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Deborah Dalmat 4/11/2014

Bullying, Cyberbullying, and Physical Activity: A secondary data analysis examining the association between peer-victimization and physical activity among adolescents

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Abstract

Bullying, Cyberbullying, and Physical Activity: A secondary data analysis examining the association between peer-victimization and physical activity among adolescents

By Deborah Dalmat

Introduction: Physical activity is necessary to promote good mental and physical health among adolescents. A variety of factors from any level within the Social Ecological Model can hinder adolescent physical activity. This analyses aims to examine the interpersonal-level influence of bullying on adolescent physical activity behavior.

Methods: This secondary data analysis used the 2011 New York State Youth Risk Behavior Survey data set. Age, sex, race, bullying victimization, and cyberbullying victimization were included in general linear models (GLM) in order to assess their bivariate association with physical activity. Multivariable GLM were then created to examine the relationship between victimization and physical activity when controlling for demographic variables. Further analyses examined the association within demographic subpopulations.

Results: Age ($p=0.047$), sex ($p<0.001$), race ($p<0.001$), and cyberbullying ($p=0.02$) proved significantly associated with physical activity in bivariate analyses and thus were included in a subsequent GLM; bullying was not significantly associated with physical activity ($p=0.80$) so was not included in the model. When controlling for demographic variables, cyberbullying victimization was marginally associated with decreased physical activity ($p=0.15$). Further examination of the relationship between cyberbullying and physical activity among demographic subpopulations found cyberbullying victimization significantly associated with lower physical activity among both males ($p=0.005$) and individuals self-identifying as white ($p=0.03$).

Conclusion: Results suggest there may be an association between cyberbullying victimization and decreased physical activity among a subset of adolescents perhaps due to differential risks and experiences with cyberbullying. Further research is necessary to examine the relationship between the different forms of bullying and physical activity behavior. Special attention should be paid to cyberbullying as research is limited. Future research should include not just victimized individuals but also those individuals that perpetrate bullying. Additionally, research should focus on subpopulations considered at high risk for bullying. There is a need to reduce the occurrence of bullying as it can negatively influence both physical and psychological health. Tertiary prevention, through programs for bullying victims, may also help reduce the deleterious effects of bullying.

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Introduction

Physical activity benefits adolescent physical and psychological health [1-3]. Physical activity in adolescence promotes musculoskeletal and cardiovascular health while aiding in healthy body weight maintenance [2]. Additionally, it decreases symptoms of depression and anxiety in youth [2]. Furthermore, physical activity has been linked to increased self-esteem and improved academic achievement [2]. Conversely, physical inactivity correlates with a multitude of negative health outcomes, including overweight and obesity, diabetes, hypertension, high cholesterol, arthritis, and asthma [2]. Physical inactivity has also been linked to a higher risk of heart disease, colon cancer, and premature death [2].

Both the World Health Organization and the U.S. Department of Health and Human Services recommend that adolescents take part in 60 minutes of physical activity all seven days of the week [1, 3]. Despite these recommendations, only 29% of high school students take part in the recommended levels of physical activity [2]. This low percentage may be explained by the fact that physical activity behavior is influenced by a variety of factors that span multiple levels of society which can either promote or constrain physical activity behaviors [4].

For example, physical activity may be promoted through social level factors such as state physical education requirements [4] or it may be constrained through interpersonal level factors such as physical inactivity among family or peers [4]. Furthermore, community-level safety and crime have been linked to physical activity behavior [4-6]

and interpersonal-level adolescent violence has been associated with sedentary behavior [7].

Bullying, defined as repeated victimization of an individual by one or more peers, is a form of interpersonal adolescent violence [8]. Bullying can manifest through both traditional in-person methods and cyber methods [8, 9]. Traditional bullying is composed of verbal, physical, and relational types of bullying [8, 9]. Verbal bullying includes name calling or slander, while physical bullying includes actions such as pushing or tripping [8]. Relational bullying includes isolating, shunning, or ostracizing the victim oftentimes using gossip [8]. The fourth form, cyberbullying, entails intimidation or harassment through emails, text messages, or social networking sites [8].

Bullying victimization and perpetration have been linked to both immediate and long-term negative outcomes such as academic issues, absenteeism [10], physical inactivity [11], depression [12], and suicide ideation [13]. Self-reported involvement in bullying varies across countries, with estimates ranging from 9% to 54% of adolescents being involved within the school term during which the survey was administered [14]. Within the United States, it was estimated that 29.9% of adolescents were involved in bullying as a victim, bully, or bully-victim [15]. Other studies have estimated bullying involvement at 9%, 9%, and 3% for victims, perpetrators, and bully-victims, respectively [16].

The relationship between involvement in bullying and physical inactivity needs to be further examined. The high rates of bullying and physical inactivity among adolescents is troubling and could potentially be compounding and leading to poorer health. Bullying may be an important factor to address in attempts to improve not only physical activity

but also the overall health of adolescents in the United States, and across the globe. The purpose of this study is to examine the relationship between bullying and physical inactivity in United States adolescents through the lens of the social ecological model. It is intended to further develop an understanding of bullying's impact on physical activity and to explore whether cyberbullying, in particular, is associated with physical activity behavior among adolescents.

Literature Review

This literature review will explore prior research about the health impacts of bullying. Special focus will be given to bullying's effects on physical activity behaviors and the health impacts of cyberbullying. These concepts will be examined through the lens of the social ecological model and this review will illuminate current gaps in the research on bullying.

Physical activity

Physical activity promotes good physical and mental health among adolescents and aids in maintaining good musculoskeletal and cardiovascular health [1-3]. Physical activity also helps with weight maintenance and reduces the symptoms of depression and anxiety in youth [2]. Moreover, physical activity contributes to mental health through improved self-esteem and improved academic achievement [2]. Long-term physical inactivity has been linked with increased heart disease and colon cancer risk in addition to contributing to risk of premature death [2]. Physical inactivity also increases risk of overweight and obesity, asthma, arthritis, diabetes, hypertension, and high cholesterol [2]. Both national and international public health organizations advise that children and adolescents take part in 60 minutes or more of physical activity every day of the week [1, 3]. However, in the United States, only 29% of high school students meet this recommended level of physical activity [2].

