2022

The Association of Suicidality With Video Gaming and Physical Inactivity Among U.S. Adolescents

Mary Colleen Cyrus
Walden University

Walden University

College of Health Professions

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Mary Colleen Cyrus

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Mary Colleen Cyrus

MS, Texas Women's University, 2011

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Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Public Health

Walden University

February 2022

Abstract

Suicide represents a leading cause of death in U.S. young people, and the rate is increasing. Although young people are spending more time each day playing video or computer games, there is limited research on the association, if any, between playing video games and suicidality. The purpose of this study was to identify whether there is a statistically significant association between video gaming, physical inactivity, and suicidality (suicidal ideation, planning, and attempts). Age, race, gender, and being bullied electronically and in school were assessed as potential confounding variables. The interpersonal theory of suicidal behavior and the social-ecological theory served as the theoretical foundation for the quantitative cross-sectional study. Data from the Centers for Disease Control and Prevention's 2017 Youth Risk Behavior Surveillance System survey were analyzed. The population included 14,756 U.S. students ages 13-18 years. Binary logistic regression revealed an association between playing video games and the three dependent variables of suicidality. The other independent variable, physical inactivity, was associated with suicidal ideation and suicide planning. Being bullied, both electronically and in school, had a positive association with all three dependent variables. Gender also revealed a positive association with females being more likely than males to exhibit suicidal behaviors. Race was associated with suicide attempts and suicide planning. The study's positive social change implications include providing knowledge that researchers and public health workers can use to (a) identify changes in youth social behaviors that increase suicidality and (b) design intervention programs to reduce video gaming and increase physical activities among young people.

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Chapter 1: Introduction to the Study

In my study, I examined the association of video gaming and physical inactivity with suicidality in U.S. adolescents. The high suicide rate of U.S. youth ages 13-18 years is significant and increasing. Study results revealed a statistically significant association between video gaming, physical inactivity, and suicidality (suicidal ideation, planning, and attempts). The results of the study have implications for positive social change. For example, awareness of the relationships between video gaming, physical inactivity, and suicidality may compel parents, educators, and other stakeholders to eliminate the variables from individual lifestyles or to reduce their impact. In Chapter 1, I will explain the following in detail: the problem that was investigated, the significance of the problem, the purpose of the study, the research questions (RQs) and hypotheses, the theoretical framework, and the nature of the study. I will also discuss the assumptions, scope and delimitations, limitations, and significance of the study, including its implications for positive social change.

Problem Statement

Suicide is a public health problem that is a leading cause of mortality in the United States. In the United States in 2017, suicide was the 10th leading cause of death overall and the second leading cause of death in the 10-34 age group (Kochanek, 2017). Globally, suicide is the third leading cause of death in the 15-19-year-old age group (World Health Organization [WHO], 2019). The suicide rate in 2017 was 14.0 per 100,000 population in the United States (Centers for Disease Control and Prevention [CDC], 2018b). According to the CDC (2018b), the suicide rate increased by 33% from

1999 to 2017. Additionally, 54% of people who died from suicide did not have a known mental health condition (CDC, 2018c). Furthermore, males commit suicide four times more than females in the United States (Kochanek, 2017).

The increase in the rate of suicide, of youth in particular, is occurring amid an increase in the percentage of youth playing video games. In 2017, 43% of U.S. students played video or computer games for 3 hours or more daily, an increase of 22% to 43% from 2003 to 2017 (CDC, 2018a). In addition, 15% of U.S. high school students were obese and 16% were overweight in 2017, an increase from 1999-2017 of 11% to 15% for obesity and 14% to 16% for overweight youth (CDC, 2019b).

According to my literature review, research on suicide is substantial, and there are many studies on the adolescent age group. However, there are limited studies of the association between playing video games and suicidality. Of the few studies on this association, none is current and updated, according to my research. With the recent increase in video and media usage among U.S. youth (CDC, 2019b), an updated investigation of the relationship between playing video games and suicidality among youth was warranted. In addition, there is limited literature found to support the effects of physical inactivity in youth with suicidality. Examining the impact of physical inactivity on suicidality among U.S. youth was also warranted.

Purpose of the Study

Suicide is a serious public health problem but is preventable with evidence-based interventions (WHO, 2019). The purpose of this study was to identify factors that are associated with suicidality in youth. A broader aim was to increase public awareness of

factors influencing youth suicide. The findings from the study may support evidence-based changes that help to address youth suicidality. The influences on youth today are changing, and public health officials must maintain current research and advocacy. Video gaming is increasing in U.S. youth as well as mortality due to suicide (CDC, 2018a; CDC, 2018b), and research to connect these two phenomena is warranted.

This was a quantitative cross-sectional study. I analyzed secondary data. Video gaming was the independent variable; physical inactivity was the independent and moderating variable; and suicidal ideation, suicide planning, and suicide attempt were the dependent variables. There were also other potential predicting variables that were analyzed as confounding variables including age, race, gender, and being bullied, both electronically and in school.

Research Questions and Hypotheses

I sought to answer nine RQs. The RQs and corresponding hypotheses were as follows.

RQ1: Is there an association between playing video games for 3 or more hours a day and suicidal ideation in the youth ages 13-18 years in the United States when controlling for being bullied, gender, age, and race?

$H_0$1: There is no association between playing video games for 3 or more hours a day and suicidal ideation in the youth ages 13-18 years in the United States when controlling being bullied, gender, age, and race.

H_a1: There is an association between playing video games for 3 or more hours a day and suicidal ideation in the youth ages 13-18 years in the United States when controlling being bullied, gender, age, and race.

RQ2: Is there an association between physical inactivity and suicidal ideation in the youth ages 13-18 years in the United States when controlling for being bullied, gender, age, and race?

H_02: There is no association between physical inactivity and suicidal ideation in the youth ages 13-18 years in the United States when controlling for being bullied, gender, age, and race.

H_a2: There is an association between physical inactivity and suicidal ideation in the youth ages 13-18 years in the United States when controlling for being bullied, gender, age, and race.

RQ3: Does physical inactivity have a moderating effect on the association between suicidal ideation and playing video games in the youth ages 13-18 years in the United States?

H_03: Physical inactivity has no moderating effect on suicidal ideation and playing video games in the youth ages 13-18 years in the United States.

H_a3: Physical inactivity has a moderating effect on suicidal ideation and playing video games in the youth ages 13-18 years in the United States.

RQ4: Is there an association between playing video games for 3 or more hours a day and suicide attempt in the youth ages 13-18 years in the United States when controlling for being bullied, gender, age, and race?

$H_0$4: There is no association between playing video games for 3 or more hours a day and suicide attempt in the youth ages 13-18 years in the United States when controlling being bullied, gender, age, and race.

H_a4: There is an association between playing video games for 3 or more hours a day and suicide attempt in youth ages 13-18 years in the United States when controlling for being bullied, gender, age, and race.

RQ5: Is there an association between physical inactivity and suicide attempt in the youth ages 13-18 years in the United States when controlling for being bullied, gender, age, and race?

$H_0$5: There is no association between physical inactivity and suicide attempt in the youth ages 13-18 years in the United States when controlling for being bullied, gender, age, and race.

H_a5: There is an association between physical inactivity and suicide attempt in the youth ages 13-18 years in the United States when controlling for being bullied, gender, age, and race.

RQ6: Does physical inactivity have a moderating effect on the association between suicide attempt and playing video games in the youth ages 13-18 years in the United States?

$H_0$6: Physical inactivity has no moderating effect on suicide attempt and playing video games in the youth ages 13-18 years in the United States.

H_a6: Physical inactivity has a moderating effect on suicide attempt and playing video games in the youth ages 13-18 years in the United States.

RQ7: Is there an association between playing video games for 3 or more hours a day and suicide planning in the youth ages 13-18 years in the United States when controlling for being bullied, gender, age, and race?

$H_0$7: There is no association between playing video games for 3 or more hours a day and suicide planning in the youth ages 13-18 years in the United States when controlling being bullied, gender, age, and race.

H_a7: There is an association between playing video games for 3 or more hours a day and suicide planning in youth ages 13-18 years in the United States when controlling for being bullied, gender, age, and race.

RQ8: Is there an association between physical inactivity and suicide planning in the youth ages 13-18 years in the United States when controlling for being bullied, gender, age, and race?

$H_0$8: There is no association between physical inactivity and suicide planning in the youth ages 13-18 years in the United States when controlling for being bullied, gender, age, and race.

H_a8: There is an association between physical inactivity and suicide planning in the youth ages 13-18 years in the United States when controlling for being bullied, gender, age, and race.

RQ9: Does physical inactivity have a moderating effect on the association between suicide planning, and playing video games in the youth ages 13-18 years in the United States?

$H_0$9: Physical inactivity has no moderating effect on suicide planning and playing video games in the youth ages 13-18 years in the United States.

H_a9: Physical inactivity has a moderating effect on suicide planning and playing video games in the youth ages 13-18 years in the United States.

Theoretical Framework

I based the study's theoretical framework on the social-ecological model (SEM) and the interpersonal theory of suicidal behavior (IPTS). The IPTS is based on two concepts, which are desire and capability to commit suicide, and two interpersonal components of desire, which are thwarted belongingness and perceived burdensomeness (Van Orden et al., 2010). A key tenet of the theory is that the willingness or desire for death, the capability of harming oneself or committing suicide, and the desire to commit suicide are caused by the absence of belonging (Gauthier et al., 2014). The IPTS concept of desire to commit suicide explains why individuals who are disconnected socially due to playing video games would have suicidality.

The SEM model explains how different influences overlap to cause health outcomes and is a framework for prevention (CDC, 2019a). Individual, relationship, community, and societal factors all play a role in individual health outcomes (CDC, 2019a). In this study, I addressed suicidality as the health outcome and investigated the variables that put individuals at risk. In using the SEM as a framework, I sought to explain how its four overlapping factors interact to influence suicidality. Individual factors for this study included personal history or experience; relationship factors, social connections with friends; community factors, the cultural values and norms of high

school students; and societal factors, the set of values and norms of each student. When the factors that make up the SEM and that increase the risk of suicidality are both understood, prevention methods to reduce the high suicide rate of U.S. youth may be more likely.

Nature of the Study

The research method involved analysis of a secondary data set, the Youth Risk Behavior Survey (YRBS) of 2017 (CDC, 2018d). This study featured a cross-sectional design. The independent variables (IVs) were playing video games (defined as playing video games for 3 or more hours a day) and physical inactivity (defined as not participating in exercise for at least 1 hour a day on 5 days per week). I also investigated physical inactivity as a moderating variable. The dependent variables (DVs) were suicidal ideation, suicide planning, and suicide attempt. Confounding variables (CVs), including gender, age, race, and being bullied, both electronically and in school, were included, and the outcome variables were tested with and without the confounding variables. Playing video games (PVD) includes computer/internet games as well as internet/smartphone video games. The data do not differentiate between the technology source; the variable is video and computer games. Because computer games can be played on smartphones, I included smartphone video game playing as a form of PVD for the purpose of this study.

I obtained data for the study from the YRBS 2017 data set. Because only secondary data were used, there were no primary data collected by conducting interviews and therefore no need for the development of instruments. I used SPSS Version 27 software, specifically, 2017XXH_SPSS.SPS-IBM SPSS Statistics Syntax Editor saved

within the YRBS data set, to analyze the data. Data were analyzed using binary logistic regression and chi-square tests. I performed the binary logistic regression to estimate odds ratios (OR) for the association between the two IVs and DVs, as well as analyze the moderating variable. I performed chi-square tests to examine the likelihood of association between the specified IV and DV after controlling for each confounding variable.

Definitions

Adolescent population: The teenage population that is transitioning from puberty to adulthood. For purposes of this research, it was defined as individuals ages 13-18 years old (Hacker, 2011).

Bullying: The use of force, coercion, or threat to abuse, aggressively dominate, or intimidate a person (Hacker, 2011).

Gender: Either the male or female division of a species (Hacker, 2011).

Moderator variable: A variable that changes the strength or direction of an effect between an independent and dependent variable (Hacker, 2011).

Physically inactivity: A type of lifestyle, also known as a sedentary lifestyle, with little to no physical activity. For purposes of this research, physically inactive was defined as less than 5 days per week of physical activity whereas physically active was defined as 5 or more days per week of physical activity (Hacker, 2011).

Suicidal ideation: A term, also known as suicidal thoughts, that refers to serious thoughts about taking one's own life (Hacker, 2011).

Suicidality: A term that encompasses suicidal ideation, suicide planning, and suicide attempts (Hacker, 2011).

Suicide attempt: A term that refers to when a person tries to voluntarily take their own life but survives (Hacker, 2011).

Suicide planning: The formulation of a specific method by which one intends to takes one's own life voluntarily (Hacker, 2011).

Video gaming: An electronic game in which players control images on a video screen (Hacker, 2011).

Youth Risk Behavior Surveillance (YRBSS): A surveillance system that monitors six categories of health-related behaviors that contribute to the leading causes of death and disability among youth and adults (CDC, 2018d).

Assumptions

I assumed that interacting with video characters could be disconnecting youth socially and discouraging the development of social connections with people. I also assumed that physical inactivity may cause suicidality. More specifically, the assumption was that playing video games in excess creates a decrease in social interactions and contact and therefore may lead to suicidality as well as physical inactivity. Thus, physical inactivity may be a moderator variable for suicidal ideation, suicide planning, and/or suicide attempt. Physical activity may be a protective factor for any of the components of suicidality in adolescents who play video games in excess whereas physical inactivity may strengthen the relationship between video gaming and suicidality.

Scope and Delimitations

The focus of this study was on the effects of video gaming and physical inactivity with suicidality. Because video gaming for excessive hours would decrease the amount of time an individual has for physical activity, physical inactivity could also be a moderating factor. I sought to determine whether any of the components of suicidality are associated with excessive video gaming and physical inactivity. Excessive video gaming and physical inactivity were independent variables in the study; physical inactivity was also studied as a moderating variable. Completed suicide was not tested due to the live participant sample. For example, the survey question on attempted suicide represented SA; the question on planning, SP; and the one on thinking of suicide, SI. Therefore, it was possible to differentiate between, and separately test, the DVs, but data were unavailable to examine completed suicide.

The study was dependent on secondary data collected from a sponsored federal agency with a large sample size, over a large area in the United States, that administered a school-based survey (CDC, 2018d). The methods used by CDC researchers could resolve some potential biases in data collection as well as limit false reporting; however, the data are not indicative of all socio-cultural geographic populations in the United States. For example, the adolescents sampled did not include home-schooled youth. To address this issue, surveys would need to be sent to youth who are home-schooled. In addition to the youth homeschooled not being accessed, some of the survey questions create a limitation. For example, some are single questions that give a dichotomous “yes”

or “no” answer, such as “Do you think of suicide, or are you sad or lonely?” Scaled answers may create a more accurate tool for reporting valid results (Creswell, 2014).

Limitations

The limitations of the study relate to the use of secondary data. I did not directly collect the data but instead depended on the correct and ethical standards of CDC researchers. The data were collected by a public agency that is experienced in research, and the sample was large and from throughout the United States (CDC, 2018d). However, absentees from school during the time of survey administration could have caused some external validity issues. There may also have been recall bias from the participants. In addition, the age of the study population may have caused some false reporting. Also, doubts of confidentiality in reporting could have caused response bias or underreporting (Creswell, 2014). Another limitation is that the data set included confounding variables for cross analysis. To decrease potential validity issues caused by confounders and improper instrumentation, I used statistical software application to test the variables.

Significance

Video gaming is a mediated activity that does not always require social interaction with other individuals; therefore, it may create negative consequences by discouraging social connections. Social connections include social interactions and contact; such engagements have decreased by one third since 1985 (Holt et al., 2017). According to epidemiological research, social disconnection predicts poor health

outcomes such as psychological issues and health behaviors (Holt et al., 2017). In addition, physical inactivity could be a factor influencing psychological issues as well.

