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SCHOOL-SPONSORED CONTACT SPORTS, CHILDHOOD RELIGIOSITY, AND COMPREHENSIVE AGGRESSION LATER IN LIFE

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Abstract

The general purpose of this study was to investigate whether there is a significant relationship among the number of years that African American girls have participated in school-sponsored contact sports prior to graduating from high school, their childhood religiosity, and their amount of comprehensive aggression as young adults. In order to control for the personal risk factors (i.e., extraneous independent variables) that have been linked to aggression, the personal risk factors of race, sex, age, academic achievement, depression, and Attention Deficit Disorder were controlled through design. Consequently, only African American females, 21 to 40 years of age, who have graduated from high school, who have not been treated for depression, and who have not been diagnosed with Attention Deficit Disorder were surveyed. In addition, in order to control for family and social risk factors (i.e., other extraneous independent variables that have been linked to aggression), data were collected on these risk factors and their impact was controlled statistically. After all of the independent variables (i.e., predictor variables plus extraneous variables) were checked for multicollinearity, multiple regression was used to assess the relationships among the variables. The findings indicate that sports participation and childhood religiosity do not simultaneously or uniquely predict comprehensive aggression. However, the study's findings do indicate that the same predictor variables, along with family and social risk factors, do jointly predict comprehensive aggression.

Keywords: Female Athletes, African Americans, Blacks, Contact Sports, Religiosity, Aggression, Social Learning Theory, Aggression Questionnaire, Religious Emphasis Scale

I. INTRODUCTION

A. *Cost of Crime*

The total cost of crime in the U.S. is about \$3.2 trillion annually [1]. In addition to the direct costs associated with crime, such as the cost of items stolen, the cost of policing, and the cost of the prison system, there are indirect costs. The indirect costs of crime are greater than the direct costs of crime and they include pain and suffering, psychological distress, decreased quality of life, and private expenditures related to the prevention of crime. In short, crime is an expensive problem in the U.S. and efforts must be made to minimize the problem. However, before the problem can be effectively solved, it is important to determine the variables that may be linked to this problem.

B. *Childhood Aggression and Crime Later in Life*

Aggressive behaviors in childhood are good predictors of adult criminality [2] – [4]. Although aggression is the product of a number of interacting factors, no other factor measured in childhood, whether physiological, cognitive, environmental, or familial, has been shown to predict more of the variation in adult antisocial behavior than does early aggression. Indeed, there is stability in the relationship between childhood aggression and adult criminality. In other words, aggressive children become aggressive adults.

Because contact sports have been linked to aggression, and aggression has been linked to crime, it is important to understand the factors that are linked to aggression in order to reduce crime [2] – [4]. Furthermore, because a great amount of learning is done during childhood, anything that can be done to promote the learning of pro-social behaviors and to prevent the learning of aggressive behaviors during this time may prove beneficial to society. In other words, prevention is an effective crime control strategy.

C. *Sports in America*

Sports are important in American society and they provide many benefits, such as a) improving one's self-esteem, b) reducing one's levels of stress, depression, and aggression, c) improving one's leadership skills, d) improving one's motor skills, math skills, and strategic thinking skills, e) learning self-discipline, f) learning how to deal with disappointment and frustration, and g) learning the value of teamwork [5] – [8]. However, because millions of American children participate in school-sponsored sports that utilize aggression, it is important to know whether participation in school-sponsored sports is generating elevated amounts of learned aggression [9]. In order to provide policy makers and policy researchers with information that is currently unavailable to them, additional research is needed to better understand aggression across sports for African American female athletes [10].

D. *The Need for Additional Research on Religiosity and Aggression in Sports*

Researchers, whose studies have indicated that religiosity acts as a buffer against illicit drug use, have called for additional research on religiosity in other social contexts, such as

sports participation, and for other social behaviors, such as aggression [11] – [12]. Specifically, there is a gap in knowledge due to a lack of research addressing religiosity and aggression involving African American female athletes who participate in school-sponsored contact sports. Therefore, the purpose of this study is to examine the relationships among the number of years that African American girls have participated in school-sponsored contact sports prior to graduating from high school, their childhood religiosity, and their amount of comprehensive aggression later in life.

II. LITERATURE REVIEW

A. Akers' Social Learning Theory

There is a large body of evidence that provides strong and consistent support for Akers' social learning theory [13]. Indeed, primary data have been used to assess the validity of Akers' social learning theory and to compare the social learning theory to other theories. As part of the process, more than 100 empirical tests have been conducted, which have produced high levels of explained variance, much more than other theoretical models with which it was compared. Some of these studies include research on drug abuse, teenage smoking, problem drinking, rape and sexual coercion, serious delinquency, cross-national homicide rates, and terrorist violence.