Bullying

Bullying is a form of interpersonal adolescent violence [8]. It is defined as the recurring victimization of an individual by one or more peers through either traditional or

cyber means [8, 9]. Traditional bullying includes verbal, physical, and relational forms of bullying [8, 9]. Name calling and malicious statements repeatedly made against an individual constitute verbal bullying while physical bullying includes pushing, tripping, and other physical assaults made against an individual [8]. The third traditional form of bullying, relational bullying, involves the isolation, shunning, or exclusion of the bullying victim and often involves the use of gossip [8]. Cyberbullying, a fairly new method of bullying tied to advances in technology, involves the use of emails, text messages, and social networking sites to intimidate or harass the victimized individual [8].

Bullying includes four types of individuals: bullies, victims, bully-victims, and bystanders [9, 14, 16-21]. Bullies are the perpetrators of instances of bullying, while victims are the individuals at targeted by bullies [9, 14, 16-21]. Bully-victims are individuals involved in bullying both as perpetrators and victims [9, 14, 16-21]. The fourth category includes individuals who observe bullying but are otherwise not involved [19].

The estimated prevalence of bullying varies greatly across countries [14]. Cross-national estimates place involvement in bullying between 9% and 54% among adolescents [14].United States data places bullying involvement at 29.9% with 13.0% of adolescents perpetrating bullying, 10.6% of adolescents being victimized, and 6.3% being co-involved as both victims and perpetrators [15]. A second study placed the prevalence of bullying in United States adolescents at 9%, 9% and 3% for bullies, victims, and bully-victims, respectively [16].

Social Ecological Model

This analysis of the association between bullying victimization and physical activity will be guided by the Social Ecological Model. The Social Ecological Model has been used to examine a variety of health behavior topics including nutrition [22], violence [23], and physical activity [4]. This model addresses well the multifaceted influences on physical activity behavior [4]. These influences include societal level factors, individual level factors, and all the levels in between that promote and constrain physical activity behavior [4]. The Social Ecological Model is composed of the following levels, in descending order from macro- to micro-level: the social structure, policy, and systems level; the community level; the institutional or organizational level; the interpersonal level; and the individual level [22].

The social structure level of the Social Ecological Model comprises policies, regulations, and laws at the local, state, and federal levels which encourage or hinder health behaviors [22-24]. In terms of physical activity behavior, this level may include policies related to transportation, land-use, zoning, and physical education requirements for schools [4]. For example, New York State law promotes physical activity through a requirement that all students, Kindergarten through 12^{th} grade, take part in 120 minutes of physical education every week [25].

The community level of the Social Ecological Model includes large-scale networks of organizations or groups with norms and standards [22, 24]. Physical activity behavior may be promoted or constrained at this level through community level characteristics such as crime and cultural attitudes toward physical activity [4]. The institutional or

organizational level encompasses formal and informal rules and norms within institutions and social organizations [24] such as schools or churches [22]. School-specific physical activity programs, such as those promoting walking to school, are one method through which organizations or institutions can influence physical activity behavior [4].

The final two levels of the Social Ecological Model are the interpersonal and the individual levels. The interpersonal level includes social networks and support systems such as family and friends [22, 24]. This level may influence physical activity through modeling of the behaviors of the social support system or by presence or absence of physical activity partners [4]. The individual level of the Social Ecological Model includes knowledge, attitudes, and personality traits as well as beliefs that influence behaviors and perceived barriers to behaviors [22].

The Social Ecological Model is especially helpful in understanding physical activity behavior as it addresses how each level can influence both higher and lower level entities [22]. Additionally, the social ecological model aids in the understanding of how upstream societal and interpersonal factors can lead to changes in the behavior of the individual [22]. Much previous research into physical activity within the framework of the social ecological model examined community level and social structure level influences such as the built environment and neighborhood crime [4]. This analysis will examine the interpersonal level factor of bullying, or peer victimization, and its impact on the physical activity behavior of the individual.

Violence and health

Because bullying is a form of violence, a brief description of violence's health impacts is necessary in understanding the influence of bullying on health. Both qualitative and quantitative studies have examined violence's impact on psychological and physical health. Literature shows that chronic neighborhood crime and violence has been linked to anxiety, substance abuse, depression, Posttraumatic Stress Disorder, aggressive or criminal behavior, and interpersonal issues [26, 27]. Studies have also linked exposure to violence to high blood pressure [28].

Additionally, crime and violence have been associated with lower levels of physical activity. A review of the qualitative literature in the United Kingdom revealed a fear of crime as a barrier to physical activity [29]. Literature also suggests that neighborhood crime and adolescent physical activity have an inverse relationship; as crime increases, physical activity decreases, and vice versa [6, 30]. Furthermore, parental fears of crime have been shown to play a role in not allowing children to take part in physical activity outdoors [5]. The extensive research on this topic indicates contextual violence as a serious public health problem which affects psychological and physical health.

Bullying and health

It follows logically that exposure to bullying, as a form of violence, would produce similar results. Among adolescents, interpersonal violence has been associated with symptoms of depression, absenteeism, bullying victimization, and sedentary behavior [7]. Adolescent bullying victimization has been linked to depression [9, 31], suicide ideation or suicide attempts [13, 21], and physical inactivity [11]. It is hypothesized that bullying

may lead to depression and suicide as it can lead to feelings of isolation and helplessness [9]. Depression may, in turn, account for increased rates of suicide ideation, suicide attempts [21], and physical inactivity [32].

Involvement in bullying varies across demographic subpopulations. Research suggests that racial and ethnic minority adolescents may be at higher risk of bullying victimization than non-Hispanic White adolescents [33, 34]. Other studies have found differences in bullying involvement by gender, with adolescent males more likely than females to be involved in bullying [31]. Differences in bullying involvement by age have also been noted, with younger adolescents involved at higher rates than older adolescents [31].

Furthermore, prior research suggests that demographic variables such as race and ethnicity, age, or sex may moderate the relationship between bullying and mental health outcomes. One study found that the strength of association between bullying victimization and mental health outcomes varied according to age, sex, and type of bullying [35]. In this study, verbal and relational bullying were more strongly associated with physical symptoms of anxiety among adolescent girls while physical bullying victimization was more strongly associated with separation and panic anxieties among boys [35]. The relationship between verbal and relational bullying victimization and social anxiety was also more pronounced among younger adolescents compared to older adolescents [35]. A second study found slight differences in the association between weight-based verbal bullying and mental well-being among adolescents across racial and ethnic groups and across the sexes [36]. Weight-related teasing was found to have a slightly greater negative effect on adolescent boys for body satisfaction, depressive

symptoms, and suicide ideation [36]. Racial differences in the association between weight-related teasing and mental health outcomes were also observed among both boys and girls with White adolescents at either increased or decreased risk of poor mental wellness dependent on mental health measure (e.g. suicide ideation, depressive symptoms, or self-esteem) [36].