There is a high personal and societal cost for suicidality in the United States. The financial cost is an estimated 51 billion dollars in combined medical expenses and work losses per year for all suicidal ideation (CDC, 2016). Addressing suicide through evidence-based research may have the potential to reduce the high cost on society. This study led to the identification of factors that influence suicidality; these findings may allow public officials and other stakeholders to initiate preventive and treatment measures. For example, the findings may promote parental awareness and possible restrictions on playing video games, as well as promote funding for school programs that educate children on healthy behaviors. The study findings may also encourage school officials to design programs to promote education on the topic.

Conclusion

Video gaming is a prominent youth issue that could lead to significant health issues, such as suicide. I assume there may be a significant correlation between video gaming, suicidal ideation, suicide planning, and suicide attempt that is resulting in the increased suicide rate among U.S. youth. In this study, I investigated this assumption by testing these variables as well as the possibility of physical inactivity being a moderating factor for suicidal ideation, suicide planning, and/or suicide attempt. In Chapter 2, I will address the theory that may explain these correlations as well as explore the research related to the study's RQs.

Chapter 2: Literature Review

Introduction

Suicide is a public health problem that is one of the leading causes of mortality in the United States. In the United States in 2017, the second leading cause of death in the 10-34 age group was suicide (CDC, 2018a). The purpose of the study was to identify factors that are associated with suicidality in youth. I examined whether video gaming and physical inactivity are associated with suicidality in youth. Study findings may increase the public's awareness of the factors that contribute to youth suicide. The findings may also inform the development of interventions by policy makers and researchers to address the high rate of youth suicide.

I found abundant literature on depression and suicidal ideation among adults and some among youth, mainly school surveys where the population is easily accessible. Furthermore, researchers have addressed body image, bullying, including cyberbullying, and other lifestyle behaviors associated with suicidal behaviors. However, researchers have not examined video gaming and physical inactivity in association with suicidal ideation, suicide planning, and suicide attempt, according to my review of the literature. Research indicates that physical activity decreases depression, hours of video gaming increases the capability of suicide in college students, and violent video gaming increases negative conduct in school (An et al., 2014; Cho et al., 2014; Gauthier et al., 2014; Michell et al., 2015). Yet, even with the increase in suicide among youth, research on youth suicidality is limited. Therefore, research is needed to address this public health issue. In Chapter 2, I will provide detailed descriptions of the literature search strategy

and theoretical foundation for the study. A literature review, including identification of gaps in the research that were addressed in this investigation, will also be included.

Literature Search Strategy

I performed a literature review to evaluate any associations between suicidality in youth to reveal gaps that might potentially improve this public health problem. I found that the review revealed a need for interventions to address suicidal ideation, suicide planning, and attempted suicide amid increased video gaming and decreased physical activity among youth.

To find literature, I used the search engine Google Scholar and the following databases: Academic Search Complete, Science Direct, PsycArticles, PsycBooks, PsycExtra, PsycInfo, EBSCOhost, and ProQuest. The key search terms used were *adolescence*, *young people*, *youth*, *teens*, *suicidal ideation*, *suicide*, *suicide planning*, *suicidality*, *suicide attempt*, *video games*, *and health behaviors such as physical activity and physical inactivity*. The literature review was conducted using only peer-reviewed literature from the last 9 years (2011-2020) with a concentration on the association between suicidal ideation, suicide planning, suicide attempt, physical activity, and video gaming. The target population was adolescents within the United States, but studies from other countries were reviewed and are included in the review. Approximately 300 articles were reviewed, and approximately 50 articles were found to have met the inclusion criteria.

Theoretical Foundation

I used two theories, SEM and IPTS, as the theoretical foundation for the study.

Social Ecological Theory

With its explanation of multiple levels of influence on an outcome, SEM is a useful tool for health workers and researchers seeking to target prevention methods to change a health outcome and effect positive social change. Bronfenbrenner developed the original theory in 1977. SEM explains that human development is based on social ecology in different aspects of sociology and ecology of human growth (National Institutes of Health, 2019). The model has five levels: individual (knowledge, attitude, skills), interpersonal (social network), organizational (environment, ethos), community (cultural values, norms), and public policy. These levels of influence could affect the decisions of the youth being studied as well as can be used for intervention purposes. The levels of influence interact to cause health behaviors such as the decision to play video games, engage in physical activity, and/or plan and attempt suicide.

Researchers consider the social environment aspect of the SEM model to be the most influential and preventable (CDC, 2019a). In the context of this study, the social environment involves parents and what they allow youth to do. This is because the study population is the adolescent age group whose members are still under parental guidance and direction. Parents have social values that they instill in their children, and they are the ones who allow or disallow video gaming and usually are the persons who purchase the video games. Both of these factors are controlled by the parent and, therefore, can be encouraged or prevented.

Another influential aspect of the SEM model that is reflected in the study is individual. The knowledge, attitude, and skills of youth are a factor in their decision to

play video games or stay physically active. The individual knowledge and beliefs would have to be influenced or changed to reflect positive outcomes. For example, youth would need to be aware of the effects of video gaming and physical inactivity and be willing to choose the positive behavior.

Furthermore, SEM provides an explanatory framework for interpreting and acting upon the study results. Health care workers and researchers could devise prevention methods by targeting specific aspects of the model. Prevention efforts could focus on the social environment by providing parent education and awareness and school programs for youth to influence individual and interpersonal relationships. Other actors could also take action. For example, media organizations could advertise to generate awareness of the issue, and policy makers could formulate policy restrictions on video game sales and purchasing requirements.

Interpersonal Theory of Suicidal Behavior

The IPTS is based on two concepts, which are desire and capability to commit suicide (Van Orden et al., 2010). Two interpersonal components of desire, thwarted belongingness and perceived burdensomeness, are support the theory (Van Orden et al., 2010). The capability to commit suicide is based on fearlessness, which is explained by repeated exposure to pain and fear (Van Orden et al., 2014).

The IPTS concept of desire to commit suicide explains why individuals who are disconnected socially due to playing video games would have suicidal behavior or suicidality. The willingness or desire for death with the capability of harming oneself or committing suicide and the desire to commit suicide are caused by the absence of

belonging, according to the theory (Gauthier et al., 2014). In other words, if an individual does not feel like they belong, they have a sense of social disconnection or social isolation (Gauthier et al., 2014). As in this study, video gaming for excessive hours daily would disconnect the individual socially from society and create a social disconnection that could potentially cause social isolation and desires to harm self. This component of the theory would explain the relationship between excessive video gaming and suicidal ideation, suicide planning, and/or suicide attempt if an association is found. If the individual also is fearless due to repeated painful stimuli, the consequences may have a greater likelihood of being lethal; however, I did not test this component of the theory in this study. To test all parts of the theory, variables such as child abuse or individual experiences with life-altering events would have to be in place that would represent the capability component of the IPTS.

Interpersonal Theory of Suicidal Behavior in Relation to High-Risk Behavior With High Pain Tolerance

Teismann et al. (2014) conducted a study using the IPTS to explain how the capability of suicide increases due to high-risk taking behavior after increased pain tolerance is acquired. There were 81 male video game participants. Teismann et al. studied whether participation in a first-person shooter game versus a first-person racing game would increase pain tolerance. The results revealed a higher pain tolerance in those who played the action shooting video games, and an association was found between action shooting video games and high risk-taking behavior.

Literature Review Related to Key Variables and/or Concepts

Risk Factors of Suicide

To explain suicidality, I relied on SEM, which offers a theoretical explanation for suicidality as well as the risks factors for suicide. The SEM model is a framework for prevention that is based on many levels of influence such as individual, social, environment, and community (CDC, 2020). Understanding how these levels of influence individuals could help public health workers to prevent health disparities such as suicide. The CDC uses the SEM model to understand individual health threats in order to create preventive strategies (CDC, 2020). According to the CDC, risk factors for suicide are a combination of individual, relationship, community, and societal factors. The CDC interpretation aligns with the explanation offered in this research.

The risks factors for suicide are many and target all populations. According to the CDC (2020), the risk factors for suicide include

- family history of suicide,
- family history of child maltreatment,
- previous suicide attempt(s),
- history of mental disorders, particularly clinical depression,
- history of alcohol and substance abuse,
- feelings of hopelessness,
- impulsive or aggressive tendencies,
- cultural and religious beliefs (e.g., belief that suicide is noble resolution of a personal dilemma),

- local epidemics of suicide,
- isolation,
- a feeling of being cut off from other people,
- barriers to accessing mental health treatment,
- loss (relational, social, work, or financial),
- physical illness,
- easy access to lethal methods,
- unwillingness to seek help because of the stigma attached to mental health, and
- substance abuse disorders or to suicidal thoughts.

The leading risk factor for suicide is a prior suicide attempt (WHO, 2019). Family history of suicide is also a significant risk factor and, in cases of attempted suicide, has been found to be associated with the inability to maintain stable, lasting relationships (Rajalin et al., 2017). The WHO (2019) stated that individuals who are unable to sustain relationships have a high risk for suicide. Crisis situations such as chronic pain/illness, financial problems, disaster, violence, abuse, loss, and sense of isolation are significantly associated with suicidal behaviors (WHO, 2019).

Literature on Risk Factors for Suicide

Abraham et al. (2017) reviewed suicide globally from an epidemiological viewpoint to investigate risk and protective factors associated with adolescent suicide and global strategies for prevention. The authors found that globally adolescent suicide is a public health issue that is complex with many risk factors as well as protective factors.

Global risk factors include psychiatric conditions (family history, psychiatric illness, substance abuse), psychosocial issues (abuse, isolation, family conflict, personal violence, socioeconomic disadvantaged, discrimination), trauma, culture and community (societal, social, religious), and indigenous or displacement status (refugees, asylum seekers, emigrants). The protective factors include strong family and interpersonal relationships, and religious and cultural beliefs. Global strategies would include increasing the protective factors through psychiatric care and public health awareness.

Dyer et al. (2020) examined the role of religion and family with adolescent suicide in the state of Utah in the United States. The authors considered the association between suicidal ideation with perceived burdensomeness and thwarted belongingness in relation to abandonment of God. The results revealed that shame was positively associated with suicidal ideation but not abandonment by God. Religiosity defined as increased church and family support through religion (specifically measured by church attendance at least once a week) was negatively associated with suicidal ideation. The research implications are for adolescents to have church and family intervention strategies.

Rajalin et al. (2017) examined interpersonal relationships with the association between family history of suicide in individuals that attempted suicide. The researchers included a follow-up of 181 individuals after an attempted suicide attempt. The results revealed significantly higher interpersonal problems specifically with long lasting relationships among individuals who had a family history of suicide. This discovery is

significant for intervention purposes due to the problematic long-term relationship between mental health professionals and the patient who attempted suicide.

Ringer et al. (2018) examined belongingness with the association between face to face and online interactions. The authors controlled for age, sex, race, socioeconomic status, and depression. They tested thwart belongingness in both face-to-face and online interactions and online interactions as a moderator for negative face-to-face interactions with thwart belongingness. The study results revealed that only negative face-to-face interactions were significantly associated with higher levels of thwart belongingness, and there were no moderation effects between both interactions and thwart belongingness. These results indicate that face-to-face interactions are important in the feeling of belongingness. The authors concluded that interpersonal relationships involving face-to-face interactions affect suicidal ideation and should guide future research and intervention strategies.

Predictors and Associated Factors of Suicidal Ideation, Suicidal Planning, and/or Suicide Attempts (Dependent Variable Suicidality)

Hale (2015) examined the 2011 YRBS data for predicting factors for suicidal ideation, sadness hopelessness, and suicide planning as follows: drug use, relationship violence, bullying, perception of weight, forced sex, hours playing video games, alcohol use, cigarette use, physical activity, and sleeping hours per night. The results revealed that hopelessness was the primary predictor of suicidal ideation and suicide planning.

Altangerel et al. (2014) examined the prevalence and predictors of suicidal behaviors among Monoglian high school students. Females were found to have more

suicidal behaviors than males. The predictors for suicidal ideation were no close friends, feelings of loneliness, insomnia, self-perception of underweight or overweight, and carrying a weapon were significant predictors of suicidal behaviors. Risk factors for suicidal ideation were missing school, being bullied, and being hungry.

Lee et al. (2016) examined over 20,000 high school students from the Korean Youth Risk Behavior Web-based Survey for 2014 data to investigate body image and related factors such as physical activity, dietary behaviors, and actual body weight status. The authors found that body image distortion was significantly associated with sadness and suicidal ideation when controlling for socio-economic factors, demographics, and mental health characteristics.

Jacobson et al. (2011) examined the relationship between restrictive emotionality (difficulty understanding and expressing emotions) with depression and suicidal ideation. The authors sampled 2,189 high school students for a self-reported survey from five public schools and one private school in New York. The authors found that those reported restrictive emotionality were 11 times more likely to have depressive symptoms, 3 times more to have suicidal ideation, and 2 times more to attempt suicide.

Xiao et al. (2019) investigated health lifestyles and suicidal behaviors among US adolescents ages 13-17. Data was used from the 2017 YRBS containing 14,506 subjects. The health behaviors analyzed were consumption of fruits and vegetables for breakfast, physical activity, sleep, and media use with three suicidal behaviors (ideation, plan, and attempt). The results revealed that negative health behaviors were associated with suicidal ideation.

Pfeldderer et al. (2019) examined physical activity, sleep, and school environmental factors with suicidal ideation. The 2017 National Risk Behaviors Survey was used for data collection and analysis of which 10,125 high school students answered the survey. The authors controlled the following factors: age, sex, and BMI. Physical activity was measured as a daily activity and the school environmental measures involved school safety, such as being bullied, buying illegal drugs at school, and bringing weapons to school. The results revealed that all factors (school environment, physical activity, and sleep) predict suicidal ideation with the logistic regression model of testing reporting all factors even the controlled variables being statistically significant in the association with suicidal ideation.

These studies of youth in the United States and Globally, collected self-reported data within the school setting as with my proposed study, and tests one or more of the components of suicidality. The literature supports the predictors or risk factors for suicide of those being sad, lonely, and hopeless in the studies by Hale (2005), Altangerel et al. (2014) and Lee et al. (2016). Other common trends among the results of the literature review revealed that negative health behaviors such as diet and exercise were associated with suicidal ideation as in Pfeldderer et al., (2019); Xiaos et al. (2019), and Lee et al. (2016).

Predictors and Associated Factors of Video Gaming (Independent Variable) and Suicidal Ideation, Suicidal Planning, and/or Suicide Attempts

Michell et al. (2015) examined the relationship between video game play and acquired capability for suicide in college students. Acquired capability of suicide was

defined by testing the college students painful and provocative events, and the amount of video gaming on a weekly basis. The authors also looked at video game category and gender as moderating factors. The results revealed an association between the weekly hours of playing video games and capability of suicide as well as the action video game category moderating the relationship between acquired capability of suicide. Gender did not moderate the relationship with the weekly time playing video games and acquired capability of suicide. The results suggest that the college student that spend more time weekly playing action video games are more capable of suicide when having suicidal ideation than those that play other categories of video games.

Messias et al. (2011) examined YRBS data from 2007 and 2009 to identify an association between excessive video gaming and internet use with teenage suicidal ideation and planning when adjusting for race, gender, smoking, and sadness. The results revealed that excessive video gaming and internet use of 5 hours or more daily increased risk of adolescent sadness, suicidal ideation, and suicide planning. However, video gaming and internet use was not tested separately for the individual impact or significance, and suicide attempts were not tested.