The social learning theory that was developed by Akers and Burgess relies on the concepts of differential association, definitions, differential reinforcement, and imitation [14] - [17]. For example, one way that learning occurs is through the process of differential association in which an individual learns and emulates the attitudes and behaviors of persons whom the individual considers significant. The strength of the individual's attitudes and behaviors is directly related to the frequency, duration, and intensity of the direct and indirect communications that the individual has with those persons whom the individual considers significant. Thus, individuals learn to evaluate their own behaviors through their interactions with significant others and groups in their lives. Furthermore, the content of learning is achieved through definitions. Accordingly, an individual learns which behaviors the significant other people define as favorable and which ones they define as unfavorable and the individual will adapt those same definitions. Finally, the primary mechanism of learning occurs through differential reinforcement and imitation, where behaviors are conditioned through rewards and punishments and are reinforced over time. Indeed, behaviors can be manipulated through positive reinforcement (e.g., by providing rewards), negative reinforcement (e.g., by not requiring extra work), direct punishment (e.g., by requiring extra work), and indirect punishment (e.g., by removing rewards). In addition, learning occurs through direct experience and by observing the behaviors and consequences of other people. In other words, individuals learn to model the behaviors that have demonstrated to be beneficial either to themselves or to other people.

Modifying behaviors through observation, imitation, and reinforcement is an integral part of contact sports. As part of the learning process, coaches often make use of operant conditioning and observational learning. For example, day after day, in order to develop the players' skills and to have them perform in a predictable fashion, the coaches may have the

players perform the same tasks over and over again. Furthermore, even if the players are not performing the tasks themselves, they can still learn how to behave by observing how the actions of other players are rewarded and punished [15]. This process works because the coaches are significant individuals in the lives of the athletes; the coaches have the ability to reward the players by starting them in a game.

Modifying behaviors through punishment and pain is an integral part of contact sports. Coaches often employ physical pain in order to gain compliance, to develop discipline, and to develop the players' physical fitness. This process works because the coaches, who have the ability to reward the players by starting them in a game, are significant individuals in the lives of the athletes [15].

B. Female Athletes and Violence

Although there are many news articles on athletes who commit crimes, there are few studies that actually investigate whether athletes are more likely to engage in crime [18]. Indeed, current research on female sports participation and violent behaviors is scarce [19]. On the one hand, there is no scientific study that conclusively shows that female athletes are more likely to commit assaults than non-athletes [20]. On the other hand, there is no scientific study that conclusively shows that female athletes are less likely to commit assaults than non-athletes [21]. Indeed, research shows that sports may have a positive, negative, or neutral impact on delinquent behaviors [22].

In an effort to assess female athletes and violence, researchers performed a study that compared female athletes to female non-athletes [18]. The researchers found that female high school athletes were twice as likely to fight as female non-athletes. On the other hand, female non-athletes were three times more likely to carry a weapon than female high school athletes.

A second study was conducted on African American female athletes by assessing two years-worth of data collected during a 1989 longitudinal Family and Adolescent Study in Western New York [23]. Data were collected on around 90 African American females from 13 to 16 years of age through face-to-face interviews and by using self-administered surveys. The researchers performed multiple regression analysis to assess the relationship between athletic involvement and overall delinquency, which included violent acts. The findings indicate that the frequency of sports participation did not predict adolescent delinquency.

Finally, a third study was conducted on 156 female athletes who attended a southern U.S. college [24]. Although the researcher stated that he was unable to calculate the composition of females based on race, he did state that nearly 14% of the participants were not Caucasian. Thus, the researcher implied that about 21 of the participants were African American. The researcher collected data from self-administered surveys and performed correlational analyses by calculating Pearson r correlation coefficients. The findings indicate that all of the female athletes (including the African American female athletes) who had participated in contact sports were likely to engage in physically aggressive behaviors outside the sports environment.

C. Religiosity

In an effort to quantify whether religiosity predicts illicit drug use, researchers conducted a cross-sectional study on 532 adolescents from three urban public high schools on the East Coast of the U.S. The researchers measured religiosity by a) how much time was spent in prayer, studying the Bible, and in church service, b) the frequency of financial contributions made to the church, and c) the frequency of attempts made to convert others to believe in God [25]. The sample was randomly selected and was comprised of 45% males, 55% females, and a percentage of African Americans who were representative of the school population in the area. Data were collected using self-administered surveys and were analyzed using Pearson product-moment correlations. The findings indicate that personal commitment to religious beliefs is a good predictor of illicit drug use (i.e., a negative relationship) but that church attendance is not. In other words, merely attending religious events, especially if the children are pressured to be there against their wishes, is not a good predictor of illicit drug use.