Bullying has been shown to affect more than just the victim's health. One study showed that both bullies and victims of bullying were at increased risk of suicide ideation and attempting suicide [13]. Furthermore, being involved in bullying in any manner including as a bystander or observer has been linked to increased suicide ideation and feelings of helplessness [19]. A further study found that even after controlling for depression and delinquency, bullying and suicide ideation were shown to have a significant association; this association appeared among bullies, victims, and bully-victims [21].

The effects of bullying are long-lasting; it has been shown that victims of bullying in childhood have higher rates of attempted suicide later on in adulthood [37]. Furthermore, bullying in childhood has been associated with a variety of other issues in adulthood ranging from health, wealth, and social outcomes [17]. One study found that, in adulthood, bullying victims faced financial management issues, while bullies had increased rates of frequent drinking, marijuana and other illicit drug use, and participation in one-night stands [17]. Bully-victims were found to report higher rates of serious illness and poor health and a lack of close friends [17]. All three categories involved in bullying had significantly higher reports of psychiatric problems, smoking, employment issues,

and difficulty making and keeping social relationships [17]. Another study associated childhood bullying with specific adult psychiatric disorders [12]. Bullies showed an increased risk for antisocial personality disorder, while victims and bully-victims were at risk of agoraphobia, generalized anxiety disorder, and panic disorders [12]. Bully-victims were also at risk of depression and suicide ideation or attempts [12].

Bullying and physical inactivity

Given the parallel outcomes of violence and bullying on mental and emotional health in addition to the effect of violence on physical activity, it's reasonable to posit that bullying, or peer violence, could produce similar negative effects on physical activity. Recent research into the subject of bullying supports this hypothesis.

Qualitative studies have been used to identify the barriers to physical activity in overweight and obese youth [38]. A systematic review of the qualitative literature was conducted examining literature indexed in Medline, Embase, CINAHL, PsychInfo, SportsDiscus, and Academic Search Premier using the search terms of "Physical active*" and "exercise" and "barrier" [38]. The search included studies and gray literature published between 1950 and 2009 and articles not written in English were excluded [38]. The initial search garnered 3,944 articles [38].

Two reviewers independently screened articles for inclusion based on the following criteria: the study gathered data through qualitative methods such as individual or group interviews, the study participants were between the ages 10 and 20 or otherwise focused on adolescence (such as adults recalling childhood), study participants were overweight or obese during adolescence with no intellectual or physical disabilities, and the study

participants examined the topics of physical activity and barriers to participating in physical activity [38]. After exclusion of duplicate articles and articles that did not meet inclusion criteria, 15 articles remained [38].

Two reviewers independently assessed quality of the included articles using the Critical Appraisal Skills Programme which focuses on the clarity, appropriateness, and rigor of select portions of qualitative research studies [38]. Thematic network analysis incorporated with cross-case analysis was used to synthesize the information from the included studies [38]. Barriers to physical activity were organized as individual, interpersonal, and environmental level factors [38]. The reviewers identified 35 basic barrier themes: ten at the environmental level, six at the interpersonal level, and 19 at the individual level [38]. In the interpersonal level, five studies included the theme of verbal bullying as a barrier to physical activity and one identified physical bullying as a barrier [38]. Examples of verbal bullying included name-calling while the example of physical bullying involved being targeted during dodge ball [38]. Social exclusion and stereotyping were also identified as barriers in five and four studies, respectively [38]. On the individual level, perceived verbal bullying was identified as a barrier in one study [38]. The authors posit that these barriers may lead to decreased physical activity as they could hinder psychosocial development and further exacerbate weight status by increased vulnerability to victimization and impeded ability to create peer relationships which would promote physical activity behavior [38].

Quantitative studies have also examined the relationship between bullying and physical activity behavior among youth with similarly negative associations. A study conducted by researchers at the University of Florida examined the effects of peer

victimization on depression, loneliness, anxiety, and physical activity behavior [32]. The study included 92 at-risk of overweight and overweight youth between the ages of eight and eighteen [32]. The sample included both males (n=38) and females (n=54) and their parents [32]. The survey instrument administered to youth combined the Schwartz Peer Victimization Scale, the Children's Depression Inventory, the Asher Loneliness Scale, the Multidimensional Anxiety Scale for Children, the Social Physique Anxiety Scale, and the PACE+ Adolescent Physical Activity Measure [32]. Parents of participants completed the Internalizing and Externalizing Problem Scales of the Child Behavior Checklist [32]. Both survey instruments collected data via self-report [32].

The five-item Schwartz Peer Victimization Scale measured victimization youth experienced in the two weeks prior to survey administration [32]. The Children's Depression Inventory-Short Form included 10 items examining the youth's mental, emotional, and behavioral symptoms of depression [32]. The survey instrument included 16 of the 24 items on the Asher Loneliness Scale [32]. This scale measures self-reported feelings of loneliness, adequacy, and peer status of youth during the two weeks before the survey [32]. The Multidimensional Anxiety Scale for Children includes 39-items measuring youth's separation, social, and general anxiety level [32]. Social anxiety related to the perceived evaluation by others of the youth's physique was examined through the 12-item Social Physique Anxiety Scale [32]. Youth physical activity was assessed via the two-item PACE+ Adolescent Physical Activity Measure which gathers data on how many days during the previous week youth engaged in at least 60 minutes of physical activity and how many days they are active for 60 minutes or more in a typical week [32]. The instrument for parents included the Child Behavior Checklist in which

parents rated children's internalizing and externalizing behavior problems [32]. All included scales, apart from the Social Physique Anxiety Scale, had good or excellent internal reliability ($\alpha \geq 0.82$) within the surveyed sample [32].

Following these bivariate analyses, hierarchical linear regressions were conducted to analyze whether psychological factors mediated the relationship between peer victimization and physical activity [32]. Findings suggested that symptoms of depression and feelings of loneliness acted as mediators in the relationship between peer victimization and physical activity [32].