Gauthier et al. (2014) examined the exposure to violent video games with fearlessness and pain tolerance. The authors tested violent video game exposure and suicidal ideation explaining the association is due to IPT. IPT suggests that people desire death and are fearless of pain that actually follows through with completed or attempted suicide. The desire for death is explained by the theory for lack of belongingness or a sense of social disconnection, which is relevant to my study proposal. The assumption

was that violent video games would be associated with fearlessness, but not pain tolerance. The authors found that in 781 college students there was an association between violent video game playing and fearlessness about death, but there was no association with pain tolerance.

Lui et al. (2016) investigated the association of media use including video games during school days with suicidal ideation and self-harm. A total of 13,659 male and female secondary school students were sampled across China and surveyed for different media uses, self- harm, and suicidal ideation. The results revealed that more than 2 hours per day of television was associated with higher risk of depression for both males and females, video game exposure was associated with higher self-harm, depression, anxiety, and attention deficit hyperactive disorder in both males and females.

Merelle et al. (2017) investigated the health problems related to video gaming and social media in adolescence by conducting a survey of 21,053 secondary students. Mental health problems, life-events, lifestyle, and substance use were tested to analyze any association between video gaming or social media. The results revealed video gaming was most associated with conduct problems, suicidal thoughts, sedentary behavior, and male gender, and social media use was most associated with conduct problems, hyperactivity, and sedentary behavior.

Arrivillaga et al. (2020) examined internet and smartphone usage among adolescents with suicidal ideation. Emotional Intelligence was examined as a moderator for the association between problematic internet and smartphone use with suicidal ideation. The sample includes 1008 male and 1188 female adolescents. The results

revealed a significant association between problematic internet and smartphone use with suicidal ideation, as well as emotional intelligence moderates the negative link between suicide risk and problematic internet and smartphone use. The authors found that emotional intelligence is a protective factor for suicidal ideation, because the higher the emotional intelligence of the individuals with problematic internet and computer use, the weaker the association with suicidal ideation.

The literature examines video gaming along with internet and media use with suicidal ideation or self-harm, and the majority of these studies address action or violent video games with the amount of time playing. However, the time playing video games is measured weekly or daily along with internet and media use and does not exclude media and internet from the time playing video games as in Lui et al. (2016); Messias et al. (2011), and Merelle et al. (2017). Mitchell et al. (2015) examined the weekly time playing video games with acquire capability of suicide, but not suicidality. In addition, the study addresses only pain tolerance and action video games among young adults, and not the adolescent population. However, the adolescent population has been found to have an increase in video gaming from 22% in 2003 to 43% in 2017 (CDC, 2019).

Predictors and Associated Factors of Physical Inactivity (Independent Variable) and Suicidal Ideation, Suicidal Planning, and/or Suicide Attempts

Casiano et al. (2012) examined Canadian students and the association between the hours of television, video games, and computer/internet with depression, alcohol dependence, binge drinking, risky sexual behaviors, and obesity. The findings for video

game users indicated no depression, risky sexual behavior, nor binge drinking, but obesity was indicative of video game and computer/internet users.

Vancampfort et al. (2018) evaluated a systematic review of the association between physical activity (PA) and suicidal ideation (SI). The literature uncovered 14-21 studies that included both adolescents and adults with a significant association between PA and SI. The results indicate that individuals who are PA verses physical inactive are less likely to have SI.

An (2014) examined the association between physical activity intensity with depression and suicidal ideation among middle school students in South Korea. Data from the Youth Health Risk Behaviors was used for a total of 37,420 students. Both moderate and vigorous physical activity was associated with lower depression in both males and females and less suicidal ideation in females. The results revealed that physical activity is a moderator for decreasing depression and suicidal ideation in youth.

Cho (2014) investigated physical activity and suicide attempts in South Korean adolescents Youth Risk Behaviors Web-Based Survey. The purpose was to examine the relationship between suicidal ideation (SI)and attempts (SA) with the level of physical activity in 74,186 youth. The variables were vigorous physical activity (VPA), moderate (MPA), and low (LPA). The results revealed significant association between the level of physical activity and SI and SA. Whereas the more vigorous physical activity the less likely of SI and SA.

Arat et al. (2017) examined the global school-based health survey of 23,372 youth 11-17 years of age for physical inactivity and mental health in six middle-income

countries. The study was to address the global health issue in youth of physical inactivity and poor mental health. The following variables were measured: loneliness, anxiety, depression, suicide attempts, and suicidal ideation in the recent 12-month period and exercising for 60 minutes daily. The results indicated a low prevalence of all mental health problems as well as low prevalence of physical activity; however, daily activity for 60 minutes a day did reveal slight decreases in anxiety and loneliness. However, physical activity in the Philippines revealed an association between increased suicide attempts. This association is in contrast with other studies but may be contributed to the type and intensity of the activity, but this was not investigated in the study (Arat et al., 2017). Low-levels of walking/biking was associated with increased odds of suicide attempts in Sri Lanka and decreased odds of loneliness. In China, low levels of exercise decreased odds of suicidal ideation. The results indicate a need for more studies on the topic to better understand these contrasting conclusions.

These studies relate to physical activity and the association with suicidal ideation, and many reveal an association with physical activity and suicidal ideation. Merrell et al. (2017), Pfeldderer et al. (2019), and Xiao et al. (2019) all found that sedentary lifestyle or lack of physical activity are found to be associated with video gaming and suicidal ideation. Casiano et al. (2012) found obesity to be associated with video gaming, and Vancampfort et al. (2018) systematic review revealed that individuals that are physical activity are less likely to have suicidal ideation. Cho (2014) concluded that the more vigorous the physical activity the less likely of suicidal ideation and suicide attempts. An (2014) found that physical activity is a moderator for decreasing depression and suicidal

ideation; therefore, does physical inactivity cause a moderating effect between video gaming and suicidal ideation, suicide planning, and suicide attempts? This is presented as a RQ in my proposal.

Association Between Suicide and Age, Gender, Race, and/or Being Bullied(Confounding Variables)

Wang et al. (2018) examined the 2013 YRBS data to identify an association between all types of body weight and bullying victimization with males and females. The findings revealed that there was a statistical significance between the body weight of males and bullying, but not girls. In addition, boys being bullied was associated with younger age, White youth, hopelessness, excessive video playing, and suicidal ideation.

Lee et al. (2019) compared gender and psychosocial characteristic behaviors of completed suicide in the different ages of adolescents. The authors compared younger to older adolescents with age 15 distinguishing between younger and older; therefore ages 10-14 are considered younger and 15-19 older. The study was conducted in Victoria, Australia with approval from Vital Statistical Records and the Justice Department for the year 2015. The authors found 273 completed suicides in the 10-19 age group; whereas no deaths were in the 10-12 age group, 102 completed suicides in the 13-16 age group, and 171 completed suicides in the 16-19 age group. The differences in male and female were noted as females attempting suicide or self-harm prior to their completed suicide more than males, and males completing suicide on their first attempt more than females. The results also revealed that abuse and bullying occurred more often in female suicide.

Gillen et al. (2019) compared self-harm (SH) thoughts and behaviors among youth ages 11-18 in Northern Ireland. The study addressed SH thoughts and behaviors comparing 11-14 years old to 15-18 years old assuming that younger youth experience SH thoughts and behaviors more. The results revealed that SH thoughts and behaviors are established early with 7.9% of 11-15 years old experiencing SH thoughts and 5.7% of SH behaviors.

Chen et al. (2020) examined the correlation between ADHD, school bullying, and quality of life with suicide in the adolescent age group. The sample size of 203 ADHD students were selected to participate in the study to analyze these variables. The authors placed school bullying into 3 categories as follows: victim (bullied), perpetrator (bullying), and victim-perpetrator (bullied & bullying). The results revealed that 37.9% of the ADHD students reported suicidality including suicide planning, suicide attempts, and suicidal ideation in the last 12 months. However, the girls with ADHD had more suicidality than boys by a 30% higher margin. In addition, those with suicidality had lower quality of life and higher victimization of bullying. The authors concluded that there is a significant correlation between school bullying, quality of life and suicidality; whereas, ADHD may regulate these relationships.

Yang et al. (2020) examined suicidal ideation and suicide attempts for an association between bullying behavior with gender as a moderating variable. The sample included the adolescent population of 23,392 youth ages 12-19 years of which 10,625 were male and 12,767 were female. The setting was high schools in Southeast China using a cluster sampling method. A total of 882 victims of bullies, 1144 were bullies, and

736 were bully-victims. The results revealed a significant association between bullying behavior and suicidal ideation and suicide attempts. In addition, gender was a moderating factor for bullying behaviors and both suicidal ideation and suicide attempts. Bullying behaviors are positively associated with suicidal ideation and suicide attempts; whereas, being bullied and bullying others with suicidal ideation and suicide attempts is stronger in females than males, the association with being both a bully and victim of a bully with suicide attempts is stronger in males than females, and the association between being both a bully and a victim of a bully with suicidal ideation were similar with both males and females.

Hooper et al. (2017) investigated environmental stress and the association between suicide attempts in Black American adolescents and adjusting for age and gender over a 14-year period with 457 participants. The age group was 11-19 years and mostly from sever impoverished community. The authors gathered the baseline environmental stressors and evaluated the perceived level of stress with suicide attempts. The perceived baseline environmental stressors were coded as low or high and actual age with suicide attempt calculated. The results revealed a significant association with adolescent age and suicide attempts revealing the older the adolescent the more suicide attempts. In addition, high levels of environmental stress were reported more in younger adolescents and decreased environmental stress in older adolescents. These results indicate older adolescents being at a high risk of suicide even when environmental stressors are low and more likely in males than females.

Pena et al. (2018) investigated the association between suicide attempts with depressed mood and problem behaviors (substance abuse & violence) among different races of high school students in New York City. The sample size of 3,951included Dominican, Mexican, Puerto Rican, and non-Hispanic White students and the instrument used was the national YRBSS survey. White adolescents accounted for most of the population at 43.8% and 30.5% made of the Dominicans. In order to obtain ethnicity, data was collected on the birthplace of the adolescent's parents. The results revealed the White population had the fewest suicide attempts when adjusting for age and gender, and there was no significant difference in the Latino groups with suicide attempts. There was a positive association between all three of the Latino groups and suicide attempts when depression and problem behaviors were present. The results indicate more intervention methods are needed for the Latino population for violence and substance abuse prevention.

These studies are related to the controlled variables in this study and are found to be associated with suicidal ideation, planning, and attempts. Gillen et al. (2019) found that suicidal thoughts and self-harm was associated with the younger population of adolescents. This finding is similar to Wang et al.'s (2018) discovery that younger White male adolescents were more likely to have suicidal ideation. In contrast, Hooper et al. (2017) found an association with older adolescents and the male gender. Lee et al. (2019) found that males have more completed suicide on their first attempt than females. There is a substantial amount of research to support being bullied as a predictor of suicidal ideation, planning, and attempts. Altangerel et al. (2014), Hale (2015), Pfeldderer et al.

(2019), and Wang et al (2018) found bullying to be associated with suicidal ideation. Chen et al. (2020) identified school bullying to be associated with suicidal ideation, planning, and attempts. Yang et al. (2020) identified bullying as a moderator for both suicidal ideation and planning.

Gaps in Literature Review

Researchers have identified that adolescent suicide is a problem world-wide from reported incidences as well as reported suicide attempts and suicidal thoughts. The literature is abundant on media used such as cyberbullying and social media as associating factors for suicidal ideation and attempted suicide. Some research was found to identify an association between physical activity reducing depression as well as suicidal ideation. Much of the research on youth is from secondary data collected from youth surveys. However, the association between video gaming, suicidal ideation, suicide planning, and suicide attempt has not been investigated in quantity and no research is on excessive video playing when controlling for the variables presented in this study. In addition, there is literature on physical activity and decreased mental illnesses, but there no literature found on the relationship with suicidal ideation, suicide planning, suicide attempt, and physical inactivity.

The literature is representative of youth studied mainly in school surveys with large sample sizes throughout different countries in the world. Most studies are secondary data collection taken from archived national databases. The literature reviewed had the common variables in my study and tested in varies ways, but not as I studied. The literature revealed physical activity having an associated with decreased

odds of suicidal ideation; however, research was not found on testing done on physical inactivity as a predictor or moderator of suicidality. Furthermore, excessive video gaming as a predictor of suicidality is not found in the literature when controlling for the confounding variables presented in my study. In addition, limited studies are found differentiating the three components of suicidality with excessive video gaming and physical inactivity. The authors of the literature had strengths in testing the adolescent population and these variables through a large-scale school survey, which allows easy access to this population; however, limitations have been assessed using this method. Even so, analyzing the adolescent population is most favorable through school access, because the target population is together as a group in school. As noted in the literature review, remaining studies are needed to test for confounding variables collectively such as being bullied, gender, age, and race as addressed in my study.

The current literature does not have the association between daily extended play of video gaming with suicidality. Few studies in the past have studied the association; however, none have been found to test the variables in my study. Violent video gaming and the association with fearlessness was found (Gauthier et al., 2014). The research reveals a statistical significance between social media and negative conduct in school age children (Merelle et al., 2017). However, there is no literature on excessive video gaming and suicidality when controlling for confounding variables such as gender, race, age, and being bullied as well as differentiating between the association of the three components of suicidality with video gaming and physical inactivity. When considering the impact of age, race, gender, and being bullied as directly associated with my DV, but not included

in my RQs, controlling for them is not just appropriate but warranted. In addition, physical activity and depression were identified to have an association, but physical inactivity as a moderating factor for suicidal ideation, suicide planning, and suicide attempt is not investigated. These gaps in research were addressed through my study with the goal to increase knowledge and understanding for future advocacy and interventions for youth suicide prevention.

Conclusion

The problem with adolescent suicide is a significant problem world-wide. Research on the reasons why, is critical to reduce and prevent this global health problem and is warranted. The literature I reviewed in this chapter addresses suicide in adolescence with extensive research on cyberbullying, social media, and depression as associated factors, but does not thoroughly explore other current issues in youth such as the increasing use of video gaming and how physical inactivity moderate the association. This study filled in the gaps in research and identified significant factors in the prevention of suicide in adolescents. In Chapter 3, I will describe the methods and design I used to test the variables (video gaming and physical inactivity) with suicidal ideation, suicide planning, and suicide attempt.

Chapter 3: Research Method

Introduction

The purpose of the research was to identify factors that are associated with suicidality in youth. The study may increase the public's awareness of factors that contribute to youth suicidality. Policy makers and other stakeholders may be able to design interventions based on the findings that lead to positive social change. I investigated whether video gaming and physical inactivity are associated with suicidality. The three components of suicidality (suicidal ideation, suicide planning, and suicide attempts) were investigated for an association with video gaming and physical inactivity. I designed the study to test the association between the variables. The RQs and hypotheses for the study were as follows:

RQ1: Is there an association between playing video games for 3 or more hours a day and suicidal ideation in the youth ages 13-18 years in the United States when controlling for being bullied, gender, age, and race?

$H_0$1: There is no association between playing video games for 3 or more hours a day and suicidal ideation in the youth ages 13-18 years in the United States when controlling being bullied, gender, age, and race.

H_a1: There is association between playing video games for 3 or more hours a day and suicidal ideation in the youth ages 13-18 years in the United States when controlling being bullied, gender, age, and race.

RQ2: Is there an association between physical inactivity and suicidal ideation in the youth ages 13-18 years in the United States when controlling for being bullied, gender, age, and race?

$H_0$2: There is no association between physical inactivity and suicidal ideation in the youth ages 13-18 years in the United States when controlling for being bullied, gender, age, and race.

H_a2: There is an association between physical inactivity and suicidal ideation in the youth ages 13-18 years in the United States when controlling for being bullied, gender, age, and race.

