–604.

Chapple, Constance L., Julia A. McQuillan, and Terceira A. Berdahl. 2005. "Gender, Social Bonds, and Delinquency: A Comparison of Boys' and Girls' Models." *Social Science Research* 34(2):357–83.

Choi, P. Y. L., A. C. Parrott, and D. Cowan. 1990. "High- dose Anabolic Steroids in Strength Athletes: Effects upon Hostility and Aggression." *Human Psychopharmacology: Clinical and Experimental* 5(4):349–56.

Choi, P. Y. L. and H. G. Pope. 1994. "Violence toward Women and Illicit Androgenic-Anabolic Steroid Use." *Annals of Clinical Psychiatry* 6(1):21–25.

Clark, Ann S. and Leslie P. Henderson. 2003. "Behavioral and Physiological Responses to Anabolic-Androgenic Steroids." *Neuroscience and Biobehavioral Reviews* 27(5):413–36.

Cullen, Francis and Robert Agnew. 2003. *Criminological Theory: Past to Present : Essential Readings*. Second. edited by D. VanDercreek and J. Ballinger. Los Angeles, California: Teweles, Claude.

Cullen, Francis and Pamela Wilcox. 2010. "Sutherland, Edwin H.: Differential Association Theory and Differential Social Organization." *Encyclopedia of Criminological Theory* 899–907.

Doane, David P. and Lori E. Seward. 2011. "Measuring Skewness: A Forgotten Statistic?" *Journal of Statistics Education* 19(2). Retrieved (https://www.tandfonline.com/doi/full/10.1080/10691898.2011.11889611).

Durkin, Keith F. et al. 2016. "COLLEGE STUDENTS AND BINGE DRINKING : AN EVALUATION OF SOCIAL LEARNING THEORY." 2173(April).

Fernandez, Ephrem, Andrew Day, and Gregory J. Boyle. 2015. "Measures of Anger and Hostility in Adults." Pp. 74–100 in *Measures of Personality and Social Psychological Constructs*.

Gage, Elizabeth Ann. 2008. "Collegiate Setting." *Violence Against Women* 14(9):1014–32.

Ganesan, Kavitha and Mark V. Pellegrini. 2018. "Anabolic Steroids." *StatPearls Publishing*.

Gau, Jacinta. 2015. *Statistics for Criminology and Criminal Justice*. 2nd ed. SAGE Publications.

Gingrich, Paul. 2004. "Chapter 11 Association Between Variables." *Introductory Statistics for the Social Sciences - Http://uregina.ca/~gingrich/text.htm* 794–835. Retrieved (http://uregina.ca/~gingrich/text.htm).

Haley, James Thomas. 2009. "Stuttering, Emotional Expression, and Masculinity: Fighting out Words, Fighting Back Tears." *Dissertation Abstracts International: Section B: The Sciences and Engineering* 70(5–B). Retrieved (http://search.ebscohost.com/login.aspx?direct=true&db=psyh&AN=2009-99220-303&site=ehost-live).

Harris, Kathleen Mullan, J.Richard Udry, and Peter S. Bearman. 2013. "The Add Health Study: Design and Accomplishments." 1–22. Retrieved (http://www.cpc.unc.edu/projects/addhealth/documentation/guides/DesignPaperWII V.pdf).

Hart, Caroline O. and Christian E. Mueller. 2013. "School Delinquency and Social Bond Factors: Exploring Gendered Differences among a National Sample of 10th Graders." 50(2):116–33.

Huizinga, David and Delbert S. Elliott. 1986. "Reassessing the Reliability and Validity of Self-Report Delinquency Measures." *Journal of Quantitative Criminology* 2(4):293–327.

Isacsson, G., M. Garle, E. B. Ljung, U. Asgård, and U. Bergman. 1998. "Anabolic Steroids and Violent Crime--an Epidemiological Study at a Jail in Stockholm, Sweden." *Comprehensive Psychiatry* 39(4):203–5. Retrieved (http://www.ncbi.nlm.nih.gov/pubmed/9675504).

Kaplan, Howard B. 1976. "Self-Attitudes and Deviant Response." *Social Forces* 54(4):788–801.

Kouri, Elena M., Scott E. Lukas, Harrison G. Pope, and Paul S. Oliva. 1995. "Increased Aggressive Responding in Male Volunteers Following the Administration of Gradually Increasing Doses of Testosterone Cypionate." *Drug and Alcohol Dependence* 40(1):73–79.