The effects of bullying on perceived barriers to physical activity was further explored in another sample of overweight (93.7%) and at-risk for overweight (6.3%) youth aged 8 through 17 [39]. The sample included 95 adolescents and included multiple racial/ethnic groups and participants of both sexes [39]. A 21-item Barriers to Physical Activity Scale assessed the five domains of barriers to physical activity with an excellent internal consistency of 0.91 [39]. The five domains of barriers to physical activity for this study included Body-Related Barriers, Convenience Barriers, Resource Barriers, Social Barriers, and Fitness Barriers [39]. This scale assessed feelings of being self-conscious while participating in physical activity (Body-related barriers), perceived access to equipment, locations, and knowledge in order to participate in physical activity (Resource barriers), discomfort during physical activity (Fitness barrier) and weather and time constraints on physical activity (Convenience barriers) [39]. The scale also assessed Social Barriers to physical activity which included being teased during sports and being picked last in physical activity scenarios [39]. The subsections constituting these domains

also had adequate internal consistencies in the sample ranging from α=0.64 for convenience barriers to α=0.88 for resource and fitness barriers [39].

Information on frequency of peer victimization was gathered using the five-item Schwartz Peer Victimization Scale and children's symptoms of depression were gathered using the 10-item Children's Depression Inventory Short Form [39]. Level of physical activity as compared to peers was assessed via one survey item [39]. Parental distress was assessed using the 53-item Brief Symptom Inventory which measures symptomatic distress among adults [39].

Hierarchical regression analyses conducted found that the measured psychosocial variables significantly contributed to the youth's perceived barriers to physical activity [39]. Peer victimization significantly contributed to perceived body-related barriers, resource barriers, fitness barriers, and social barriers but did not contribute to variance in perceived convenience barriers to physical activity [39]. When psychosocial factors were examined independently of one another, peer victimization was found to be significantly associated with perceived body-related barriers and social barriers to physical activity [39]. Furthermore, perceived barriers to physical activity were found to be a mediating factor in the relationship between peer victimization and physical activity [39].

Quantitative studies among nationally representative samples examining the relationship between bullying victimization and physical activity have also been conducted among adolescents [11]. Secondary data analysis of the Health Behavior in School-Aged Children study represents one such study [11]. The Health Behavior in School-Aged Children study included 7,786 of the 9,461 students in the 2001 to 2002

sample [11]. The sample was collected through a three-stage cluster design (school districts, schools, and classrooms) on the national level in the United States of America [11]. Students in grades six through ten were included in the sample [11]. Missing data on the administrator section of the survey relating to school crime prevention led to the exclusion of 15 schools, or 1675 students [11].

Much of the data was collected via student self-report [11]. In order to assess the level of physical activity, two questions from the survey were examined: a question asking the number of days the student spent in physical education (PE) and a question about how many days in a typical week the student was physically active for 60 minutes or more per day [11]. Independent variables included both individual level and school level measures [11]. Individual level variables were Body Mass Index (BMI) scores based on self-reported height and weight, bullying victimization, number of friends, positive self-image, academic achievement, and demographic data [11]. Bully victimization was measured via the seven items of the Olweus Bully/Victim Questionnaire relating to victimization by peers [11]. The seven included items measured frequency of both verbal and physical types of bullying [11]. Number of friends was calculated by summing the responses to how many male and how many female friends the youth reported having [11]. Positive self-image was measured through one item asking youth if they viewed themselves as good looking [11]. Academic achievement was assessed by asking students what they felt was their instructor's opinion of their school performance when compared to peers [11].

The school level variable of school climate or cohesion was assessed via a 5-item scale on the student segment of the survey [11]. This scale asked students whether they agreed or disagreed with five statements about students helping peers that are sad, students enjoying each other's company, kindness and helpfulness of students, student acceptance of each other, and feelings of safety at school [11]. The remaining school level measures were collected through surveys filled out by school administrators [11]. The administrator surveys collected dichotomous information on school crime prevention policies, PE requirements, and school and community based opportunities for sports participation [11]. Crime prevention policies were assessed via six survey items about the existence of peer mediation programs, bullying prevention programs, checks of students' lockers or bags, hall monitors, school uniforms, and the presence of security guards of police during school hours [11]. To assess PE requirements, school-based sports opportunities, and community-based sports opportunities administrators were asked whether each of these programs existed at their school [11].

Multilevel modeling was used to analyze the data [11]. The first model included individual level variables and the second model included individual and school level factors [11]. Results of the analyses suggested that bullying victimization was significantly associated with fewer days in PE and a lower likelihood of engaging in physical activity more than once a week [11]. Quantitative and qualitative research findings support the idea that bullying involvement is associated with decreased physical activity behavior among adolescents.

Cyberbullying: An emerging public health threat?

While physical bullying is a more obvious threat to health, non-physical forms of bullying can negatively impact physical activity behavior as well. If in-person bullying, teasing, and rumor spreading are a perceived barrier to physical activity in students, cyberbullying may also be a barrier to physical activity among adolescents. While there is limited research on the emerging issue of cyberbullying, data suggests that, in many cases, cyberbullying produces similar effects to traditional, in-person forms of bullying.

Research suggests that cyberbullying is associated with similar mental health outcomes to those associated with traditional forms of bullying. One study sought to examine the impacts of cyberbullying in comparison to traditional forms of bullying through a survey administered in two rural Pennsylvania schools [10]. Overall, 931 sixth through 12th grade students participated in the study [10]. The survey measured frequency of traditional, or in-person bullying, frequency of cyberbullying, academic performance, physical health, self-esteem, symptoms of depression, and anxiety [10]. Traditional bullying was measured using the Olweus Bullying Questionnaire in which students indicated how often they were victimized and how often they victimized other students [10].

Dependent variables were also gathered through student self-report [10]. Academic performance items asked students to indicate how often they'd been absent from school, left school early due to sickness, and what their typical grades were [10]. A physical health outcome scale assessed whether in the prior four weeks a student had experienced any of the following ten symptoms: sadness, anxiety, fatigue, problems sleeping,

headaches, irritability, tension, poor appetite, skin problems, or bedwetting [10]. The internal consistency of this scale within the sample was 0.85 [10]. The 10-item Rosenberg Self-Esteem Scale, the 20-item Beck Youth Depression Scale, and the 20-item Beck Youth Anxiety Scale measured adolescent self-esteem, depression symptoms, and anxiety, respectively [10]. Cronbach's α within this sample was 0.85 for the Rosenberg Self-Esteem Scale and 0.94 or higher for the depression and anxiety scales [10].