RQ3: Does physical inactivity have a moderating effect on the association between suicidal ideation and playing video games in the youth ages 13-18 years in the United States?

$H_0$3: Physical inactivity has no moderating effect on suicidal ideation and playing video games in the youth ages 13-18 years in the United States.

H_a3: Physical inactivity has a moderating effect on suicidal ideation and playing video games in the youth ages 13-18 years in the United States.

RQ4: Is there an association between playing video games for 3 or more hours a day and suicide attempt in the youth ages 13-18 years in the United States when controlling for being bullied, gender, age, and race?

$H_0$4: There is no association between playing video games for 3 or more hours a day and suicide attempt in the youth ages 13-18 years in the United States when controlling being bullied, gender, age, and race.

H_a4: There is an association between playing video games for 3 or more hours a day and suicide attempt in youth ages 13-18 years in the United States when controlling for being bullied, gender, age, and race.

RQ5: Is there an association between physical inactivity and suicide attempt in the youth ages 13-18 years in the United States when controlling for being bullied, gender, age, and race?

H_05: There is no association between physical inactivity and suicide attempt in the youth ages 13-18 years in the United States when controlling for being bullied, gender, age, and race.

H_a5: There is an association between physical inactivity and suicide attempt in the youth ages 13-18 years in the United States when controlling for being bullied, gender, age, and race.

RQ6: Does physical inactivity have a moderating effect on the association between suicide attempt and playing video games in the youth ages 13-18 years in the United States?

H_06: Physical inactivity has no moderating effect on suicide attempt and playing video games in the youth ages 13-18 years in the United States.

H_a6: Physical inactivity has a moderating effect on suicide attempt and playing video games in the youth ages 13-18 years in the United States.

RQ7: Is there an association between playing video games for 3 or more hours a day and suicide planning in the youth ages 13-18 years in the United States when controlling for being bullied, gender, age, and race?

$H_0$7: There is no association between playing video games for 3 or more hours a day and suicide planning in the youth ages 13-18 years in the United States when controlling being bullied, gender, age, and race.

H_a7: There is an association between playing video games for 3 or more hours a day and suicide planning in youth ages 13-18 years in the United States when controlling for being bullied, gender, age, and race.

RQ8: Is there an association between physical inactivity and suicide planning in the youth ages 13-18 years in the United States when controlling for being bullied, gender, age, and race?

$H_0$8: There is no association between physical inactivity and suicide planning in the youth ages 13-18 years in the United States when controlling for being bullied, gender, age, and race.

H_a8: There is an association between physical inactivity and suicide planning in the youth ages 13-18 years in the United States when controlling for being bullied, gender, age, and race.

RQ9: Does physical inactivity have a moderating effect on the association between suicide planning, and playing video games in the youth ages 13-18 years in the United States?

$H_0$9: Physical inactivity has no moderating effect on suicide planning and playing video games in the youth ages 13-18 years in the United States.

H_a9: Physical inactivity has a moderating effect on suicide planning and playing video games in the youth ages 13-18 years in the United States.

Research Design and Rationale

I used a quantitative cross-sectional study design involving analysis of secondary data from the YRBS of 2017. The design is aligned with the RQs because the study addressed the 13-18-year-old age group and their behaviors in relation to suicidality, which is addressed in the YRBS. I tested all study variables in the data set to address the RQs.

Secondary data access saves time as information is readily available to manipulate (Creswell, 2014). The time savings may allow researchers to answer RQs more quickly, which could potentially help to solve public health problems. I used this time-efficient research choice to safely and efficiently answer the study's RQs. Public agency data are readily available and safe and pose the fewest ethical issues for both researchers and participants (Creswell, 2014). For example, the primary researchers followed ethical policies and procedures when initially collecting the data. The data for this study came solely from the YRBS data source, thus limiting the data collection standards to those of that agency.

Methodology

Population

The target population was adolescents ages 13-18 in the United States. The population size was 14,765 adolescents from 144 schools across the United States including the 50 states and the District of Columbia. The Virgin Islands and Puerto Rico was excluded from the study population. Public and private schools serving Grades 9-12

students were included. Alternative schools, such as vocational, special education, Department of Defense, and schools with fewer than 40 students, were excluded.

Sampling and Sampling Procedures

CDC researchers used a three-stage cluster sample design and weighted it to account for nonresponse and overpopulation of Black and Hispanic students (CDC, 2018d). For example, overall weights were scaled so that student counts were equal to the total sample size. Statistical software packages to calculate sampling variances must be used with the YRBS database due to the complexity of the sampling design. I used the SPSS software package provided in the CDC database to perform these calculations.

CDC researchers conducted a systematic random sampling from each school to determine the class period (CDC, 2017b). Of the 192 schools and 18,324 students sampled, 144 schools and 14,956 students were included and analyzed; after exclusion criteria were applied, 144 schools and 14,765 students were used for the final response sample. I excluded many of the questions within the survey for my research purposes. In all, I used eight of the 161 total questions for my data analysis.

Inclusion and exclusion criteria consisted of editing the amount of student participants to appropriate responses to questions. For example, I excluded those who did not completely answer the questions or left questions blank, and I added inclusion criteria to add students of all races to the sample. Weighted factors were applied to adjust for oversampling of Black and Hispanic youth. However, I used statistical software provided by the CDC to account for the sampling variances of the 2017 survey.

Power Calculation

The power analysis identifies the power level for the study. I calculated it by using G*Power 3.1 software. Therefore, the power level identified for this study was 1.0 with the given sample size of 14,765. The power analysis was calculated using the G*Power 3.1 software with an effect size of 0.5, alpha level of 0.05, and power level of 0.95. To analyze data, I used a logistic regression model; therefore, the F-test and statistical test was logistic regression: fixed model, R deviation from zero. The number of predictors was six, and the sample size was already known at 14,765 participants. After inputting these specifications, I calculated the power level at 1.0, Df at 14758, critical t at 1.9601247, and the no centrality parameter at 27.17075.

Archival Data Source

The Youth Risk Behavior Surveillance (YRBS) 2017 is archived data used for youth surveillance and is a secondary resource for researchers. The YRBS is a division of the CDC department with the United States Federal Agency under the Department of Health and Human Services (CDC, 2020). The CDC was established in 1945 and opened in Atlanta in 1946 with the goal to stop the spread of malaria and is controlled by Federal requirements and regulations (CDC, 2020). The CDC functions is to "conduct critical science and provide health information that protects our nation against expensive and dangerous health threats, and responds when these arise"(CDC, 2020, p. 1). The mission of the CDC is the nation's health protection agency is "save lives and protect people from health threats" (CDC, 2020, p. 1). The CDC has experts and scientists conducting surveillance and research under Federal standards and must be credentialed and qualified

accordingly (CDC, 2020). Therefore, the YRBS data is not just aligned with the RQs but is the best data resource meeting federal guidelines and credibility. In addition, YRBS data is a public resource and requires no authorization for public use including secondary data collection for researchers.

The 2017 survey was administered with responses from 144 high schools and 14,765 students across the United States ages 13-18 years old in grades 9th-12th consisting of 161 questions asking in detail about specific behaviors. The behaviors testing for my study include the suicide questions and general questions about being bullied and computer/video gaming. The codebook has a list of information such as variable name, questions, and code labels which are used in my research study. Specifically, the survey questions that relate to the variables being tested in my study including physical activity, suicidal ideation, suicide planning, suicide attempt, bullied behavior, gender, and computer/video gaming.

Centers for Disease Control and Prevention Data Collection Procedures

The CDC's Institutional Review Board approved the protocol for the YRBS (CDC, 2017b). The YRBS 2017 data is used to conduct the study; therefore, the data is confined to the policies, procedures, and ethical requirements of the organization.

The survey questions are conducted by the CDC every two years including national, state, territorial, tribal government, and local school-based samples of 9th- 12th grades public and private school students (CDC, 2017b). The CDC requires data collection methods to be done accurately and systematically with a checklist for quality questions. The QAS-99 checklist to evaluate question quality must be completed. The

QAS-99 includes conflicting or inaccurate instructions, complicated instructions, unclear or complex terms, awkward or ungrammatical words, vague questions, not defined reference periods, inappropriate or assumed behavior questions, calculation questions, sensitive content or wording, and identifying illogical order.

The data collection method is further outlined by the CDC protocol and procedures for the specified type of data collection (CDC, 2018d). For example, the different data collection methods are as follows: focus groups, questionnaire, observation, interviews, and document review. For purposes of my research, the data collection method was done by questionnaire. The CDC offers a 'how to do questionnaire' brief explaining when and how to develop questions as well as advantages and disadvantages. The criteria for questionnaires determined by the CDC should include the following: data for large samples, data collection based on knowledge and behaviors, protection of participants, prior knowledge of amount and type of participants, unbiased concise questions, demographic questions, and logical order.

Ethical issues can be somewhat eliminated through questionnaire studies due to maintaining confidentially by not identifying the person surveyed. This is particularly important with the adolescent population and sensitive questions identified in the YRBS 2017 survey used for my study.

The YRBSS uses a large sample to collect data from the youth population in order to identify problems in public health and has collected data between 1991-2017 from over 4.4 million schools (CDC, 2018d). The Youth Risk Behavior Surveillance System monitors six health behaviors that contribute to the leading causes of death such as

injuries and violence, sexual, alcohol and drugs, tobacco, unhealthy diet, and physical inactivity (CDC, 2018d). The purpose of the data collection is as follows: "determine the prevalence of health behaviors; assess whether health behaviors increase; decrease, or stay the same over time; examine the co-occurrence of health behaviors; provide comparable national, state, territorial, tribal, and local data; provide comparable data among subpopulations of youth; monitor progress toward achieving the Healthy People objectives and other program indicators" (CDC, 2018d, p. 1).

Instrumentation and Operationalization of Constructs

The study variables are as follows: two independent variables, one dependent variables, one moderating variable, and four potential confounding variables. The variables are specific to each RQ with the goal to discover any associations. The variables were tested with nominal binary dichotomous coding with answers either yes or no as follows: 0=no and 1=yes, 1=female and 2=male, and frequency answers such as exact number of suicide attempts, hours of video game playing, and days per week of exercise. The questions in the YRBS are specific to each variable.

Independent Variables

The two independent variables are playing video games (PVG) and physical inactivity (PI). The questions to measure these variables from the YRBS are as follows: Q81. On an average school day, how many hours do you play video/computer games and use the computer for other than schoolwork? Q79. During the past 12 months, on how many days were you physically active for a total of at least 60 minutes per day? (made

you breath hard) Q95. During the past 7 days, how many days did you do exercises to strengthen or tone your muscles, such as sit ups, push-ups, or weightlifting?

Physical inactivity (PI) was also tested as a potential moderating variable. PI is defined by exercising less than 5 days per week. playing video games (PVG) is defined by playing video/computer games for more than 3 hours daily.

Dependent Variable

The dependent variable is suicidality and is composed of three parts including suicidal ideation (SI), suicide plan (SP), suicide attempts (SA). Suicidality is measured by three questions which identify each component of suicidality as follows: Q26. (SI) During the past 12 months, did you ever seriously consider attempting suicide?; Q27. (SP) "During the past 12 months, did you make a plan about how you would attempt suicide?"; and Q28. (SA) "How many times have you attempted suicide?" Any answer of 'yes' for Q26 and Q27 is coded as a positive result, and Q28 is answered by the exact number of attempts, if any. However, all the answers that are positive, indicate suicidality as a positive association when the independent variable is present.

Those individuals that play video games less than 3 hours per day, and those physically active 5 or more days per week are the comparison groups to be tested as follows: PVG less than 3 hours a day with SI, SP, and SA, those that PVG more than 3 hours a day without SI, SP, and SA; those that are physical active with SI, SP and SA, and those physical inactive without SI, SP, and SA.

Potential Confounding Variables

The four confounding variables (race, gender, age, being bullied electronically, being bullied in school) are controlled with the following questions from the YRBS: Q1. "How old are you?"; Q5. "What is your race?"; Q4. "Are you Hispanic or Latino?"; Q2. "What is your sex?"; Q.23 "During the past 12 months, have you ever been bullied on school property?"; Q24. "During the past 12 months, have been electronically bullied?" All confounding variables are controlled so these factors did not influence the results.

Data Analysis Plan

The SPSS format was used to access and analyze the data; specifically, 2017XXH_SPSS.SPS-IBM SPSS Statistics Syntax Editor saved within the YRBS data sets. The statistical software is found on the CDC site at www.cdc.gov/yrbss and was accessed and downloaded easily through this website. I had the software application to download and retrieve the data such as SPSS Syntax software that I am used; however, the data sets are available as ASCII data file, Access zip file, SAS Format Program, and SAS Input Program.

All variables are nominal dichotomous measurements with the exception of attempted suicide, in which I recoded to be dichotomous as well as race which I also recoded into one question. The tests reflected according to the categorical analysis. The data analysis used was binary logistic regression and chi-square tests. The Logistic Regression test analyzed the relationship or effect of the moderating variable (MV) with the DV and IV. Also, the binary logistic regression yields an odds ratio (OR) for the

association between the IVs and DVs, and the chi-square test examined the likelihood of an association between the IVs and DVs after controlling for each confounding variable.

The binary logistic regression determined the effect that physical inactivity (PI) has on suicidal ideation (SI), suicide planning (SP) suicide attempt (SA), and playing video gaming (PVG). The test is distinctive to revealing an association between the IV and the DV. Therefore, three different binary logistic regression tests were conducted to analyze the association between the two different IVs and the three dependent variables associated with suicidality. During all testing, the variables remained in the dichotomous state of measurement. For example, PVG is either greater or equal to 3 hours a day or less than 3 hours a day and PI is either greater or equal to 5 days per week or less than 5 days per week, both coded by 0 or 1 value. In addition, the binary logistic regression gave the predictability of the DVs when the IVs are present and was done in three separate tests for the three DVs.

The chi-square test is specific to testing the likelihood of an association between two categorical variables when there is a nominal controlled variable, which is considered to be confounders as well as the strength of the association. The controlled variables are gender, race, age, being bullied electronically, and being bullied in school; therefore, the chi-square test was conducted for each dependent variable as in the Logistic Regression tests.

Threats to Validity

The development and use of government agencies' surveillance systems is advantageous to researchers and any person interested in statistics and awareness of

society and its changes. This secondary data source is beneficial to researchers for quick and easy access to primary data of public health interest. However, limitations do exist that could cause internal and external validity issues.

Internal Validity

Internal validity involves the cause and effect relationship between the study questions and observed outcome (Stangor, 2015). Confounders threatens internal validity, because these factors could explain the observed outcome of the study such as gender, race, age, and being bullied in my research. These factors increase the risk of suicidality; and therefore, interfere with the study variables. To overcome this threat to internal validity, these confounding factors were controlled in my study by testing using the chi-square and binary logistic regression models.

Another threat to internal validity is recall and response bias. The adolescent age group is a vulnerable group, because they are children and ethical standards are crucial to increase validity. This population may false report due to doubts of confidentially in reporting which would cause response bias or underreporting. To decrease this threat, the CDC has standards for collecting and reporting as discussed within Chapter 3, such as anonymous completion of the survey questions within classroom groups.

External Validity

External validity involves the external factors such as apply the study to other settings or sampling (Stangor, 2015). The threats to external validity are identified and addressed in the sampling methods. For example, selection bias is an external validity problem within my study and addressed by the primary researcher through re-weighting

factors for specific race of participants, so there is not an oversampling of the Hispanic and black population. Another sampling issue that threatens validity and can also be considered selection bias is the sampling method excludes homeschooled and absentees on the days the data collection takes place. This is only addressed by exclusion criteria by the primary researcher not including homeschooled participants; however, absentees are unavoidable. The suggestion I would make if I were the primary researcher would be to distribute the survey during the warmer months such as spring in order to avoid flu season.