In an effort to examine whether religiosity affects the behaviors of people in countries other than the U.S., researchers conducted an international study of religiosity [26]. By measuring religiosity by one's attendance in religious services, the researchers studied data on 40,873 adults from 31 nations and examined whether religiosity was associated with suicide acceptability. Data were collected from the World Health Organization and World Values Surveys through cross-sectional surveys during 1990-1993. The samples were representative of the adult populations within each country and the data collection facilitated international comparisons. Hierarchical linear regression was performed on the data and the findings indicate that the more a person has attended religious services, the less likely the person is to be supportive of harmful and destructive behaviors.

D. Research Question & Null Hypothesis

The purpose of this study was to determine if there is a relationship between contact sports participation, childhood religiosity, and comprehensive aggression later in life. Therefore, the following research question and null hypothesis were developed.

RQ: Is there a relationship among the number of years that African American girls have participated in school-sponsored contact sports prior to graduating from high school, their childhood religiosity, and their amount of comprehensive aggression as young adults?

HO: There is no relationship among the number of years that African American girls have participated in school-sponsored contact sports prior to graduating from high school, their childhood religiosity, and their amount of comprehensive aggression as young adults.

III. METHODOLOGY

A. *Research Design*

This study employed a quantitative, correlational, survey design and used an online survey generator to recruit a convenient, purposive, and non-random sample at a single point in time [27] – [28]. First, a quantitative study uses numeric values and statistical analyses to objectively quantify relationships among variables, to identify patterns, and to make predictions. Second, a correlational design allows for the determination of relationships without being able to manipulate the independent variables. Third, a survey design allows a large amount of data to be collected in a short amount of time and in a uniform manner [29]. In short, the study's design is most appropriate for linking past experiences to current behaviors, for quantifying relationships among variables, and for generalizing the findings to larger populations.

B. *Population & Sample*

The population was defined as young African American adult females who live in the U.S., who graduated from high school in the U.S., who have not been treated for depression or diagnosed with Attention Deficit Disorder, and who have played contact sports, but not collision sports, in high school. However, because the years of contact sports participation is a ratio variable, some of the participants may have played zero years of contact sports (i.e., they may be non-athletes). The sample included 255 African American females, 21 to 40 years of age, who have graduated from a U.S. high school, who played contact sports in high school (but not collision sports), who have not been treated for depression, who have not been diagnosed with Attention Deficit Disorder, and who were members of Zoomerang, a Web-based research company.

C. *Sample Size*

In order to obtain a 95% confidence level and a confidence interval of five, an optimal resultant sample size of 384 participants was targeted [30]. However, the minimum sample size for significant results is $N \geq 50 + 8k$, where N is the number of participants in the sample and k is the number of independent variables [31]. Data were collected on 10 different independent variables in this study, therefore, $k = 10$. Consequently, the minimum sample size for significant results for this study was $N \geq 50 + 8k = 50 + 8(10) = 130$ participants. Because a total of 255 completed questionnaires were received for this study, the minimum sample size requirement has been satisfied.

D. *Sample Recruitment*

This study used Zoomerang, a commercially available online survey service, to recruit participants and to administer the surveys online [28]. Since 1999, Zoomerang has administered more than 100 million online surveys to thousands of companies around the world, which include over 70 of the Fortune 100 companies. In addition, many universities

and colleges have used Zoomerang for dissertations and academic research. Zoomerang profiles its members with more than 500 attributes, which allow researchers to target particular individuals based on predetermined criteria. However, not all of the variables in the study were used by Zoomerang to profile its members. Therefore, screening questions were used to help ensure that only those individuals who met the study's criteria participated in the study.

There were several benefits in using Zoomerang. First, Zoomerang has the ability to effectively identify a large number of willing participants based on predetermined criteria. Second, Zoomerang provides a convenient way to collect data over a large geographic area. Third, Zoomerang provides powerful and flexible tools to analyze the data. Finally, because Zoomerang collects data in a uniform manner, researcher bias during the data collection process is minimized.

E. Operational Definitions of Terms

Comprehensive Aggression. Comprehensive aggression is the summation of a) the use of physical force to express aggression or anger, b) the use of quarrelsome and hostile speech, c) the tendency to express anger without direct confrontation, d) the display of anger related to arousal and sense of control (e.g., frustration, irritability, and temperamental gesturing), and e) the display of attitudes related to hostility, bitterness, and social alienation [32].