Based on responses to the traditional bullying item, youth were categorized as bullies, victims, bully/victims, or not involved [10]. The same categorization was done separately for cyberbullying [10]. Separate analyses of variance were conducted for traditional bullying and cyberbullying with each of the eight dependent variables [10]. Findings related to traditional bullying align with prior research and showed that involvement in bullying was associated significantly with increased anxiety, poorer overall health, lower self-esteem, increased symptoms of depression, increased suicide ideation, poorer grades, and leaving school early [10]. The only non-significant outcome was number of absences among victims of traditional bullying; the correlation between number of absences among perpetrators was found to be significant [10]. Cyberbullying effects were similar to those of traditional bullying, with both bullies and victims having a significant negative impact on anxiety, depression, self-esteem, overall health, school performance (absences, leaving school early, and grades), and suicide ideation [10]. While this study did not examine the association between cyberbullying and physical activity, it does offer evidence that cyberbullying is associated with depression which may influence physical activity behavior.

Further evidence of the similar outcomes of traditional and cyberbullying was found in a study which examined the association between bullying and suicide attempts [40]. The study utilized data from the 2009 Youth Risk Behavior Survey and included 1,491 high school students in Arizona [40]. The sampling utilized a two-stage cluster model including schools and classrooms within the selected schools [40].

For this study, only survey items related to demographics, bullying, depression symptoms, and suicide were included in analyses [40]. Pearson correlations were run to examine the relationships between variables such as bullying and considering suicide and structural equation modeling to test for depression as a mediator in the relationship between bullying and attempted suicide were conducted [40].

The strongest correlations were found between symptoms of depression and considering suicide and between cyberbullying and cybervictimization [40]. Further findings suggested that depression does mediate the relationship between bullying and suicide attempts among both male and female adolescents [40]. Traditional victimization was significantly associated with depression in both sexes while traditional bullying was associated with depression only among females [40]. For cyberbullying, victimization was significantly associated with depression among only females and cyberbullying was not found to be significantly associated with depression in either males or females [40]. This link between cyberbullying and depression mirrors relationships observed for traditional forms of bullying and lends further credence to the association between cyberbullying and depression while strengthening the evidence that cyberbullying may influence physical activity among adolescents.

Interpersonal level factors such as peer violence and victimization can greatly affect individual level health and behavior. As discussed in this literature review, physical and non-physical violence, victimization, and bullying can lead to both psychological and physical health impacts. The impact of bullying on physical activity has been explored to an extent in recent years but further research is needed. Much of the current literature focuses on the mental health impacts of bullying. Additionally, many studies, at present, use small or non-representative samples. Furthermore, cyberbullying, as an emerging public health topic, has very limited research examining its effects on health. Few studies have been done explicitly on the effect of cyberbullying on physical activity behavior.

Research Aims

This research aims to address these gaps in the current literature by further examining the effect of bullying on physical activity with a special focus on cyberbullying. The following questions will guide this research:

1. Does traditional bullying victimization correlate negatively with physical activity behavior among high school students in the United States? and
2. Does cyberbullying victimization correlate negatively with physical activity behavior among high school students in the United States?

Based on prior research, it is hypothesized that both traditional and cyberbullying victimization will prove significantly associated with physical inactivity.

Methods

In order to answer these research questions, a secondary data analysis of the New York State 2011 Youth Risk Behavior Survey (YRBS) was conducted. The survey was administered as part of the national Youth Risk Behavior Surveillance System organized by the Centers for Disease Control and Prevention (CDC) and carried out in conjunction with state and local level agencies [41]. The YRBS collects data on six priority health-risk behavior categories among United States high school students [41]. The standard 2011 YRBS included 86 survey items asking students about behaviors related to violence and injury, tobacco use, alcohol and other drug use, sexual behavior, dietary behavior, and physical activity behavior [41] and the New York State YRBS included 59 survey items covering these topics [42].

The 2011 New York State YRBS was selected for this study over other states due to this state's unique physical education requirements. New York State is one of few states which requires student enrollment in physical education during every year of Kindergarten-12th grade education [25]. Additionally, the state mandates a minimum of 120 minutes per week spent in physical education classes for all students [25]. These state-level requirements made the New York State sample well-suited for this study as it was hoped that this standardization would lessen the influence of differential physical education requirements across schools within the state on physical activity levels.

Sample

In order to gather the sample for state-level YRBS, two-stage cluster sampling was conducted [43]. The first stage of sampling included selecting public schools that

enrolled any students in grades 9-12 [41]. Probability of selection was proportional to the number of students enrolled at the institution [41]. In the second stage of sampling, classrooms within selected schools were selected to take part in the survey [41]. Participating classrooms were selected from either a required class period, such as homeroom, or a required class subject, such as English [41]. All students in selected classrooms were invited to participate in the survey [41]. The New York State YRBS school response rate was 81% and the response rate for students was 79% [41]. The overall response rate for New York State was 68% and the sample included 13,201 participants [41].

Data Collection and Processing Procedures

Participation in the survey was entirely voluntary and parental permission was required prior to survey administration [41]. The 2011 New York State YRBS was completed during a single class period by students while at school [41]. Students completed the self-administered survey by marking their responses on an answer sheet which was later scanned into a computer [43]. Scanned questionnaires created an electronic data set which was sent to the CDC for data cleaning and editing [43].

Completed surveys which failed quality control checks were excluded from the data set and missing data were not imputed [41]. When logical inconsistencies occurred between questions, such as in a case where two survey item responses contradict one another, both survey items were set to missing [43]. Surveys with fewer than 20 valid responses failed quality control checks and were deleted from the data set [43]. Additionally, weighting was applied to the data set based on student sex, grade, and

race/ethnicity to adjust for nonresponse and oversampling of Hispanic and Black students [41]. This weighting was performed in order to make the estimates representative of the student population in each survey jurisdiction [43]. All available data on New York State participants were included in this analysis.

Measures

Only select items from the survey were included in this secondary analysis. In order to address the research questions, seven survey items were included in analyses. Included items gathered information on bullying victimization, cyberbullying victimization, and physical activity levels. Items gathering demographic information were also included in this analysis.

Bullying and cyberbullying victimization

The interpersonal level factors of bullying victimization and cyberbullying victimization were assessed via two survey items. In this survey, bullying was defined as "when 1 or more students tease, threaten, spread rumors about, hit, shove, or hurt another student over and over again. It is not bullying when 2 students of about the same strength or power argue or fight or tease each other in a friendly way." Bullying victimization was assessed through the Yes/No question of "During the past 12 months, have you ever been bullied on school property?" Cyberbullying victimization was similarly assessed via the survey item "During the past 12 months, have you ever been electronically bullied? (Include being bullied through e-mail, chat rooms, instant messaging, Web sites, or texting.)" [44].