Ethical Procedures

The data was obtained from a national data set publicly available with no restrictions for access. Ethical issues and procedures were addressed by the primary researchers and accounted for through the CDC guidelines. Ethical procedures included as follows: maintaining anonymous reporting by subjects, adjusting for missing data, weighted counts of subjects based on student population in each state, and analysis of data using SAS (21) and SUDANN (22) software to adjust for the complex sampling of subjects.

As the secondary researcher, I addressed ethical concerns related to the processing of data to safeguard the information through accurate representation. For example, I carefully conducted data input and analysis of information so that the manipulation of data to answer the RQs would be a true and accurate representation of the archived data set. I gathered the previously collected and recoded data using consistent and accurate step-by-step procedures to maintain my ethical obligations as the researcher. Before

accessing the data, I obtained permission from Walden University's Institutional Review Board (approval no. 01-25-21-0432306).

Conclusion

This chapter explained in detail the research design and rationale, methodology, sample, data source, collection, analysis plan, and any threats to validity. The research design is quantitative cross-sectional study and used secondary data from the YRBS of 2017. The design is aligned with the RQs, such as the study addressed the age group 13-18-year-old and their behaviors in relation to suicidality. The data source and collection were obtained and controlled by CDC regulations and standards and carried out the surveillance system of the 2017 YRBS. The analysis included all eight variables (Playing Video Games [PVG], Physical Inactivity [PI], Suicidal Ideation [SI], Suicide Planning (SP), Suicide Attempt (SA), Gender [CV], Age [CV], Race, [CV], being bullied electronically [CV], and being bullied in school [CV]), and includes two statistical tests (chi-square and binary logistic regression). The tests are to analyze the associations between all the variables including the PI as both the independent variable and moderating variable. The threats to validity were identified and addressed by both primary researcher and I as the secondary researcher, which include response bias, confounding variables, and underreporting or recall bias as well as no response from children being homeschooled or absentees at time of data collection.

Chapter 4: Results

Introduction

In this chapter, I present the results of the study. I examined whether playing video games and being physically inactive were associated with suicidal ideation (SI), suicide planning (SP), and/or suicide attempt (SA) in the United States among youth ages 13-18 years. Suicide is the second leading cause of death in the United States in the adolescent population (Kochanek, 2017). The use of video games is also increasing among U.S. adolescents (2018a). To address the potential impact of playing video games on youth suicidality, I examined the relationship between playing video games (PVG) for more than 3 hours per day and SI, SP, and SA, the three dependent variables. Physical inactivity (PI) is also a public health issue with all age groups in the United States (CDC, 2018a). I examined the relationship between PI and SI, SP, and SA; PI was both an independent and moderating variable. The assumption was that age, race, being bullied, and gender may influence the results; therefore, I adjusted for these variables by using logistic regression model in SPSS. I conducted the binary logistic regression and chi-square test to determine the association between all the variables and answer the RQs accordingly. In addition, I performed descriptive statistics to investigate the relationship, if any, between race, age, gender, and being bullied and SI, SP, and SA.

Data Collection

CDC researchers collected the YRBS 2017 data set during the spring semester of 2017 from schools across the United States including the District of Columbia with a 75% response rate from schools and an 81% response rate from students (CDC, 2018d).

The study sample is representative of the population of study; researchers surveyed 9th-12th graders and applied weighting factors to adjust for nonresponses and oversampling of Black and Hispanic students. The weighted adjustments matched the population projections for the survey year to achieve a representative sample. The sample included 144 schools and 14,765 student participants. I computed descriptive statistics including frequency of demographic data and crosstabulation of demographic data with suicidal ideation (SI), suicide planning (SP), and suicide attempt (SA) in Table 1.

Table 1

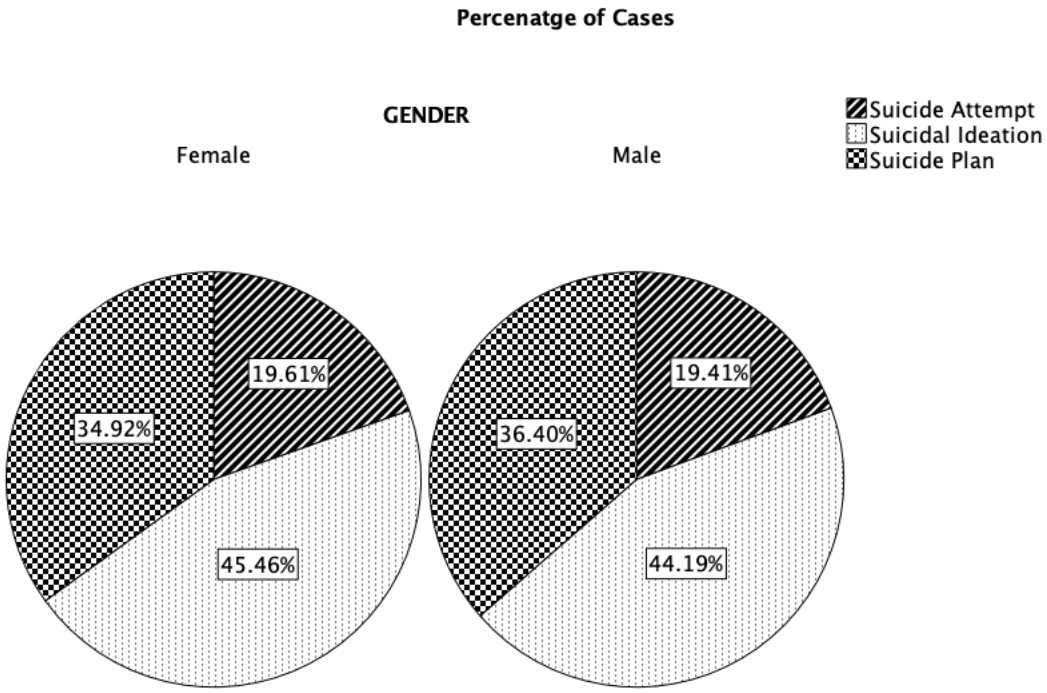
Demographic Characteristics of Study Sample

Demographic	*N*	%	Suicidal ideation *N* (%)	Suicidal planning *N* (%)	Suicidal attempts *N* (%)
Gender					
Male	7,112	48.6	848 (12.1)	709 (10.1)	278 (5.4)
Female	7,526	51.4	1684 (22.6)	1,287 (17.3)	541 (9.7)
Race/Ethnicity					
White	7,519	50.9	1,334 (17.9)	1,004 (13.5)	377 (6.5)
American Indian/Alaskan Native	458	3.1	84 (18.6)	69 (15.4)	31 (9.7)
Asian	725	5.0	130 (18.2)	106 (15)	36 (6.3)
Black/African American	3,053	20.9	472 (15.8)	386 (13)	191 (11)
Native Hawaiian/Pacific Islander	252	1.7	45 (18.5)	32 (13.3)	17 (9.9)
Hispanic/Latino	2,573	17.4	460 (18)	398 (15.7)	169 (8.6)
Age (years)					
13	22	0.1	5 (23.8)	5 (22.7)	2 (28.5)
14	1,922	13.0	332 (17.5)	271 (14.3)	119 (9.5)
15	3,586	24.3	615 (17.3)	478 (13.5)	188 (7.3)
16	3,688	25.0	653 (17.9)	490 (13.4)	205 (7.6)
17	3,611	24.5	623 (17.4)	495 (13.8)	185 (6.9)
18	1,796	12.2	305 (17.2)	251 (14.2)	119 (8.3)

Figure 1 displays a comparison of suicidality by gender.

Figure 1

Demographic Data Gender Chart

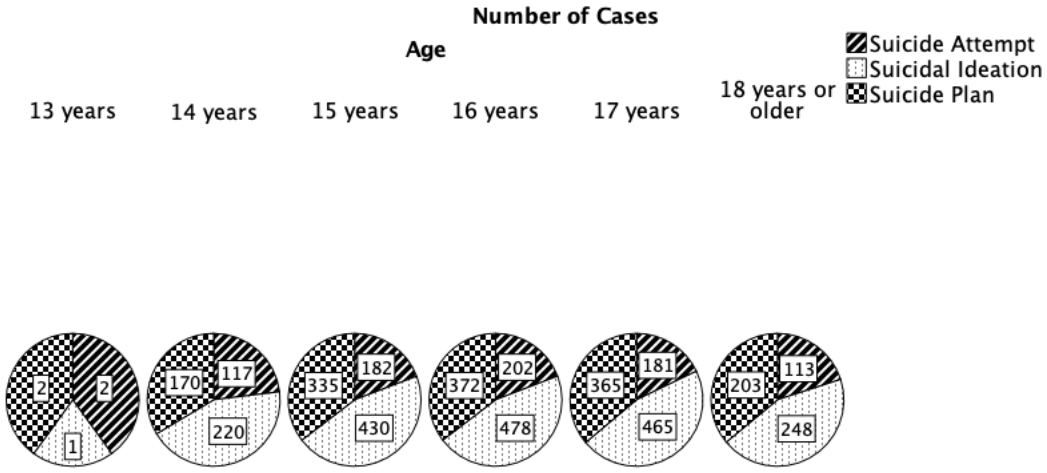


Note. The illustration shows the proportion of youth by gender with each dependent variable.

Figure 2 displays a comparison of age with SI, SA, SP.

Figure 2

Demographic Data Age Chart

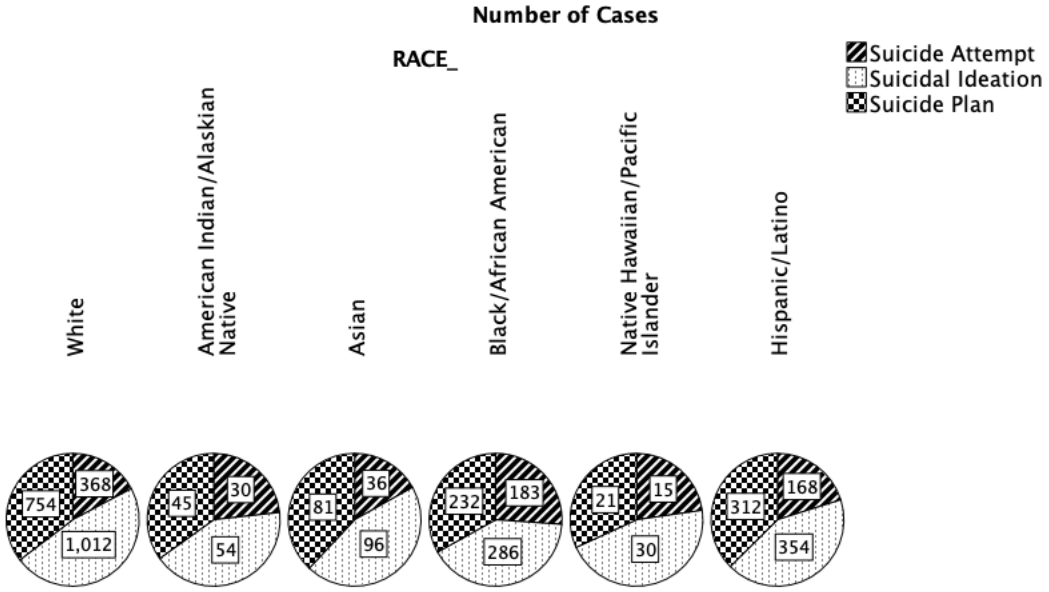


Note. Proportion of Youth by Age with Each Dependent Variable

Figure 3 displays a comparison of race SI, SA, SP.

Figure 3

Demographic Data Race Chart



Note. Proportion of Youth by Race with Each Dependent Variable

Table 2

Independent Variables of Study Sample

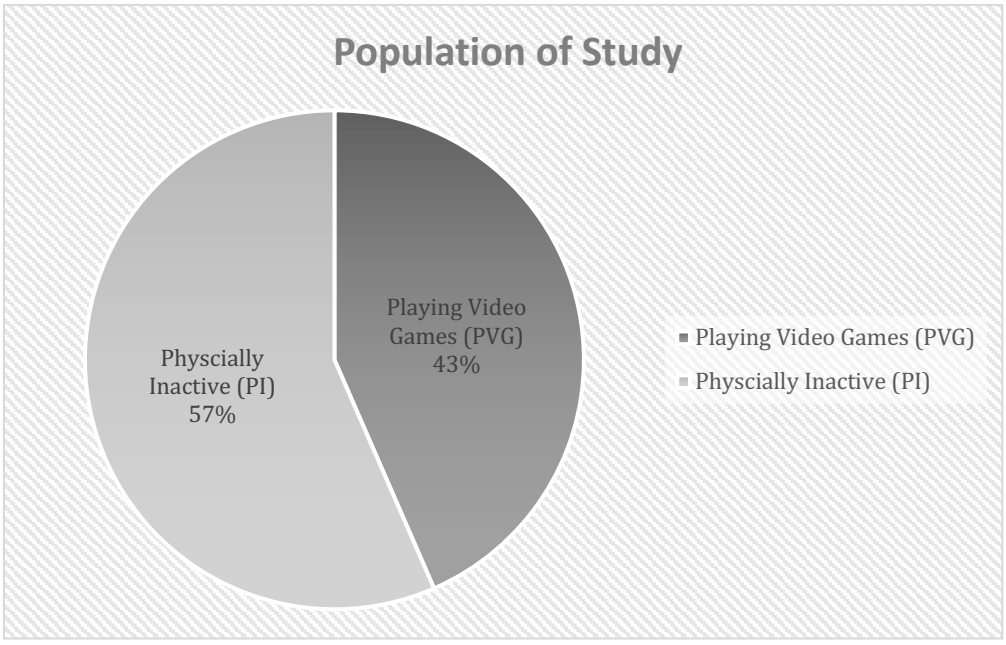
Variable	N	%
Playing Video Games $\geq 3\frac{hours}{day}$	5984	43.2
Physically Inactive	8000	56.2

Note. Playing Video Games (PVG**),** Physical Inactivity (PI)= active <5 days/week, Number (N), Percentage (%).

Figure 4 displays the percentage of youth PVG and PI.

Figure 4

Percentage of Independent Variables in the Study Population



Note. Percentage of Youth Playing Video Games and Physically Inactive in the Study Population

Table 3

Covariates of Study Sample

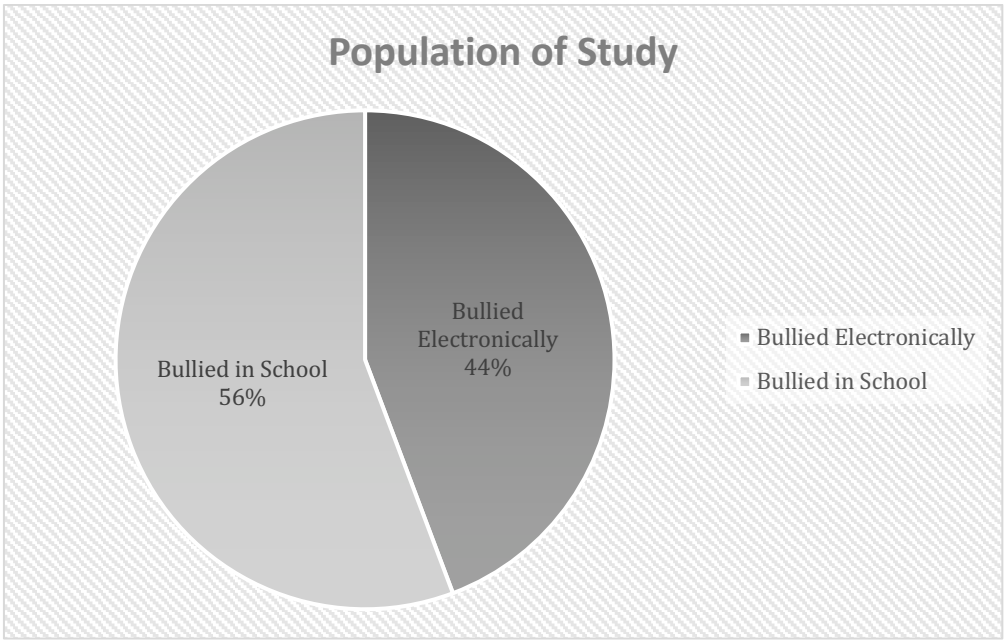
Variable	N	%
Bullied Electronically	2113	14.3
Bullied in School	2665	18.0

Note. Bullied Electronically (BE), Bullied in School (BS)

Figure 5 displays the percentage of youth bullied.