Childhood religiosity. Childhood religiosity is *the extent to which one's parents emphasized the family religion as one was growing up* [33].

Contact sports. Contact sports include volleyball, basketball, soccer, lacrosse, and water polo. A participant who has played a collision sport, such as American football or hockey, will be disqualified because the social learning experiences will be different.

School-sponsored. School-sponsored means part of a formal league that is recognized and supported by a U.S. junior high school, middle school, or high school.

Number of years. Number of years is defined as the number of continuous grade levels that a participant has played school-sponsored contact sports from 6th grade to 12th grade. The number of years may be zero. If a participant did play contact sports, the participant must have played in 12th grade and there must have been no discontinuity in sports participation from grade level to grade level, once started.

Playing contact sports. Playing contact sports was defined as practicing with a school-sponsored team as required by team policies for the entire season.

Social learning theory. The social learning theory states that the behaviors of individuals are shaped through interactions with other people and are reinforced over time [15].

F. Aggression Questionnaire

The first measure used in this study was the Buss and Warren Aggression Questionnaire, which measures aggression [34]. The Aggression Questionnaire is a 34-item self-administered survey that uses a five point Likert-type scale to measure the general level of anger and aggression via five subscales: a) physical aggression, b) verbal aggression, c) indirect aggression, d) anger, and e) hostility. For each item on the measure, a rating of one indicates, *Not at all like me*, and a rating of five indicates, *Completely like me*. The comprehensive aggression score is based on the total score of the five subscales.

The Aggression Questionnaire is a reliable instrument that sufficiently gauges overall aggression [34]. First, the internal consistency alpha coefficients were .94 for comprehensive aggression, .88 for physical aggression, .76 for verbal aggression, .78 for anger, .82 for hostility, and .71 for indirect aggression. Thus, the internal consistency for aggression was considered strong to very strong [35]. In addition, the test-retest correlation for a sample of 26 participants over a one week period was .85 for comprehensive aggression [34]. Thus, the test-retest correlation for comprehensive aggression is considered very strong [35].

The Aggression Questionnaire is also a valid instrument [34]. The Aggression Questionnaire was correlated to the a) Attitudes Toward Guns and Violence Questionnaire, b) Children's Inventory of Anger, and c) Novaco Anger Scale. The correlation coefficients between the Aggression Questionnaire and the Attitudes Toward Guns and Violence Questionnaire, the Children's Inventory of Anger, and the Novaco Anger Scale for comprehensive aggression were .38, .37, and .59, respectively. Thus, the Aggression Questionnaire has weak concurrent validity with the Attitudes Toward Guns and Violence Questionnaire and the Children's Inventory of Anger and moderate concurrent validity with the Novaco Anger Scale [35].

G. Religious Emphasis Scale

The second measure used in this study was the Religious Emphasis Scale, which measures childhood religiosity. The Religious Emphasis Scale is a 10-item self-administered survey that uses a six point Likert-type scale to measure *the extent to which one's parents emphasized the family religion as one was growing up* [33]. For each item on the measure, a rating of zero indicates, *No emphasis was placed on the behavior*, and a rating of five indicates, *A very strong emphasis was placed on the behavior*. The total score, which is a continuous variable, was calculated by summing the total points for the 10 items. A higher total score means a greater childhood religiosity.

The Religious Emphasis Scale is a reliable instrument. The Religious Emphasis Scale was standardized using two primary samples [34]. The first sample consisted of 513 college students in Altmeyer's introductory psychology class. The second sample consisted of 549 parents of these college students. Average scores on the scale were 17.7 for the college students and 25.0 for their parents. In addition, the mean inter-item correlation for the measure's 10 items produced a Cronbach's alpha of .92 for both the students and their parents. Thus, the Religious Emphasis Scale has very strong internal consistency [35].

The Religious Emphasis Scale is also a valid instrument. The Religious Emphasis Scale has been correlated to many other religious measures and the results indicate that the Religious Emphasis Scale has moderate to strong concurrent validity [34] – [35]. For example, for the students sample and parents sample respectively, the Religious Emphasis Scale has been correlated to the Religious Pressures Scale (.59, .43), the Christian Orthodoxy Scale (.59, .49), the Intrinsic Orientation Scale (.58, .50), the Church Attendance Scale (.62, .44), the Frequency of Prayer Scale (.55, .52), and the Control Impulses Scale (.63, .53).