Physical activity

Individual level physical activity was assessed via one survey item. This item asked participants "During the past 7 days, on how many days were you physically active for a total of at least 60 minutes per day? (Add up all the time you spent in any kind of physical activity that increased your heart rate and made you breathe hard some of the time.)". Response options ranged from (A) 0 days to (H) 7 days [44].

Demographic information

Demographic information on age, sex, and race/ethnicity was collected from participants through four survey items. Participants were asked to indicate how old they were and what their sex was. Response options for age ranged from (A) 12 years old or younger to (G) 18 years old or older. Response options for sex were (A) Female and (B) Male [44].

Participants were asked two questions to indicate their race and ethnicity. One item asked participants to indicate whether or not they were Hispanic or Latino. The other item asked participants to indicate what their race was. For this item, participants were allowed to choose all options that applied. Provided options included: (A) American Indian or Alaska Native, (B) Asian, (C) Black or African American, (D) Native Hawaiian or Other Pacific Islander, and (E) White. The race and ethnicity survey items were combined into a third variable which was also used in data analysis. When combined, the variable included the following categories: (1) American Indian/Alaskan Native, (2) Asian, (3) Black or African American, (4) Native Hawaiian or other Pacific Islander, (5) White, (6) Hispanic or Latino, (7) Multiple Hispanic, and (8) Multiple non-Hispanic [44].

Analyses

All analyses were run using the Complex Samples module within IBM's SPSS Statistics Version 21 in order to reduce bias associated with complex sampling designs [45]. A complex sample plan file was created prior to running any analyses. This complex sample plan file used the strata variable of STRATUM, the cluster variable of PSU, and the weight variable of WEIGHT.

The dichotomous variables of sex, bullying victimization, and cyberbullying were recoded with the reference groups of being male, individuals who had not experienced bullying, and individuals who had not experienced cyberbullying, respectively. Age variable responses were split, at the median, into two options (0) Less than or equal to 15 years old and (1) 16 years or older. The variable raceeth was recoded into a dichotomous variable with options of non-Hispanic White (0) and Racial minority (1). This dichotomization of race/ethnicity was conducted as prior research analyzing large datasets using complex sample analysis have similarly dichotomized race/ethnicity variables [45]. Furthermore, research on bullying suggests that racial and ethnic minority adolescents may be at increased risk of bullying victimization when compared to non-Hispanic White adolescents [33].

Descriptive statistics were created for all demographic variables as well as for the independent and dependent variables. Frequencies were produced for the race/ethnicity variable as well as for the dichotomous variables of age, sex, bullying victimization, and cyberbullying victimization. For the dependent variable of physical activity, the mean was calculated.

Bivariate analyses were conducted with each independent variable and the dependent variable of physical activity. The outcome variable was treated as a continuous variable (range 0-7) so first a complex samples general linear model was conducted with the bullying variable and physical activity. A second general linear model was run to examine the relationship between cyberbullying and physical activity. Next, the relationship between demographic variables and physical activity were examined using three separate general linear models.

In order to examine the relationship between the proposed predictor variables of bullying and cyberbullying victimization and the outcome variable of physical activity when controlling for demographic variables, a complex sample general linear model was created. Based on the results of the bivariate analyses, those variables with a $p<0.20$ were included in the model. As little research has been done on cyberbullying, analyses of the association between cyberbullying and physical activity were conducted within the six demographic subpopulations: individuals 15 and younger, individuals 16 and older, males, females, non-Hispanic White individuals, and racial minority individuals. These analyses examined whether different subpopulations have a greater association between cyberbullying and physical activity.

Ethics

All information included in the present study was de-identified prior to the primary investigator receiving the dataset. The Youth Risk Behavior Survey data collection procedures were approved by the CDC's Institutional Review Board [41] and the present

study was classified as non-Human Subjects Research by the Emory University Institutional Review Board (Appendix I).

Results

The sample included 13201 unweighted participants. The majority of the complex sample was 16 years or older (58.4%), male (50.8%), and self-identified as non-Hispanic White (55.7%). Detailed demographic characteristics can be found in Table 1 below. Almost one-fifth of the sample (17.7%) had experienced bullying and 16.2% had experienced electronic bullying during the twelve months prior to the survey (Table 1). Within the weighted sample, mean physical activity was 4.95 (SE=0.071), translating to a mean of nearly 4 days with 60 minutes or more of physical activity.

A general linear model was created to examine the relationship between bullying victimization and physical activity (Table 2). There was no significant difference in physical activity between those that were victimized and those that were not (t=0.251, df=157.000, p=0.802). A second general linear model explored the relationship between cyberbullying victimization and the outcome variable of physical activity (Table 2). Individuals that were the victims of cyberbullying were significantly less likely to take part in physical activity (mean=4.78, se=0.110) than those that had not been victimized (mean=4.99, se=0.070) (t=2.398, df=157.000, p=0.018).

Three complex samples general linear models were created to assess the relationship of each demographic variable to the outcome variable of physical activity (Table 2). Individuals 16 years and older were less likely to be physically active (mean= 4.86, se=0.070) than those 15 years and younger (mean=5.09, se=0.115) (t=2.000, df= 157.000, p=0.047). Additionally, there were gender differences in physical activity, with girls significantly less likely to be physically active (mean=4.46, se=0.069) than boys (mean=5.44, se=0.093) (t=11.061, df=157.000, p<0.001). Race also influenced physical

activity level, with individuals self-identifying as non-Hispanic White significantly more likely to take part in physical activity (mean= 5.25, se=0.060) than those self-identifying as another racial or ethnic group (mean= 4.53, se=0.091) (t=7.350, df=157.000, p<0.001).