Figure 5

Percentage of Covariate in Study Population



Note. Percentage of Youth Being Bullied in School and Electronically in the Study Population

Inclusion of Covariates

The demographic data revealed the total population to be 14,638, of which the majority race was White at 51.6%, and the next highest was Black at 20.6%. The largest population in age was close to evenly distributed between ages 15 years, 16 years, and 17 years, with the lowest population at age 13 years. There were a total of 7,541 females and 7,130 males in the study population.

The covariates in this study were gender, race, age, being bullied in school, and being bullied electronically. In the YRBS data set, 14.3% of students reported being bullied electronically and 18% of students reported being bullied in school. In addition, a large percentage of students (approximately 43%) reported playing video games more

than 3 hours daily. A majority of respondents (approximately 56%) reported being physically inactive.

After computing the descriptive statistics, I analyzed all variables using the chi-square test and binary logistic regression analysis to investigate the association between the covariates and the dependent and independent variables. The results justified the inclusion of the covariates in the study. I found a significant association between race, gender, and both forms of being bullied and SA and between age, race, gender, and both forms of being bullied and SI and SP.

Results

Results for Suicidal Ideation: Research Questions 1-3

RQ1: Is there an association between playing video games for 3 or more hours a day and suicidal ideation in the youth ages 13-18 years in the United States when controlling for being bullied, gender, age, and race?

$H_0$1: There is no association between playing video games for 3 or more hours a day and suicidal ideation in the youth ages 13-18 years in the United States when controlling being bullied, gender, age, and race.

H_a1: There is association between playing video games for 3 or more hours a day and suicidal ideation in the youth ages 13-18 years in the United States when controlling.

RQ2: Is there an association between physical inactivity and suicidal ideation in the youth ages 13-18 years in the United States when controlling for being bullied, gender, age, and race?

$H_0$2: There is no association between physical inactivity and suicidal ideation in the youth ages 13-18 years in the United States when controlling for being bullied, gender, age, and race.

H_a2: There is an association between physical inactivity and suicidal ideation in the youth ages 13-18 years in the United States when controlling for being bullied, gender, age, and race.

RQ3: Does physical inactivity have a moderating effect on the association between playing video games and suicidal ideation in the youth ages 13-18 years in the United States?

$H_0$3: Physical inactivity has no moderating effect on playing video games and suicidal ideation in the youth ages 13-18 years in the United States.

H_a3: Physical inactivity has a moderating effect on playing video games and suicidal ideation in the youth ages 13-18 years in the United States.

Table 4

Chi-Square Test Predicting Likelihood of any Association Between Playing Video Games ≥ 3 *Hours per day and Suicidal Ideation*

Test	Value	Df	Asymptotic significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson chi-square	92.223	1	.000		
Continuity correction	91.790	1	.000		
Likelihood ratio	91.489	1	.000		
Fisher's exact		1		.000	.000
linear-by linear association	92.217	1	.000		
N of Valid Cases	13,662				

Note. 0 cells (0.0%) have an expected count less than 5. b. Computed only for a 2x2 table.

Table 5

Symmetric Measures

		Value	Approximate Significance
Nominal by Nominal	Phi	.082	.000
	Cramer's V	.082	.000
N of Valid Cases		13662	

A chi-square test for association was conducted between playing video games ≥ $3\frac{\text{hours}}{\text{day}}$ and suicidal ideation. All expected cell frequencies are greater than five. There is a statistically significant association between playing video games ≥ $3\frac{\text{hours}}{\text{day}}$ and suicidal ideation for the Pearson chi-square $\chi 2(1) = 92.223$, $p = .000$.

However, there is a weak association between playing video games ≥ $3\frac{\text{hours}}{\text{day}}$ and suicidal ideation, $\varphi = 0.082$, $p = .000$.

Table 6

Chi-Square Test Predicting likelihood of an Association between Physical Inactivity (activity $< 5\frac{days}{week}$*) and Suicidal Ideation.*

Test	*Value*	Df	Asymptotic Significance (2-sided)	*Exact Sig. (2-sided)*	*Exact Sig. (1-sided)*
Pearson Chi-Square	93.434	1	.000		
Continuity Correction	93.005	1	.000		
Likelihood Ratio	94.937	1	.000		
Fisher's Exact		1		.000	.000
Linear-by Linear Association	93.427	1	.000		
N of Valid Cases	14053				

a. 0 cells (0.0%) have expected *count less than 5. b. Computed only for a 2x2 table*

Table 7

Symmetric Measures

		Value	Approximate Significance
Nominal by Nominal	Phi	.082	.000
	Cramer's V	.082	.000
N of Valid Cases		14053	

A chi-square test for association was conducted between physical inactivity (activity $< 5\frac{\text{days}}{\text{week}}$) and suicidal ideation All expected cell frequencies are greater than five. There is a statistically significant association between physical inactivity (activity $< 5\frac{\text{days}}{\text{week}}$) and suicidal ideation for the Pearson chi-square $\chi 2(1) = 93.434$, $p = .000$. However, there is a weak association between physical inactivity (activity $< 5\frac{\text{days}}{\text{week}}$) and suicidal ideation $\varphi = 0.082$, $p = .000$.

Table 8

Logistic Regression Predicting Likelihood of Suicidal Ideation (SI) Based on Playing Video Games $\geq 3\frac{hours}{day}$ *(PVG), Physical Inactvitiy (active* $< 5\frac{days}{week}$) (*PIA*)*, Age, Race, Gender, and Being Bullied Electronically and in School*

Variable	*B*	SE	Wald	*Df*	*P*	Odds Ratio	95% CI Higher, lower
Play Video Games $\geq 3\frac{hours}{day}$	.384	.049	62.275	1	.000	1.469	(1.335,1.616)
Physically Inactive	.295	.051	33.387	1	.000	1.343	(1.215,1.485)
Age							
13 years			10.109	5	.072		
14 years	.770	1.064	.524	1	.469	2.159	(0.268,17.375)
15 years	.849	1.063	.639	1	.424	2.338	(0.291,18.777)
16 years	.952	1.063	.802	1	.371	2.590	(0.323,20.795)
17 years	.931	1.063	7.67	1	.381	2.536	(0.316,20.365)
18 years	1.024	1.064	.927	1	.336	2.785	(0.346,22.408)
Bullied Electronically	.913	.065	200.338	1	.000	2.493	(2.197,2.829)
Bullied in School	.942	.061	239.992	1	.000	2.565	(2.277,2.890)
Race/Ethnicity							
White	-	-	6.139	1	.293		
American Indian/Alaskan Native	.195	.145	1.801	1	.180	1.216	(0.914,1.617)
Asian	.145	.111	1.692	1	.193	1.156	(0.929,1.438)
Black/African American	-.012	.065	.036	1	.849	.988	(0.869,1.122)
Native Hawaiian/Pacific Islander	.166	.196	.724	1	.395	1.181	(0.805,1.733)
Hispanic/Latino	.105	.66	2.517	1	.113	1.111	(0.976,1.265)
Gender							
Male						1.000	
Female	-.602	.051	138.081	1	.000	1.826	(1.652,2.019)

Note. Playing Video Games 3 hours or more daily (PVG), Physically active less than 5 days per week is considered (PI), Age 13-18 years, Bullied Electronically (BE), Bullied in School (BS), Race (0)=White (1)=American Indian/Native American, Race (2)=Asian,

Race (3)=Black/African American, Race (4)=Native Hawaiian/Pacific Islander, Race (5)=Hispanic/Latino, Gender is females compared to males.

The results reveal a statistically significant association between playing video games for $\geq 3\frac{\text{hours}}{\text{day}}$, physical inactivity *(active* $< 5\frac{days}{week}$), gender, and both being bullied electronically and in school with suicidal ideation; whereas, the *p-value* for each of these variables is .000 when predicting the likelihood of suicidal ideation. The odds ratio for playing video games $\geq 3\frac{\text{hours}}{\text{day}}$ and suicidal ideation is 1.469, indicating a half times more likely chance of youth to have suicidal ideation when playing video games 3 or more hours a day. The odds ratio for physical inactivity *(active* $< 5\frac{days}{week}$) and suicidal ideation is 1.343, indicating nearly 40% more likely chance of youth to have suicidal ideation when being physically active less than 5 days a week. The odds ratio for females is 1.826, indicating nearly a one times more likely chance of females having suicidal ideation than males. The odds ratio for being bullied in school is 2.565, indicating one and a half times more likely chance for youth to have suicidal ideation when bullied in school. The odds ratio for being bullied electronically is 2.493, indicating nearly 1.5 times more likely of youth to have suicidal ideation when bullied electronically.

Table 9

Logistic Regression Predicting a Moderating Effect Between Physical Inactivity and Playing Video Games on Suicidal Ideation.

Variable	*B*	SE	Wald	*Df*	*P*	Odds Ratio	95% CI for Odds Ratio Lower.	Upper
Moderator	.043	.094	.213	1	.644	1.044	(0.869	1.256)

Note. Moderator variable= (PI*PVG)

The results reveal a *p*-value of .644, greater than .05 indicating no statistical significance. Therefore, there is no moderating effect between Physical Inactivity *(* $active < 5\frac{days}{week}$) and Playing Video Games $\geq 3\frac{hours}{day}$ on Suicidal Ideation.

Summary of Results for Research Questions 1-3: Suicidal Ideation

When conducting the chi-square test to predict a likelihood of an association between playing video games $\geq 3\frac{\text{hours}}{\text{day}}$ and suicidal ideation there is a statistically significant association; however, it is a weak association. The logistic regression test confirmed the results by identifying an association between playing video games $\geq 3\frac{\text{hours}}{\text{day}}$ and suicidal ideation, and the OR revealed a slight difference between those that did not play video games with those that play video games $\geq 3\frac{\text{hours}}{\text{day}}$, also indicating a weak association.

The chi-square test did predict an association between physical inactivity (active $< 5\frac{\text{days}}{\text{week}}$) and suicidal ideation; however, it is a weak association. The logistic regression test identified an association between physical inactivity (active $< 5\frac{\text{days}}{\text{week}}$) and

suicidal ideation, and the OR revealed a slight difference between those that are physically active and those that are not with suicidal ideation.

When testing the covariates using the binary logistic regression model, a statistically significant association was revealed with gender and being bullied, both electronically and in school. The OR revealed that being bullied in school and electronically both have 1.5 more likely chance to have suicidal ideation, and females are nearly twice more likely to have suicidal ideation than males.

When testing physical inactivity *(active* $5\,\frac{days}{week}$) as a moderator variable, there was no moderating effect between physical inactivity *(active* $< 5\,\frac{days}{week}$) and playing video games $\geq 3\,\frac{hours}{day}$ with suicidal ideation.

Results for Suicide Attempts: Research Questions 4-6

RQ4: Is there an association between playing video games for 3 or more hours a day and suicide attempt in the youth ages 13-18 years in the United States when controlling for being bullied, gender, age, and race?

$H_0$4: There is no association between playing video games for 3 or more hours a day and suicide attempt in the youth ages 13-18 years in the United States when controlling being bullied, gender, age, and race.

H_a4: There is an association between playing video games for 3 or more hours a day and suicide attempt in youth ages 13-18 years in the United States when controlling for being bullied, gender, age, and race.

RQ5: Is there an association between physical inactivity and suicide attempt in the youth ages 13-18 years in the United States when controlling for being bullied, gender, age, and race?

$H_0$5: There is no association between physical inactivity and suicide attempt in the youth ages 13-18 years in the United States when controlling for being bullied, gender, age, and race.

H_a5: There is an association between physical inactivity and suicide attempt in the youth ages 13-18 years in the United States when controlling for being bullied, gender, age, and race.

RQ6: Does physical inactivity have a moderating effect on the association between playing video games and suicide attempt in the youth ages 13-18 years in the United States?

$H_0$6: Physical inactivity has no moderating effect on playing video games and suicide attempt in the youth ages 13-18 years in the United States.

H_a6: Physical inactivity has a moderating effect on playing video games and suicide attempt in the youth ages 13-18 years in the United States.

Table 10

Chi-Square Test Predicting Likelihood of an Association Between Playing Video Games $\geq 3\frac{hours}{day}$ *and Suicide Attempt*

	Value	Df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	34.813[a]	1	.000		
Continuity Correction[b]	34.370	1	.000		
Likelihood Ratio	34.565	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	34.809	1	.000		
N of Valid Cases	10136				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 344.63.
b. Computed only for a 2x2 table

Table 11

Symmetric Measures

		Value	Approximate Significance
Nominal by Nominal	Phi	.059	.000
	Cramer's V	.059	.000
N of Valid Cases		10136	

A chi-square test for association was conducted between playing video games ≥ $3\frac{\text{hours}}{\text{day}}$ and suicide attempt. All expected cell frequencies are greater than five. There is a statistically significant association between playing video games ≥

$3\frac{\text{hours}}{\text{day}}$ and suicide attempt for the Pearson chi-square $\chi 2(1) = 34.813$, $p = .000$.

However, there is a weak association between playing video games $\geq$

$3\frac{\text{hours}}{\text{day}}$ and suicide attempt $\varphi = 0.059$, $p = .000$.

Table 12

Chi-Square Test Predicting Likelihood of an Association Between Physical Inactivity (active $< 5\frac{days}{week}$*) and Suicide Attempt*

Test	*Value*	Df	Asymptotic Significance (2-sided)	*Exact Sig. (2-sided)*	*Exact Sig. (1-sided)*
Pearson Chi-Square	13.603	1	.000		
Continuity Correction	13.334	1	.000		
Likelihood Ratio	13.727	1	.000		
Fisher's Exact		1		.000	.000
Linear-by Linear Association	13.602	1	.000		
N of Valid Cases	10453				

0 cells (0.0%) have expected count less than 5. b. Computed only for a 2x2 table

Table 13

Chi-Square Test Predicting Likelihood of an Association Between Physical Inactivity (active $< 5 \frac{days}{week}$) *and Suicide Attempt*

		Value	Approximate Significance
Nominal by Nominal	Phi	.036	.000
	Cramer's V	.036	.000
N of Valid Cases		10453	

A chi-square test for association was conducted between physical inactivity (active $< 5 \frac{\text{days}}{\text{week}}$) and suicide attempt. All expected cell frequencies are greater than five. There is a statistically significant association between physical inactivity (active $<5 \frac{\text{days}}{\text{week}}$) and suicide attempts for the Pearson chi-square $\chi 2(1) = 13.603$, $p = .000$. However, there is a weak association between physical inactivity (active $<5 \frac{\text{days}}{\text{week}}$) and suicide attempts $\varphi = 0.036$, $p = .000$.