IV. RESULTS

A. Predictor Variables & Extraneous Variables

Factors other than the predictor variables that may influence the dependent variable are called extraneous variables [36]. Because multiple regression does not distinguish between predictor variables and extraneous variables, both types of independent variables must be considered [37]. However, it is important to only consider relevant extraneous variables and the proper number of extraneous variables [38] – [39]. Otherwise, specification error (i.e., the wrong model) may result and the regression model may be less than effective in its predicative capability. In this study, 14 extraneous variables that have been linked to aggression were identified: six personal risk factors, four family risk factors, and four social risk factors.

The six personal risk factors include the following: 1) race, 2) sex, 3) age, 4) academic achievement, 5) depression, and 6) Attention Deficit Disorder [40] – [43]. These factors were controlled through design. This was accomplished by only surveying African American females, 21 to 40 years of age, who have graduated from high school, who have not been treated for depression, and who have not been diagnosed with Attention Deficit Disorder.

The four family risk factors and the four social risk factors that have been linked to aggression include the following: 1) whether there were two guardians in the household, 2) whether the family received government assistance, 3) whether there was good interaction among household members, 4) whether the participants viewed siblings as significant role models, 5) whether school conflict was problematic, 6) whether community conflict was problematic, 7) whether close friends were deviant, and 8) whether neighborhood crime was problematic [40], [42] – [44]. Data on these extraneous variables were collected as part of the survey. The influence of each family and social risk factor was controlled statistically.

B. Interaction Variable

Although several independent variables may uniquely impact a dependent variable, the independent variables may also interact with one another and produce a combined impact on the outcome that is greater than any additive combination of their separate effects [45] – [47]. When considering the interaction effect, it may not be optimal to consider all possible combinations of the independent variables. For example, considering too many interaction variables may harm the accuracy of the regression model and reduce its predictive capability. As a result, interaction variables should not be included in the regression analyses unless

there is substantial evidence to believe that they should be included or unless there is a particular interest in the interaction.

Because playing sports teaches both pro-social and anti-social behaviors, and because religiosity, which is another social learning experience, may influence what is learned in contact sports, the interaction between sports participation and religiosity is of particular interest [20] –[22]. Therefore, an interaction variable between sports participation and childhood religiosity was created using statistical software. Furthermore, in an effort to prevent multicollinearity, the interaction variable was centered [31].

C. Multicollinearity

Multicollinearity exists when independent variables provide redundant information about the behavior of the dependent variable and, consequently, the unique estimates of the regression coefficients cannot be determined [39]. Because the independent variables (i.e., predictor variables plus extraneous variables) consist of both continuous and categorical variables, three different statistics were used to assess multicollinearity. First, Pearson correlation was used to determine the strength of association between the continuous variables [48]. Second, Phi correlation was used to assess the strength of association between the categorical variables. Finally, biserial correlation was used to assess the strength of association between the continuous and categorical variables. In short, none of the independent variables had a correlation coefficient above .80. Therefore, multicollinearity was not identified as a problem and all 11 independent variables (sports participation, religiosity, interaction variable, four family risk factors, and four social risk factors) were considered for the multiple regression analysis.

D. Multiple Regression

Multiple regression is a correlational parametric statistic [48]. It is useful in describing the strength and direction of relationships when there are two or more predictor variables and one criterion variable [49]. Indeed, multiple regression is effective for a) assessing the total predictive power when the predictor variables are considered simultaneously and b) for assessing the unique contributions of each predictor variable while other predictor variables are statistically controlled [36].

Multiple regression has three major analytical strategies: standard (simultaneous entry), sequential (hierarchical), and statistical (stepwise) [31], [50]. In all three models, the relationships of the independent variables to the dependent variable and the relationships of the independent variables with one another must be assessed in order to obtain a complete picture of the function of the independent variables. The appropriate procedure applied in this study was determined by the goal of the study. For this study, standard multiple regression was employed because, although there are benefits and limitations with each procedure, the standard multiple regression is in alignment with the research question. The benefits and limitations of each procedure are discussed below.

First, the standard multiple regression strategy is most appropriate when the goal of the study is to assess a) the size of the overall relationship between the independent and dependent variables and b) the amount that each independent variable uniquely contributes toward the overall relationship [31], [50] – [51]. When using the standard approach, all of the independent variables are entered into the regression equation simultaneously and the model assesses the influence of each independent variable as if it had entered the model after all of the other independent variables have been entered. In other words, each independent variable is assessed in terms of what it adds to the prediction of the dependent variable, while controlling for the other independent variables. However, the variability that is contributed to R^2 by more than one independent variable cannot be uniquely assigned to each independent variable. Thus, it is possible to undermine the importance of an independent variable even though it is highly correlated with the dependent variable.