As bullying was not significantly associated with physical activity at p<0.2, no model was created for bullying (p=0.802). All other variables were significantly associated with physical activity and thus were included in a subsequent complex samples general linear model. Results of the model suggest that cyberbullying was marginally significant within the model (p=0.152). On average, individuals that had experienced cyberbullying were involved in 0.149 points less of physical activity than those who had not been the victims of cyberbullying (B=0.149; 95%CI -0.056, 0.353; p=0.152). Further, the model suggests that age, sex, and race were significantly associated with physical activity when controlling for other variables. On average, individuals 16 years old and older took part in 0.335 points less physical activity than individuals 15 years old and younger when controlling for cyberbullying, sex, and race/ethnicity (B=0.335; 95% CI=0.125, 0.546; p=0.002). On average, males' physical activity level was 0.957 points higher than females when controlling for cyberbullying, age, and race/ethnicity (B=0.957; 95% CI=0.787, 1.127; p<0.001). Additionally, race/ethnicity was significantly associated with physical activity when controlling for other variables, with non-Hispanic White individuals, on average, having 0.717 points higher of physical activity than Racial minority individuals when controlling for cyberbullying, age, and sex (B=0.717; 95% CI=0.518, 0.915; p<0.001). The total regression model accounted for 6.4% of the variance in physical activity (Table 3).

As cyberbullying was marginally significant within the model, and research on cyberbullying is limited, six successive models were run examining the variables within demographic subpopulations (Table 4). Cyberbullying was significantly related to physical activity within both the male subpopulation (p=0.005) and the non-Hispanic White subpopulation (p=0.032). Among males, those that were cyberbullied had physical activity levels 0.665 points lower than those that were not victims of cyberbullying when controlling for age and race (B=0.665; 95% CI=0.208, 1.121; p=0.005; R^2=0.030). Among non-Hispanic White individuals, those that were victims of cyberbullying had physical activity levels 0.275 points lower than those that were not cyberbullied when controlling for age and sex (B=0.275; 95% CI=0.024, 0.527; p=0.032; R^2=0.052). Cyberbullying remained insignificant within the 15 and younger population (p=0.795) and within the 16 and older population (p=0.278). Furthermore, cyberbullying was also not significant within the model when examining the subpopulation of females (p=0.175) and among the subpopulation of individuals self-identifying as Racial minorities (p=0.546).

Table 1: Weighted characteristics of the sample

Variable	Frequency (SE)	Percent (95% CI)
Age		
≤15	334530.702 (20887.369)	41.6 (37.2, 46.1)
≥16	470102.403 (49219.303)	58.4 (53.9, 62.8)
Sex		
Male	407895.562 (36008.074)	50.8 (47.6, 53.9)
Female	395567.318 (30749.830)	49.2 (46.1, 52.4)
Race		
Non-Hispanic White	448745.994 (61097.860)	55.7 (47.7, 63.4)
Racial Minority	356660.610 (24306.540)	44.3 (36.6, 52.3)
During the past 12 months, have you ever been bullied on school property?		
No	658298.968 (51278.059)	82.3 (80.9, 83.5)
Yes	141795.273 (11973.730)	17.7 (16.5, 19.1)
During the past 12 months, have you ever been electronically bullied?		
No	672563.907 (50959.136)	83.8 (82.4, 85.1)
Yes	130348.594 (12345.629)	16.2 (14.9, 17.6)

Table 2: Mean physical activity levels in bivariate analyses

Variable	Mean (SE)	95% CI Lower, Upper	Hypothesis testing t	p
Age				
≤15	5.09 (0.115)	4.86, 5.32	2.000	0.047*
≥16	4.86 (0.070)	4.72, 5.00		
Sex				
Male	5.44 (0.093)	5.26, 5.63	11.061	<0.001*
Female	4.46 (0.069)	4.32, 4.60		
Race				
Non-Hispanic White	5.25 (0.060)	5.13, 5.37	7.350	<0.001*
Racial Minority	4.53 (0.091)	4.35, 4.71		
Bullying victimization				
No	4.96 (0.067)	4.83, 5.09	0.251	0.802
Yes	4.93 (0.156)	4.62, 5.23		
Cyberbullying victimization				
No	4.99 (0.070)	4.85, 5.13	2.398	0.018*
Yes	4.78 (0.110)	4.56, 4.99		

SE=Standard Error; CI=Confidence Interval; *=Significant at p<0.2; df=157.000

Table 3: Associations with physical activity when controlling for other variables

Variable	Estimate (SE)	95% CI Lower, Upper	P-value
Age	0.335 (0.106)	0.125, 0.546	0.002*
Sex	0.957 (0.086)	0.787, 1.127	<0.001*
Race	0.717 (0.100)	0.518, 0.915	<0.001*
Cyberbullying	0.149 (0.103)	-0.056, 0.353	0.152

SE=Standard Error; CI=Confidence Interval; *=Significant at p<0.05; R^2=0.064

Table 4: Cyberbullying's association with physical activity among subpopulations

Variable	Estimate (SE)	95% CI Lower, Upper	P-value	R^2
Age				
≤15	0.049 (0.190)	-0.326, 0.425	0.795	0.058
≥16	0.229(0.210)	-0.186, 0.644	0.278	0.064
Sex				
Male	0.665 (0.231)	0.208, 1.121	0.005*	0.030
Female	-0.179 (0.132)	-0.439, 0.081	0.175	0.026
Race				
Non-Hispanic White	0.275 (0.127)	0.024, 0.527	0.032*	0.052
Racial minority	-0.109 (0.180)	-0.463, 0.246	0.546	0.036

SE=Standard Error; CI=Confidence Interval; *=Significant at $p<0.05$

Discussion

Summary of findings

The purpose of this secondary analysis was to examine the relationship between bullying and physical activity in order to further understand how interpersonal level factors such as violence can negatively impact health. Both traditional and electronic forms of bullying were examined in this analysis as prior research has shown that both physical and non-physical bullying can negatively impact both physical and mental health [10, 40].The results of this analysis are not fully congruent with the current literature. In weighted bivariate analyses, bullying was not significantly associated with physical activity level. Interestingly, this runs counter to the current literature on the subject [11, 32, 39, 46]. This discrepancy in findings may be due to differences in sample populations examined. Many prior studies have not examined the association between bullying and physical activity using large-scale samples which may limit generalizability [10, 32, 39].

Electronic bullying proved far more influential on adolescent physical activity in this sample. When controlling for demographic variables, the relationship of cyberbullying to physical activity was marginally significant (B=0.149; 95%CI -0.056, 0.353; p=0.152). This marginal significance prompted an examination of cyberbullying within demographic subpopulations in order to ascertain whether cyberbullying had a greater effect on certain groups of adolescents. Cyberbullying was found to be significantly associated with physical activity among both male adolescents (B=0.665; 95% CI=0.208, 1.121; p=0.005; R^2=0.030) and among non-Hispanic White adolescents (B=0.275; 95% CI=0.024, 0.527; p=0.032; R^2=0.052). The association between cyberbullying and

physical activity remained insignificant among both female adolescents (p=0.175) and among racial minority adolescents (p=0.546). Further, no significant association was found among adolescents 15 years old or younger (p=0.795) nor among individuals 16 years old or older (p=0.278).