Kremelberg, David. 2011. *Practical Statistics*. edited by V. Knight and L. Habib. Thousand Oaks: SAGE Publications.

L., Akers.Ronald and Christine S. Sellers. 2012. "Introduction to Criminological Theory." Pp. 1–13 in *Criminological Theories. Introduction, Evaluation, and Application*.

Lundholm, Lena, Ulrika Haggård, Jette Möller, Johan Hallqvist, and Ingemar Thiblin. 2013. "The Triggering Effect of Alcohol and Illicit Drugs on Violent Crime in a Remand Prison Population: A Case Crossover Study." *Drug and Alcohol Dependence* 129(1–2):110–15. Retrieved (http://dx.doi.org/10.1016/j.drugalcdep.2012.09.019).

Magovcevic, Mariola and Michael E. Addis. 2008. "The Masculine Depression Scale: Development and Psychometric Evaluation." *Psychology of Men and Masculinity* 9(3):117–32.

Maravelias, C., A. Dona, M. Stefanidou, and C. Spiliopoulou. 2005. "Adverse Effects of Anabolic Steroids in Athletes: A Constant Threat." *Toxicology Letters* 158(3):167–75.

Messerschmidt, James W. 2012. "Engendering Gendered Knowledge: Assessing the Academic Appropriation of Hegemonic Masculinity." *Men and Masculinities* 15(1):56–76.

Miech, Richard A., Lloyd D. Johnston, Patrick M. O 'malley, Jerald G. Bachman, and John E. Schulenberg. 1975. "Secondary School Students." *Monitoring the Future*.

Miller, Kathleen E. et al. 2013. "Pacific Sociological Association Anabolic-Androgenic Steroid Use and Other Adolescent Problem Behaviors : Rethinking the Male Athlete Assumption." *SAGE* 45(4):467–89.

Murphy, Gardner. 1947. "Personality." *Harper* 999.

Parrott, A. C., P. Y. L. Choi, and M. Davies. 1994. "Anabolic Steroid Use by Amateur Athletes: Effects upon Psychological Mood State." *Journal of Sports Medicine and Physical Fitness* 34(3):292–98.

Pope, Harrison G., Elena M. Kouri, Kenneth F. Powell, Corbett Campbell, and David L. Katz. 1996. "Anabolic-Androgenic Steroid Use among 133 Prisoners." *Comprehensive Psychiatry* 37(5):322–27.

Pratt, Travis C., Travis W. Franklin, and Jacinta M. Gau. 2008. "Key Idea : Hirschi ' S Social Bond / Social Control Theory." *Key Ideas in Criminology and Criminal Justice* (1969):55–69. Retrieved (www.sagepub.com/upm-data/36812_5.pdf).

Salvatore, Christopher and Travis A. Taniguchi. 2013. "NIH Public Access." 33(9):738–56.

Sampson, Robert J. and John H. Laub. 2004. "A General Age-Graded Theory of Crime: Lessons Learned and the Future of Life-Course Criminology." *Advances in Criminological Theory* 13(1):28. Retrieved (https://www.researchgate.net/profile/John_Laub/publication/267817138_A_General_Age-Graded_Theory_of_Crime_Lessons_Learned_and_the_Future_of_Life-Course_Criminology/links/55648c3708ae94e957204b89/A-General-Age-Graded-Theory-of-Crime-Lessons-Learned-and-the).

Simmons, Roberta G. and Florence Rosenberg. 1973. "Disturbance in the Self-Image at Adolescence Author (S): Roberta G . Simmons , Florence Rosenberg and Morris Rosenberg Published by : American Sociological Association Stable URL : http://www.jstor.org/stable/2094407." *American Sociological Review* 38(5):553–68.

Smith, James A., Annette Braunack-Mayer, Gary Wittert, and Megan Warin. 2007. "'I've Been Independent for so Damn Long!': Independence, Masculinity and Aging in a Help Seeking Context." *Journal of Aging Studies* 21(4):325–35.

Spearman, Charles. 1904. "Spearman ' S Rank Correlation Coefficient." *Amer. J. Psychol.* 15:72–101.

Spielberger, Charles D. 1972. "Profile of Mood States." *Professional Psychology* 3(4):387–88.