Second, the sequential regression strategy is most appropriate when the goal of a study is to test a theoretical model [31], [50] – [51]. Sequential regression is used to test an explicit hypothesis about the proportion of variance attributed to independent variables after the variance due to other independent variables has already been considered. However, when using sequential regression, the researcher has to use some logical or theoretical rationale to determine the order in which the independent variables are entered into the regression analysis. The relationships among the variables help determine when the variables are entered into the analysis, with the most relevant variables entered first. In other words, because each independent variable is assessed in terms of what it adds to the regression equation after the contribution of other independent variables with higher priority have already been considered, the order of entry for each independent variable is crucial. Consequently, the importance of a specific independent variable may change dramatically depending on when it is considered in the regression analysis. Furthermore, although sequential regression allows the confounding influence of extraneous variables to be controlled, the overlap in the explained variability may not be attributed uniquely to the independent variables.

Finally, the statistical regression strategy is appropriate when a study's goal is to determine the best subset of independent variables that accurately predicts the dependent variable in a specific sample [31], [50] – [51]. Statistical regression is a model-building rather than a model-testing strategy, and the meanings of the variables are not relevant. The aim of statistical regression is to minimize the number of extraneous variables and to either add or subtract one independent variable at a time until the independent variables no longer statistically increase the value of R^2 . However, the decision on which independent variables to include or exclude are data-driven and are limited to the particular sample studied. Indeed, minor differences in the statistics can have a profound effect on the perceived importance of each independent variable and, because variability differs from sample to sample, the variables included in the statistical regression equation are sample specific. Consequently, the findings from statistical regression analysis may not be generalized to the population. Furthermore, when independent variables are entered into the statistical regression model in the order of their predictive usefulness, it is very likely that the independent variables that overestimate their true population correlations with the dependent variable (Type I error) will

become part of the model. Indeed, statistical regression is a data-fishing technique, results may be biased due to chance relationships, and the results can be misleading or make little sense if essential independent variables are improperly included or eliminated from the procedure. In general, statistical regression is considered controversial and is not recommended [51].

In sum, this study employed the standard multiple regression method because it most effectively met the needs of the study. In other words, the current study's research question was in alignment with the outcome of standard multiple regression. On the other hand, sequential regression was less than optimal because the goal of the study was not to test a theoretical model. Furthermore, the order in which the independent variables were entered into the regression analysis was not based on some logical or theoretical rationale. Similarly, statistical regression was less than optimal because the method may produce misleading results as a consequence of chance or as a consequence of either including or excluding independent variables based solely on minute statistical differences [50] – [51]. In addition, because the independent variables in statistical regression vary from sample to sample, the results cannot be generalized to the population.

E. Data Analysis

The three independent predictor variables are a) years of sports participation, b) childhood religiosity, and c) their centered interaction variable (*Sports Participation * Childhood Religiosity*). The relationships between these three predictor variables and comprehensive aggression were assessed using standard multiple regression. In addition, the contribution of each extraneous variable on comprehensive aggression was determined. The results of the multiple regression analysis are shown in Table 1.

Table 1 displays the index of overall model fit (R), the variance in the outcome that is explained by the independent variables (R^2), the amount of variance in the outcome if the model had been derived from a population that contained the sample (adjusted R^2), the ratio of the average variability in the data that the regression model did explain to the average variability in the data that the same model did not explain (F -statistic), and the F -statistic's associated p -value, which was the observed significance level for the F -test [47] – [48], [51] – [52]. In addition, other variables of interest include the unstandardized regression coefficients (B), their significance levels (p), and the square of the semi partial correlations (sr^2). If an individual coefficient is significant (as indicated by p), then sr^2 indicates the amount of variance that the particular variable uniquely contributes to R^2 .

The overall regression equation for this model is statistically significant: $F(11, 236) = 2.016, p < .05$. In other words, the data indicate that all of the independent variables jointly contributed to R^2 [31]. In short, this model explains 8.6% of the variance in comprehensive aggression. However, because none of the independent variables are statistically significant in this model, none of the independent variables uniquely contribute to R^2 . If adjusted R^2 is used in order to better represent the population, then the variables only explain 4.3% of the variance in the outcome. Although R^2 is small, the model does indicate a clear relationship and it should not be dismissed [37].