Table 14

Logistic Regression Predicting Likelihood of Suicidal Attempt (SA) Based on Playing Video Games $\geq 3\frac{hours}{day}$ *(PVG), Physical Inactvitiy (* $active < 5\frac{days}{week}$ *)(PIA), Age, Race, Gender, and Being Bullied Electronically and in School*

Variable	*B*	SE	Wald	*Df*	*P*	Odds Ratio	95% CI for Odds Ratio Lower.
Play Video Games $\geq 3\frac{hours}{day}$	.325	.081	15.954	1	.000	1.384	(1.180,1.623)
Physically Inactive	.026	.084	.094	1	.759	1.026	(0.871,1.209)
Age							
13 years			6.052	5	.301		
14 years	-.864	1.139	.575	1	.448	.422	(0.045,3.929)
15 years	1.023	1.137	.810	1	.368	.359	(0.039,3.337)
16 years	-.951	1.136.	.700	1	.403	.387	(0.042,3.586)
17 years	1.017	1.137	.800	1	.371	.362	(0.039,3.357)
18 years	-.754	1.139	.438	1	.508	.471	(0.051,4.384)
Bullied Electronically	-.995	.101	96.822	1	.000	2.719	(2.230,3.314)
Bullied in School	-.873	.098	78.877	1	.000	2.454	(2.025,2.975)
Race/Ethnicity							
White			53.152	5	.000		
American Indian/Alaskan Native	.639	.227	7.923	1	.005	1.894	(1.214,2.954)
Asian	-.111	.196	.317	1	.573	1.117	(0.760,1.641)
Black/African American	.700	.107	43.156	1	.000	2.013	(1.634,2.481)
Native Hawaiian/Pacific Islander	.645	.298	4.672	1	.031	1.905	(1.062,3.419)
Hispanic/Latino	.445	.106	17.654	1	.000	1.561	(1.268,1.921)
Gender							
Male						1.00	
Female	.570	.088	42.191	1	.000	1.781	(1.505,2.113)

Note. Playing Video Games 3 hours or more daily (PVG), Physically active less than 5 days per week is considered (PI), Age 13-18 years, Bullied Electronically (BE), Bullied

in School (BS), Race (0)=White, (1)=American Indian/Native American, Race (2)=Asian, Race (3)=Black/African American, Race (4)=Native Hawaiian/Pacific Islander, Race (5)=Hispanic/Latino. Race is White race compared to all other race and gender is females compared to males.

The results reveal a statistically significant association between playing video games for $\geq 3 \frac{\text{hours}}{\text{day}}$, gender, race/ethnicity, and both being bullied electronically and in school with suicide attempt; whereas, the *p-values* for all of these variables are.000 with exception to the American Indian/Alaskan American race is $p = .005$ and Native Hawaiian/Pacific Islander is $p = .031$, when predicting the likelihood of suicide attempt. The odds ratio for playing video games $\geq 3 \frac{\text{hours}}{\text{day}}$ and suicide attempt is 1.384, indicating nearly 40% more likely chance of youth to have suicide attempts when playing video games 3 or more hours a day. The odds ratio for American Indian/Alaskan American was 1.894, indicating a nearly one times greater likelihood of attempting suicide when compared to White youth. The odds ratio for Black race was 2.013, indicating one times more likely chance for these youth to attempt suicide when compared to White youth. The odds ratio for Native Hawaiian/Pacific Islander is 1.905, indicating nearly one times more likely chance for these youth to attempt suicide when compared to White youth. The Hispanic/Latino odds ratio is 1.561, indicating 50 % more likely chance for these youth to attempt suicide when compared to White youth. The odds ratio for females is 1.781, indicating nearly one times more likely chance of females having suicide attempts than males. The odds ratio for being bullied in school is 2.454 indicating one and a half times more likely chance for youth to have attempted suicide when bullied in school. The

odds ratio for being bullied electronically is 2.719, indicating nearly two times more likely chance of youth to have attempt suicide when bullied electronically.

Table 15

Logistic Regression Predicting a Moderating Effect Between Physical Inactivity and Playing Video Games on Suicide Attempt.

Variable	*B*	SE	Wald	*Df*	*P*	Odds Ratio	95% CI for Odds Ratio Lower.	Upper
Moderator	.214	.154	1.934	1	.164	1.238	.916	1.674

Note. Moderator variable= (PI*PVG)

The results reveal a *p*-value of .164, which is greater than .05, indicating no statistical significance. Therefore, there is no moderating effect between Physical Inactivity *(* $active < 5\frac{days}{week}$) and Playing Video Games $\geq 3\frac{hours}{day}$ on Suicide Attempt.

Summary of Results for Research Questions 4-6: Suicide Attempt

When conducting the chi-square test to predict a likelihood of an association between playing video games $\geq 3\frac{\text{hours}}{\text{day}}$ and suicide attempt, there is a statistically significant association; however, it is a weak association. The logistic regression model confirmed the results by identifying an association between playing video games $\geq 3\frac{\text{hours}}{\text{day}}$ and suicide attempt, and the OR revealed a slight difference between those that did not play video games with those that play video games $\geq 3\frac{\text{hours}}{\text{day}}$, also indicating a weak assosication.

The chi-square test did display an association between physical inactivity *(active* $< 5\frac{days}{week}$) and suicide attempt; however, it is a weak association. The logistic regression model did not identify an association between physical inactivity *(active* $< 5\frac{days}{week}$) and suicide attempt.

When testing the covariates using the binary logistic regression analysis, a statistically significant association was revealed with gender, being bullied, both electronically and in school, American Indian/Alaskan Native, Native Hawaiian/ Pacific Islander, Black, and Hispanic groups with suicide attempt. The ORs revealed that the Black, American Indian, and Native Hawaiian groups were more likely to attempt suicide than the White group, and the Hispanic group 50% more likely chance. In addition, being bullied in school and electronically both had over twice more likely chance to attempt suicide, and females are nearly twice more likely to attempt suicide than males.

When testing physical inactivity *(active* $5\frac{days}{week}$) as a moderator variable, there was no moderating effect between physical inactivity *(active* $< 5\frac{days}{week}$) and playing video games $\geq 3\frac{hours}{day}$ with suicide attempt.

Results for Suicide Planning: Research Questions 7-9

RQ7: Is there an association between playing video games for 3 or more hours a day and suicide planning in the youth ages 13-18 years in the United States when controlling for being bullied, gender, age, and race?

$H_0$7: There is no association between playing video games for 3 or more hours a day and suicide planning in the youth ages 13-18 years in the United States when controlling being bullied, gender, age, and race.

H_a7: There is an association between playing video games for 3 or more hours a day and suicide planning in youth ages 13-18 years in the United States when controlling for being bullied, gender, age, and race.

RQ8: Is there an association between physical inactivity and suicide planning in the youth ages 13-18 years in the United States when controlling for being bullied, gender, age, and race?

$H_0$8: There is no association between physical inactivity and suicide planning in the youth ages 13-18 years in the United States when controlling for being bullied, gender, age, and race.

H_a8: There is an association between physical inactivity and suicide planning in the youth ages 13-18 years in the United States when controlling for being bullied, gender, age, and race.

RQ9: Does physical inactivity have a moderating effect on the association between playing video games and suicide planning in the youth ages 13-18 years in the United States?

$H_0$9: Physical inactivity has no moderating effect on playing video games and suicide planning in the youth ages 13-18 years in the United States.

H_a9: Physical inactivity has a moderating effect on playing video games and suicide planning in the youth ages 13-18 years in the United States.

Table 16

Chi-Square Test Predicting likelihood of an Association between Playing Video Games $\geq 3\frac{hours}{day}$ *and Suicide Planning*

Test	*Value*	Df	Asymptotic Significance (2-sided)	*Exact Sig. (2-sided)*	*Exact Sig. (1-sided)*
Pearson Chi-Square	57.861	1	.000		
Continuity Correction	57.481	1	.000		
Likelihood Ratio	57.384	1	.000		
Fisher's Exact		1		.000	.000
Linear-by Linear Association	57.856	1	.000		
N of Valid Cases	13649				

a. 0 cells (0.0%) have expected count less than 5. b. Computed only for a 2x2 table

Table 17

Symmetric Measures

		Value	Approximate Significance
Nominal by Nominal	Phi	.065	.000
	Cramer's V	.065	.000
N of Valid Cases		13649	

A chi-square test for association was conducted between playing video games $\geq 3\frac{\text{hours}}{\text{day}}$ and suicide planning. All expected cell frequencies are greater than five. There is a statistically significant association between playing video games $\geq 3\frac{\text{hours}}{\text{day}}$ and suicide planning for the Pearson chi-square $\chi 2(1) = 57.861$, $p = .000$. However, there is a weak association between playing video games $\geq 3\frac{\text{hours}}{\text{day}}$ and suicide planning $\varphi = 0.065$, $p = .000$.

Table 18

Chi-Square Test Predicting likelihood of an Association between Physical Inactivity (active $< 5\frac{days}{week}$*) and Suicide Planning*

Test	*Value*	Df	Asymptotic Significance (2-sided)	*Exact Sig. (2-sided)*	*Exact Sig. (1-sided)*
Pearson Chi-Square	58.060	1	.000		
Continuity Correction	57.687	1	.000		
Likelihood Ratio	58.931	1	.000		
Fisher's Exact		1		.000	.000
Linear-by Linear Association	58.056	1	.000		
N of Valid Cases	14037				

a. 0 cells (0.0%) have expected count less than 5. b. Computed only for a 2x2 table

Table 19

Symmetric Measure

		Value	Approximate Significance
Nominal by Nominal	Phi	.064	.000
	Cramer's V	.064	.000
N of Valid Cases		14037	

A chi-square test for association was conducted between physical inactivity (active $< 5 \frac{\text{days}}{\text{week}}$) and suicide planning. All expected cell frequencies are greater than five. There is a statistically significant association between physical inactivity (active $<5 \frac{\text{days}}{\text{week}}$) and suicide planning for the Pearson chi-square $\chi 2(1) = 58.060$, $p = .000$. However, there is a weak association between physical inactivity (active $<5 \frac{\text{days}}{\text{week}}$) and suicide planning $\varphi = 0.064$, $p = .000$

Table 19

Logistic Regression Predicting likelihood of Suicidal Planning (SP) based on Playing Video Games $\geq 3\frac{hours}{day}$ *(PVG), Physical Inactivity (* $active < 5\frac{days}{week}$*) (PI), Age, Race, Gender, and Being Bullied Electronically and in School*

Variable	*B*	SE	Wald	*Df*	*P*	Odds Ratio	95% CI for Odds Ratio Lower.
Play Video Games $\geq 3\frac{hours}{day}$	.315	.053	35.075	1	.000	1.370	(1.234,1.520)
Physically Inactive	.227	.056	16.707	1	.000	1.255	(1.125,1.399)
Age		.					
13 years			7.643	5	.177		
14 years	-.288	.789	1.33	1	.715	.750	(0.160,3.518)
15 years	-.276	.787	.123	1	.726	.759	(0.162,3.548)
16 years	-.234	.787	.088	1	.766	.791	(0.169,3.700)
17 years	-.161	.787	.042	1	.838	.851	(0.182,3.980)
18 years	-.063	.788	.006	1	.937	.939	(0.200,4.405)
Bullied Electronically	.853	.070	149.783	1	.000	2.346	(2.046,2.689)
Bullied in School	.875	.066	175.300	1	.000	2.399	(2.108,2.731)
Race/Ethnicity							
White			15.476	5	.009	1.00	
American Indian/Alaskan Native	.147	.161	.829	1	.363	1.158	(0.844,1.589)
Asian	.221	.121	3.358	1	.067	1.248	(0.985,1.581)
Black/African American	.065	.071	.826	1	.364	1.067	(0.928,1.228)
Native Hawaiian/Pacific Islander	.117	.221	.279	1	.597	1.124	(0.729,1.731)
Hispanic/Latino	.261	.071	13.634	1	.000	1.298	(1.130,1.491)
Gender							
Male						1.00	
Female	.476	.056	72.653	1	.000	1.610	(1.443,1.796)

Note. Playing Video Games 3 hours or more daily (PVG), Physically active less than 5 days per week is considered (PI), Age 13-18 years, Bullied Electronically (BE), Bullied

in School (BS), Race (0)=White, (1)=American Indian/Native American, Race (2)=Asian, Race (3)=Black/African American, Race (4)=Native Hawaiian/Pacific Islander, Race (5)=Hispanic/Latino. Gender is females compared to males.

The results reveal a statistically significant association between playing video games for $\geq 3\frac{\text{hours}}{\text{day}}$, physical inactivity *(active* $< 5\frac{days}{week}$), gender, race/ethnicity, and both being bullied electronically and in school with suicide planning; whereas, the *p-value* for all of these variables is .000 predicting the likelihood of suicide planning. The odds ratio for playing video games $\geq 3\frac{\text{hours}}{\text{day}}$ and suicide planning is 1.370, indicating nearly 40% more likely chance of youth to have suicide plans when playing video games three or more hours a day. The odds ratio for physical inactivity *(active* $< 5\frac{days}{week}$) is 1.255, indicating a nearly 30% more likely chance of youth to plan suicide when physically inactive. The odds ratio for the Hispanic group is 1.298, indicating a slight increase, but only 30% more likely chance for these youth to plan suicide when compared to White youth. The odds ratio for females is 1.610, indicating an increase of 60% more likely chance for females to have suicide plans than males. The odds ratio for being bullied in school is 2.399 indicating nearly one and a half times more likely chance for youth to have suicide plans when bullied in school. The odds ratio for being bullied electronically is 2.346, indicating almost one and half times more likely chance of youth to have suicide plans when bullied electronically.

Table 20

Logistic Regression Predicting a Moderating Effect between Physical Inactivity and Playing Video Games on Suicidal Planning

Variable	*B*	SE	Wald	*Df*	*P*	Odds Ratio	95% CI for Odds Ratio Lower.	Upper
Moderator	-.050	.104	.234	1	.628	.951	.776	1.165

Note. Moderator variable= (PI*PVG)

The results reveal a *p*-value of .628, which is greater than .05, indicating no statistical significance. Therefore, there is no moderating effect between Physical Inactivity *(active* $< 5\frac{days}{week}$) and Playing Video Games $\geq 3\frac{hours}{day}$ on Suicidal Planning.

Summary of Results for Research Questions 7-9: Suicide Planning

When conducting the chi-square test to predict a likelihood of an association between playing video games $\geq 3\frac{\text{hours}}{\text{day}}$ and suicide planning, there is a statistically significant association; however, it is a weak association. The logistic regression model confirmed the results by identifying an association between playing video games $\geq 3\frac{\text{hours}}{\text{day}}$ and suicide planning, and the OR revealed a slight difference between those that did not play video games with those that play video games $\geq 3\frac{\text{hours}}{\text{day}}$, also indicating a weak association.

The chi-square test did predict an association between physical inactivity (active $< 5\frac{\text{days}}{\text{week}}$) and suicide planning however, it is a weak association. The logistic regression model identified an association between physical inactivity (active $< 5\frac{\text{days}}{\text{week}}$) and suicide

planning, and the OR revealed a slight difference between those that are physically active and those that are not with suicide planning.

When testing the covariates using the binary logistic regression model, a statistically significant association was revealed with gender, race/ethnicity (the difference appeared only between White and Latino/Hispanic) and being bullied, both electronically and in school. The OR revealed that the Hispanic group has a slight increase, but less than 50% more likely chance to plan suicide than the White group. The OR for being bullied in school and electronically both have nearly one and half times more likely chance to plan suicide, and females are slightly over half times more likely to plan suicide than males.

When testing physical inactivity *(active* $5\frac{days}{week}$) as a moderator variable, there was no moderating effect between physical inactivity *(active* $< 5\frac{days}{week}$) and playing video games $\geq 3\frac{hours}{day}$ with suicide planning.