Su, MD; Tung-Ping et al. 1993. "Neuropsychiatric Effects of Anabolic Steroids in Male Normal Volunteers." 269(21).

Universitet, Syddansk. 2018. "Strengths and Limitations." *Copenhagen School of Global Health*.

Volavka, Jan. 1999. "The Neurobiology of Violence: An Update." *Journal of Neuropsychiatry and Clinical Neuroscience* 11(3):307–14.

Warr, Mark. 2002. "Companions in Crime." 172.

Wedro; MD, Benjamin. 2018. "Anabolic Steroid Abuse." *MedicineNet*. Retrieved (https://www.medicinenet.com/anabolic_steroid_abuse/article.htm#anabolic_steroid _abuse_facts).

Winch, Robert F. and Morris Rosenberg. 1965. "Society and the Adolescent Self-Image." *Social Forces* 44(2):255. Retrieved (http://www.jstor.org/stable/2575639?origin=crossref).

Zimmerman, B. J. 2001. "Social Learning, Cognition, and Personality Development." Pp. 14341–45 in *International Encyclopedia of the Social & Behavioral Sciences*. Retrieved (http://www.sciencedirect.com/science/article/pii/B0080430767017654).

Wave III Add Health Survey Items, AAS and Violent Behavior

In the past year, have you used anabolic steroids or other illegal performance enhancing substances for athletes?

Response Value	Response Label	Frequency	Percent
.	missing	6	0.04
0	not marked	15026	98.87
1	marked	73	0.48
6	refused	44	0.29
8	don't know	15	0.10
9	not applicable	33	0.22

Which of the following things happened in the past 12 months? You shot or stabbed someone.

Response Value	Response Label	Frequency	Percent
.	missing	9	0.06
0	no	14764	97.15
1	yes	194	1.28
6	refused	106	0.70
8	don't know	67	0.44
9	not applicable	57	0.38

In the past 12 months, how often did you take part in a physical fight where a group of your friends was against another group?

Response Value	Response Label	Frequency	Percent
.	missing	6	0.04
0	never	13788	90.73
1	1 or 2 times	1021	6.72
2	3 or 4 times	166	1.09
3	5 or more times	81	0.53
6	refused	79	0.52
8	don't know	22	0.14

9	not applicable	34	0.22

In the past 12 months, how often did you hurt someone badly enough in a physical fight that he or she needed care from a doctor or nurse?

Response Value	Response Label	Frequency	Percent
.	missing	7	0.05
0	0 times	14101	92.79
1-67	1 to 67 times	847	5.60
996	refused	91	0.60
998	don't know	74	0.49
999	not applicable	77	0.51

Response Value	Response Label	Frequency	Percent
0	never	3357	22.09
1	just a few times	9448	62.17
2	about once a week	1834	12.07
3	almost every day	413	2.72
4	every day	126	0.83
6	refused	5	0.03
8	don't know	13	0.09
9	not applicable	1	0.01

Wave III Add Items, Theory

Health Survey Sociological

In the past 12 months, how often have you cried a lot?

Do you agree or disagree that you like yourself just the way you are?

Response Value	Response Label	Frequency	Percent
1	strongly agree	5200	34.22
2	agree	4938	32.49
3	neither agree nor disagree	2533	16.68
4	disagree	1177	7.74
5	strongly disagree	107	0.70
96	refused	16	0.11
98	don't know	1193	7.85
99	not applicable	32	0.21

Response Value	Response Label	Frequency	Percent
.	missing	362	2.38
0	none of my friends	7275	47.87
1	one friend	1670	10.99
2	two friends	931	6.13
3	three friends	2234	14.70
6	refused	5	0.03
7	legitimate skip	3894	25.62
8	don't know	4	0.03
9	not applicable	9	0.06

Of your three best friends, how many binge drink at least once a month?

Response Value	Response Label	Frequency	Percent
0	no	9560	62.91
1	yes	5589	36.78
6	refused	29	0.19
8	don't know	9	0.06
9	not applicable	10	0.07

Are you currently enrolled in school or in a job training or vocational education program?

Do you currently have a job?

Response Value	Response Label	Frequency	Percent
0	no	3851	25.34
1	yes	11306	74.40
6	refused	26	0.17
8	don't know	6	0.04
9	not applicable	8	0.05