Table 1

Summary of Standard Multiple Regression Statistics Using Independent Variables and Comprehensive Aggression

Model	R	R ²	Adjusted R ²	Std. Error of Estimate	F	p
1	0.293	0.086	.043	10.590	2.016	.028

Variable	B	SE B	β	p	sr ²
(Constant)	49.447	1.948		.000	
Years of Sports Participation	-.018	.266	-.004	.945	.000
Childhood Religiosity	.064	.047	.087	.178	.007
Sports Participation * Childhood Religiosity	-.013	.018	-.046	.471	.002
Two Guardians in Household	-1.441	1.556	-.064	.355	.003
Received Government Assistance	.605	1.954	.021	.757	.000
Interaction among Household Members	1.505	2.246	.047	.503	.002
View Siblings as Role Models	-.577	1.476	-.026	.696	.001
Conflict in School	6.622	3.398	.159	.053	.015
Conflict in Community	1.800	3.018	.043	.552	.001
Close Friends are Deviant	2.407	2.090	.079	.251	.005
Crime in Neighborhood	1.203	1.680	.047	.475	.002

F. Current Study's Internal Validity

The current study has internal validity. In other words, the changes in the dependent variable are due to the changes in the independent variables and not due to some unintended variables [49]. The seven factors that demonstrate internal validity are a) *history*, b) *maturation*, c) *testing*, d) *instrumentation*, e) *statistical regression*, f) *biased selection of participants*, and g) *experimental mortality* [53]. These factors are discussed below.

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The *history factor* involves specific events, other than the treatment, that occur between multiple observations and that may affect the results [53]. Because only one observation took place during the study, and because all of the sampling took place within a short amount of time, the *history factor* is only a nominal threat to the study's internal validity. However, because aggression was measured, controversial social events that may have created anger in society were monitored during the gathering of the data.

The *maturation factor* involves performance change due to age or fatigue [53]. For example, a participant may have discontinued answering the questions on the survey before she had finished answering all of the questions. In order to minimize the threat, the study's survey was short, the questions were easy to answer, and the instruments only required a total of about 20 minutes to complete [32]. Furthermore, the surveys were administered online and this allowed the participants to take breaks whenever necessary. Hence, the *maturation factor* is only a nominal threat to the study's internal validity.

The *testing factor* involves the pretest sensitizing of participants [53]. In other words, administering a test prior to treatment may change how the participants respond on a posttest. However, because only a posttest was administered in the current study, the *testing factor* is only a nominal threat to the study's internal validity.

The *instrumentation factor* involves the unobserved changes in researcher criteria or the changes in the sensitivity of the instruments to measure what they are supposed to measure [53]. In other words, internal validity is threatened a) if the researcher changes definitions during the data collection process or b) if the measures used to collect data become more or less sensitive over time. Because data in the study were collected via surveys, and because data were collected from each participant only once, the definitions and measures were consistent throughout the study. Indeed, all data from all participants were collected via the same instruments and in the same manner. Furthermore, each participant was given standard instructions. Thus, the *instrumentation factor* is only a nominal threat to the study's internal validity.

The *statistical regression factor* involves recruiting participants for treatment based upon their extreme scores prior to treatment [53]. Thus, if measured again, their scores will move closer to the population average, regardless of the actual treatment. However, because participants in the current study were not selected based on any type of pretest scores, the *statistical regression factor* is only a nominal threat to the study's internal validity.

The *biased selection of participants factor* involves administering different treatments to different groups and then comparing the groups after the treatment [53]. If the groups are not randomly selected, then there is the potential that a group may have pre-existing biases prior to the treatment. Thus, the pre-existing biases and not the treatment may cause differences among the groups. However, because the study's participants were homogeneous (i.e., African American females), and because there was only one group, the *biased selection of participants factor* is only a nominal threat to the study's internal validity.

The *experimental mortality factor* involves the differential loss of participants from groups, resulting in nonequivalent groups [53]. Because the study only considered one group (i.e., African American females) and the participants were surveyed only once, the *experimental mortality factor* is only a nominal threat to the study's internal validity.

G. Current Study's External Validity

The current study has external validity. External validity refers to the extent to which a study's findings can be applied to a target population beyond the specific individuals and settings [49]. The four factors that demonstrate external validity are a) *reactive testing*, b) *interactions between participant selection biases*, c) *reactive effects of experimental arrangements*, and d) *multiple treatment interference* [53]. These factors are discussed below.

The *reactive testing factor* indicates that a pretest may affect how participants react to the treatment [53]. Consequently, the participants' responses may not be representative of the general population. However, because a pretest was not administered in the study, the *reactive testing factor* poses little threat to the study's external validity.

The *interactions between participant selection biases factor* indicates that by selecting a purposive non-random group, the effects of the treatment may only apply to that group [53]. For example, because the study only surveyed African American females, the findings may not be applied to individuals of other races. Thus, in order minimize the risk of applying the findings to inappropriate groups, the target population's characteristics to which the study's findings may apply have been disclosed.