Cyberbullying's varied strength of association with physical activity by race and ethnicity and by sex parallels prior research on the strength of bullying's association with mental health issues across these groups [35, 36]. Additionally, previous studies suggest that the association between bullying and physical activity is mediated by depression [32] and that cyberbullying is associated with depression [10]. It follows logically that cyberbullying would be associated, to an extent, with physical activity through the pathway of depression. Furthermore, research suggests that the association between mental health issues and weight may be moderated by racial and ethnic group [47]. This suggests that race and ethnicity may potentially play a role in moderating the relationship between cyberbullying and physical activity if said relationship is mediated by depression. Other factors may also be contributing to the strength of the association between cyberbullying and physical activity among adolescent males and non-Hispanic White adolescents.

Strengths and limitations

There were several limitations within this study. For one, the cross-sectional nature of the data makes it impossible to infer causality in the relationship between cyberbullying and physical activity as there is no way to assess temporality. Additionally, this analysis, as a secondary data analysis, was limited by the inability to gather data on all possibly

pertinent information relating to bullying and cyberbullying. For example, the 2011 New York State Youth Risk Behavior Survey does not ask questions about socioeconomic status which has been linked to physical activity behavior in children and adolescents [48, 49]. Additionally, the 2011 New York State Youth Risk Behavior Survey does not gather data on sexual orientation which may be influential on both bullying victimization [50] and on physical activity behavior [51]. Moreover, the relationship between both forms of bullying and physical activity may have reduced significance as the Youth Risk Behavior Survey only asks about those victimized by bullying and prior research has shown poor health outcomes among both victims and perpetrators of bullying [12, 13, 21]. Furthermore, this study is limited in that it did not examine physical activity through the lens of the entire Social Ecological Model. This analysis was limited to an investigation of only the effect of the interpersonal level variable of peer victimization on individual level physical activity behavior.

This analysis also had multiple strengths. This study sought to strengthen the research on the public health problem of bullying by analyzing a generalizable sample of adolescents. Furthermore, it is one of the first to examine the impacts of cyberbullying on physical activity. This analysis provides intriguing and potentially important insights into this topic.

Implications and recommendations for research and practice

This analysis illustrates a need for further research on both forms of bullying employing quantitative and qualitative methodologies. Future research needs to examine physical activity behavior among both victims and perpetrators of bullying and

cyberbullying. Additionally, there is a need to perform longitudinal studies in order to examine whether bullying occurs prior to decreased physical activity or whether decreased physical activity precedes peer victimization. Furthermore, it is necessary for research to examine the consequences of bullying and cyberbullying, especially among high risk groups such as non-heterosexual adolescents.

Considerable additional research is needed to examine both cyberbullying in general and cyberbullying in relation to physical activity. Specifically, in addition to the aforementioned further research needed for both bullying and cyberbullying, cyberbullying also requires supplementary qualitative research. There is a need to explore the perceptions of both cyberbullying victims and perpetrators and to examine how they feel their experiences impact both their mental and physical health in addition to their physical activity behaviors.

The findings of this analysis support a need to address issues of bullying and cyberbullying as they have been show to negatively influence both physical and mental health. This study suggests that cyberbullying may also negatively affect physical activity behavior, which is vital to maintaining good mental and physical health. There is a need for programs and policies which address electronic forms of peer victimization. These policies and programs must work toward reducing the prevalence and also on improving the coping of victimized individuals. Anti-bullying policies have been shown to reduce suicide attempts among minority sexual orientations [52] and could potentially be used to promote physical activity and protect both physical and mental wellness.

Conclusion

The potentially far-reaching impacts of bullying necessitate addressing not just the health issues that bullying can contribute to, but also the issues of bullying and cyberbullying in and of themselves. Public health must address issues of interpersonal violence and peer victimization while continuing to address the mental and physical health of the individual. Further research is needed examining the relationship between electronic and traditional forms of bullying and physical activity, especially among high risk groups. Specific focus should be made on expanding research on cyberbullying as it is a new area of study with limited scope as yet.

As physical activity contributes to good mental and physical health, it is necessary to reduce, wherever possible, barriers to physical activity behavior. Physical activity may be impeded by neighborhood or interpersonal violence as well as by a variety of other factors. This analysis sought to examine the relationship between traditional and electronic forms of bullying and physical activity in a large scale study in order to produce more generalizable results. While the findings relating to traditional forms of bullying are incongruent with current research, this may be due to limitations within this analysis. Despite the limitations of this analysis, the results demonstrated the importance of examining both traditional and electronic forms of bullying in the context of physical activity behavior. Coupled with information from prior research, this analysis supports a need for further research on bullying and cyberbullying. Additionally, it demonstrates a need to implement policies aimed at reducing both traditional and electronic forms of bullying.

Appendix

Institutional Review Board Letter Confirming non-Human Subjects Research

EMORY UNIVERSITY | Institutional Review Board

DATE: November 11, 2013

RE: **Determination:** No IRB Review Required
Project Topic/Title: *Examining Bullying and Physical Activity in United States High School Students*
PI: Deborah Dalmat

Dear Ms. Dalmat:

Thank you for requesting a determination from our office about the above-referenced project. Based on our review of the information you provided, we have determined that it does not require IRB review because it does not meet the definition of involving "human subjects" as set forth in Emory Policies and Procedures or federal regulations (45CFR46.102). In particular, this project aims to determine if there is a correlation between bullying and physical inactivity. In order to investigate this aim, you will be using data collected from the 2011 Youth Risk Behavior Survey provided as a public resource by the Centers for Disease Control and Prevention. You will have no interaction or intervention with individuals, and no identifiable information will be viewed or retained.

Please note that this determination does not affect the ability to publish the results. If you have questions about this issue, please contact the IRB.

This determination could be affected by substantive changes in the study design, subject populations, or identifiability of data. If the project changes in any substantive way, please contact our office for clarification.

Thank you for consulting the IRB.

Sincerely,

Kevin Wack, MA, MTS
Research Protocol Analyst
Education and Quality Assurance
Emory University Institutional Review Board
1599 Clifton Rd, Atlanta, GA 30322

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