The *reactive effects of experimental arrangements factor* indicates that because the participants know that they are involved in an experimental treatment, their responses may be artificial [53]. However, because the surveys were administered online and the identities of the participants were anonymous, there was little motivation for the participants to provide less than truthful responses. Thus, the *reactive effects of experimental arrangements factor* poses little threat to the study's external validity.

The *multiple treatment interference factor* indicates that, for multiple experimental treatments, the participants' exposure to early treatments may affect the participants' responses to later treatments [53]. However, the current study was non-experimental and participation in contact sports and participation in religious activities during childhood had already occurred prior to the commencement of the study. Furthermore, data were only collected at one point in time. Thus, the *multiple treatment interference factor* poses little threat to the study's external validity.

V. DISCUSSION

The current study's findings indicate that sports participation and childhood religiosity do not simultaneously or uniquely predict comprehensive aggression. However, the study's findings do indicate that the same independent variables, along with family and social risk factors, jointly predict comprehensive aggression. Even so, all of the independent variables considered simultaneously still only explain 8.6% of the variability in comprehensive aggression, which leaves 91.4% of the variability still to be accounted for by other variables. Thus, additional research is necessary.

Parents are stakeholders in maintaining a peaceful society and they must take an active part in promoting pro-social behaviors [54]. Indeed, because there are over 400 U.S. residents for every full-time sworn police officer, law enforcement requires that people

voluntarily comply with the law and assist with law enforcement efforts [55] – [56]. Thus, because most law enforcement is done by community members and not by the police, the community members are the ones who set the standards for socially acceptable behaviors [54]. Hence, this study provides information that may be used by parents and school administrators so that they may be able to make best-practice decisions in promoting pro-social behaviors within children.

There are limitations in the study. First, because the study had a correlational design, it does not indicate casual relationships [53]. Second, because the sample was convenient, purposive, and non-random, there is a possibility that the participants who chose to participate may be different in meaningful ways from those individuals who chose not to participate. As a result, the findings cannot be generalized to other population groups that do not match the sample's characteristics. Third, a larger sample size would have provided more precise estimates and would have increased the likelihood of a more adequate representation of the population. Fourth, considering females up to age 40 has allowed much time for extraneous variables to affect the participants' behaviors after high school. However, aggressive behaviors learned during childhood have been positively linked to adult criminality [2] – [4]. Fifth, because the study is quantitative in nature, it does not provide an in-depth understanding of the meanings that the participants have associated with their lived experiences [57]. Finally, because Likert-type scales were used, there is the possibility that a) the participants engaged in central tendency bias by simply selecting the middle option rather than the best option, b) the participants engaged in acquiescence bias by simply selecting positive responses over negative responses, and c) due to limited options, the participants were forced to select options that did not accurately represent their realities [58].

There are several recommendations for further research. First, childhood religiosity, contact sports participation, and aggression can be better evaluated via a longitudinal study. Natural environments for examining school-sponsored contact sports participation and religiosity are private religious schools that have sports programs. Aggression can be measured over a long period of time by following a group of students who attend religious schools and who play contact sports. Indeed, a longitudinal study is appropriate for development trends and would help minimize the impact that extraneous variables may have on aggression [59]. Second, future studies may perform similar research using collision sports instead of contact sports. According to the social learning theory, the behaviors of individuals are reinforced over time according to the intensity of their social learning experiences [15]. The intensity of collision sports may enhance the behaviors that are learned when compared to contact sports. Thus, collision sports may display a more pronounced amount of aggression, which may be easier to measure. Third, aggression can be measured in a different manner. For example, the current study used the Aggression Questionnaire to assess aggression, years after the participants had played school-sponsored contact sports. Instead of using a self-administered survey to collect data after the fact, aggression can be measured in real time by the number and seriousness of penalties committed by participants. Fourth, religiosity may be measured in a different manner [60]. For example, a measure may be selected that assesses the intensity of religious beliefs. If a serious religious conviction impacts perception, then it may impact how aggressive behaviors in sports are perceived.

Finally, a qualitative study may be performed. For example, a phenomenology study, which explores the essence of experience, may gain a deeper understanding of experiences and may uncover hidden phenomena [61]. Although using strict quantitative procedures may objectively explain relationships between variables and make accurate statistically significant predictions, human nature is complex and the absolute predictability of human behaviors is unrealistic [62] – [63]. Thus, participants may be asked open-ended questions that allow them to express their interpretations of reality.

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