Summary

The data analysis revealed statistically significant associations identifying the independent variable playing video games $\geq 3\frac{hours}{day}$ (PVG) as being associated with each dependent variable which are the three components of suicidality including suicidal ideation (SI), suicide attempt (SA), and suicide planning (SP). The independent variable physical inactivity

(active $< 5 \frac{\text{days}}{\text{week}}$) (PI) was found to have an association with the dependent variables SI and SP; however, there is no moderating effect with PI as the moderator variable for each dependent variable of suicidality including SI, SA, and SP.

The results of the covariates varied with each dependent variable. Whereas, being bullied, both electronically and in school, had a positive association with all three dependent variables SI, SA, and SP and the strongest association with each DV. Gender was also predicted to have an association between all three dependent variables SI, SA, and SP; whereas, females were more likely than males to be positive for all suicidality behaviors. Race was identified to be associated with SA and SP; Compared to White, American Indian/Alaskan Native, Black, White, Hispanic/Latino, and Native Hawaiian/ Pacific Islander were all found to be at higher risk for suicide attempts. However, for suicide plans, the only difference between racial groups were between Whites and Hispanic/Latino. In Chapter 5, I will discuss interpretation, limitations, recommendations, implications, and the relationship with my theoretical framework with the study results.

Chapter 5: Discussion, Conclusions, and Recommendations

Introduction

The purpose of the study was to identify factors that are associated with suicidality in youth. Study findings may increase the public's awareness of the factors contributing to youth suicidality as well as inform policy makers' and researchers' development of evidence-based policies and interventions. The factors influencing youth behaviors should be expected to change as society continues to change. The ongoing COVID-19 pandemic is affecting all populations in the world, both mentally and physically (Kumar et al., 2021; WHO, 2022). Public health officials must engage in ongoing research and advocacy to address the changing world. The increase in video gaming among youth at a time of increasing mortality due to suicide (CDC, 2018b; CDC, 2019b) merited research to explore the potential connection of these two phenomena. The data, though they were collected prepandemic, provide a foundation for postpandemic research.

This was a quantitative cross-sectional study. I analyzed secondary data to address the public health issue of suicidality in youth. The independent variables were video gaming and physical inactivity; in addition, physical inactivity was tested as a moderating variable. The dependent variables were the components of suicidality including suicidal ideation, suicide planning, and suicide attempt. There were other variables that were examined as potential confounding variables including age, race, gender, and being bullied.

Globally, suicide is the third leading cause of death in youth (WHO, 2019). In the United States, suicide is the second leading cause of death in youth (Kochanek, 2017). In addition, the overall suicide rate increased by 33% from 1999 to 2017 in the United States, and video gaming in youth increased from 22% to 43% from 2003 to 2017 (CDC, 2018b; CDC, 2019b). Additionally, 54% of people who died from suicide did not have a known mental health condition (CDC, 2018c).

The results revealed an association between the independent variable playing video games $\geq 3\,\frac{hours}{day}$ (PVG) and each dependent variable (the three components of suicidality including suicidal ideation, suicide attempt, and suicide planning). The independent variable physical inactivity (active $< 5\,\frac{\text{days}}{\text{week}}$) was associated with two of the dependent variables: suicidal ideation and suicide planning; however, physical inactivity did not have a moderating effect with suicidality. Being bullied, both electronically and in school, had a positive association with all three dependent variables and the strongest association when compared to all other independent variables. Gender also revealed a positive association with females being more likely than males to exhibit suicidality behaviors. Race was associated with suicide attempts and suicide planning, whereas race/ethnicity had positive associations with suicide attempt and suicide planning.

Interpretation of the Findings

The findings confirm and expand the knowledge on video gaming and physical inactivity with suicidal behaviors. The results identify positive associations with both video gaming and physical inactivity with suicidal behaviors. This knowledge confirms the findings from the literature presented in Chapter 2 on suicidality. Also, the findings

from this study may inform future research and public health planning. For example, I used prepandemic data from 2017. A comparison to postpandemic data is now warranted and may further clarify the relationship between the study variables.

The Findings in Relation to the Literature Review

The peer-reviewed literature review revealed predicting factors and associations related to suicidality including suicidal ideation, suicide attempt, and suicide planning. Some of the findings in this study confirmed and a few disconfirmed the findings from the literature review. Overall, the literature review supported my findings.

Hale (2015) confirmed that hours playing video games, bullying, and physical activity are associated with suicidal ideation and suicide planning. Michell et al. (2015) confirmed that extended hours playing video games did predict suicidal ideation; however, violent video games had the strongest association with suicidal ideation which is an extension of my research. Messias et al. (2011) found that video gaming and internet use of 5 hours or more daily is associated with suicidal ideation and suicide planning; however, video gaming and internet use were not tested separately. Merelle et al. (2017) confirmed that video gaming was associated with suicidal ideation and physical inactivity. Lui et al. (2016) confirmed that video game exposure is associated with suicide attempt in both males and females. Wang et al. (2018) confirmed that excessive video game playing is associated with suicidal ideation along with other factors not related to my study. Arrivillage et al. (2020) had similar findings to my study findings and found that problematic internet and smartphone use is positively associated with suicidal ideation.

Xiao et al. (2019) confirmed that negative health behaviors such as physical inactivity is associated with suicidal ideation. Pfeldderer et al. (2019) confirmed that physical activity or nonactivity is a predictor of suicidal ideation. Cho (2014) had findings that were similar to my findings. Cho confirmed that the more vigorous the physical activity the less likely of both suicide attempt and suicidal ideation. In a systematic review, Vancampfort et al. (2018) confirmed that physical inactivity increases the likelihood of suicidal ideation. An (2014) had similar findings to my findings by identifying physical activity as a moderator for decreasing suicidal ideation in youth. Arat et al. (2017) disconfirmed my findings by finding that physical activity is associated with increased suicide attempts.

Altangerel et al. (2014) did confirm my findings, that females have high risk for suicidal behaviors than males. Chen et al. (2020) confirmed that being bullied at school is associated with suicidality and that more females than males have suicidality (suicide plan, attempt, and ideation); however, the researchers included only youth with ADHD. Yang et al. (2020) confirmed that bullying behaviors predict suicidal ideation and suicide attempt. Lee et al. (2019) confirmed that females attempted suicide more than males; in addition, they found that the older age group were more likely to complete suicide than the younger age group. Hooper et al. (2017) supported my findings by discovering that the older the adolescent the more likely the suicide attempt. Latino youth with behavioral problems had more suicide attempts than White youth, which is consistent with the findings of some researchers (Pena et al., 2018).

I used a large sample to examine all components of suicidality with both video gaming and physical inactivity. I compared only those who played video games daily for 3 or more hours and those who were physically inactive as identified by their exercising for 1 hour and less than 5 days per week. I controlled for five potential confounding variables and tested physical inactivity as a moderating variable. The findings revealed that physical inactivity was not a moderating variable and even though excessive video gaming has a positive association with all components of suicidality, it is a weak association. In addition, physical inactivity was not tested before with suicidality, and a positive association does exist with only suicide attempt and suicide planning, yet it is also a weak association.

The Findings in Relation to the Social Ecological Model

The social ecological model (SEM) was one of the theories in the study's theoretical framework. As applied to this study, the SEM's four overlapping factors interact to influence suicidality as follows: individual (knowledge, attitude, skills), interpersonal (social network), organizational (environment, ethos), and community (cultural values, norms). These levels of influence affect the decisions of the youth being studied as well as can be used for intervention purposes. The levels of influence interact to promote health behaviors such as the decision to play video games; engage in physical activity; and undertake suicide-related planning, thoughts, and attempts.

This study revealed a positive association between playing video games and all components of suicidality, and physical inactivity was positively associated with suicidal ideation and suicide planning. These findings can be explained by the four overlapping

factors of SEM. For instance, attitude and values of youth determine their decision to play video games and to be physically active. In addition, the social and physical environment would encourage video gaming and physical activity such as providing youth with video games as well as having friends who practice these behaviors.

The most significant finding of this study that is closely related to the social aspect of the SEM is the association between being bullied and suicidality. In fact, the strongest positive association with all components of suicidality was being bullied both in school and electronically. These confounding variables are relevant to two of the four factors that explain the SEM: social and individual. However, social is most relevant in this study as well as assumed to be the most influential aspect of the SEM. It is reasonable to assume that bullying in school or electronically will disconnect the individual from society as they feel like an outcast and are traumatized by cruelty. The second aspect of this analysis of theory is explained by the IPTS and connects the social aspect of the SEM.

The Findings in Relation to the Interpersonal Theory of Suicidal Behavior

The interpersonal theory of suicidal behavior (IPTS) is based on two concepts, which are desire and capability to commit suicide (Van Orden et al., 2010). The theory also includes two interpersonal components of desire: thwarted belongingness and perceived burdensomeness (Van Orden et al., 2010). If an individual does not feel like they belong, they have a sense of social disconnection or social isolation. Youth who are bullied would similarly experience social disconnection or isolation due to a perception

of not belonging. This would explain the strong positive association between being bullied and suicidality found in this study.

In addition, video gaming for excessive hours daily would disconnect the individual socially from society and create a social disconnection that could potentially cause social isolation and desires to harm self. In this study, I included only those youth who played video games for 3 or more hours daily. It is reasonable to assume that an excessive amount of time playing video games would result in decreased social interactions. The youth that played video games for 3 or more hours daily in my study are found to be positively associated with all components for suicidality, and the IPTS could also explain this interaction.

The findings from this study are consistent with the social aspects of both the SEM and the IPTS. In both theories, the social environment aspects are assumed to be the most influential and likewise the most preventable (Van Orden et al., 2010). Health care workers could target prevention methods on those aspects of both models to produce positive social change. However, positive social change does not occur without application of theory and evidence-based research.

Limitations of the Study

I performed a secondary data analysis of data gathered within the school setting. As such, the study's limitations are representative of secondary data collection. The general limitations in such studies would include valid and reliable instrumentation, student absenteeism, recall bias, and underreporting (Creswell, 2014). Where it is possible, I made adjustments for these limitations.

The limitations of using a data instrument created by other researchers include its potential inaccuracy as a tool for reporting as well as the exclusion of potential variables of interest. There are other confounders absent from the secondary data that could lead to suicidality and are also risk factors for suicide, such as family history of suicide, family history of child maltreatment, history of mental disorders, clinical depression, impulsive or aggressive tendencies, cultural and religious beliefs, local epidemics of suicide, isolation, barriers to accessing mental health treatment, loss (relational, social, work, or financial), and physical illness (CDC, 2020).

The data instrument was available in both dichotomous and scaled form. Scaled answers may create a more accurate tool for reporting valid reliable results; however, in my study I used three independent variable and for testing purposes the variable measurement needs to be consistent. The variables in the primary data set were not consistent in one form of questioning. In addition, the race category was split into two questions with Hispanic group separately into another question.

Confounders threaten internal validity because these factors could explain the observed outcome of the study. Therefore, the variables (gender, race, age, and being bullied) available in the secondary data set is controlled in my study. Some of these factors did increase the risk of suicidality; and therefore, interfere with the study variables such as being bullied, gender, and race. To overcome this threat to internal validity, these confounding factors are controlled. However, other risk factors to suicide were in the secondary data set such as depression, hopelessness and substance abuse, but not used in my study; and therefore, there is a threat to internal validity within my study.

Recall bias and underreporting is also a threat to internal validity. The adolescent age group is a vulnerable group and false reporting could occur due to doubts of confidentially in reporting. However, there is not a way of knowing this for the secondary researcher and is another limitation of the study. There could be some external validity issues with homeschooled students and absenteeism, but again unavoidable for the secondary researcher.

Using data already established to address a new research study can present barriers and complications that the secondary research must overcome. To overcome such limitations I made the following adjustments: recoded the three dependent variables to reflect all dichotomous data answers so that statistical testing would be correct using the binary logistic regression model, recoded the race category to adapt to the RQs and merged race into one variable data, used an established public federal organization for my data set, included the confounding variables within the data set and controlled them in my study, and used a credible source (CDC) for my secondary data set. However, changing the variables from continuous to binary can cause loss of information and create additional limitations. Another limitation is the fact that the study is cross-sectional, measuring the variables at a specific point in time; and therefore, unable to examine causal relationships. In addition, some potential confounding variables that are also risk factors for suicide, such as family history of mental disorders and completed suicide were not in the data set; and therefore, adjustment for this limitation was unavoidable.

Recommendations

Further research is needed that would address the limitations, gaps in the literature, and the current pandemic in which my study did not analyze. Researchers have identified that adolescent suicide is a problem world-wide from reported incidences as well as reported suicide attempts and suicidal thoughts. Much of the research on youth is from secondary data collected from youth surveys. However, the association between video gaming, suicidal ideation, suicide planning, and suicide attempt was not investigated in quantity and no research is on excessive video playing when controlling for the variables presented in my study until now. The literature revealed physical activity having an associated with decreased odds of suicidal ideation; however, research was not found on testing done on physical inactivity as a predictor or moderator of suicidality. Furthermore, excessive video gaming as a predictor of suicidality is not found in the literature when controlling for the confounding variables presented in my study. In addition, limited studies are found differentiating the three components of suicidality with excessive video gaming and physical inactivity.

Research studies that include all the risk factors for suicide as confounding variables to control and compare with suicidality would address the limitations of my study and continue to fill the gaps in the literature. Additionally, research on why bullying is such a significant factor in suicidality as well as research on the effectiveness of intervention programs on bullying is warranted. The alarming fact is that my study is not the only study to find bullying a predictor of suicidal behaviors, yet it is still a

significant problem. Therefore, prevention methods on bullying are warranted as well as investigation into any prevention methods already in place.

The isolation of all people during the COVID-19 pandemic may have many negative consequences. Suicide, physical inactivity, and video gaming are just a few obvious factors that may have resulted in poor outcomes. During the current pandemic lockdown suicide, video gaming, and physical inactivity may have increased in the adolescent population with school and social interactions suspended. Further research that would build on my research addressing the consequences of the current pandemic is warranted. The finding that social isolation increases such disparities is consistent with the SEM and IPTS and may reinforce the relevance of both theories. The finding may also bolster the findings in epidemiological studies that social disconnection can explain some morbidities and moralities. In one of these investigations, Holt (2017) stated that social disconnection predicts poor health outcomes such as psychological issues and health behaviors. Health behaviors are responsible for many preventable health disparities in which can cause illness and death. In addition, social disconnection that is both physical and social through policy due to a pandemic is the ultimate isolation and does not occur without consequences. In this day of the emerging pandemic, mental and physical needs have changed and life has changed for everyone world-wide. It is reasonable to assume that COVID is a disease that affects both mental and physical aspects of life, and the impacts need to be identified. The data in my study is pre-pandemic and gives a foundation for post-pandemic data and research that may potentially culminate to be even more alarming.

Implications

The goal is to produce positive social change in public health. Evidence-based research allows these changes on all levels (individual, family, organizational, and societal); if however, the study is grounded, justifiable, and filling in the gaps from prior research. In my study, positive social change is potentially at all levels, and would also involve further research. Ultimately, the research would lead to prevention efforts at every level which could potentially have a significant impact on suicidality. However, changes in society would have to be implemented in order to create positive social change.

Playing video games for three or more hours daily is found to increase the odds of suicidality and methods can be implemented to discourage such behavior. Some of the methods are as follows: student/parent education and awareness, video game store policy and procedure for sell of video games to minors could be changed to unlawful due to harm, and public awareness through advertisements targeting the youth, parents, and video game venders.

My study found that the confounding variables (being bullied) is the most significantly associated with suicidality; therefore, these are factors that need to be addressed to induce positive social change. Programs to address bullying of youth would involve individual, family, organizational, and societal levels such as school programs that have state policies mandating education and no tolerance policies on bullying. For example, educators need to be more accountable for student bullying as they are the eyes and ears of the school system and should be mandated to monitor more closely bullying

behaviors. At the individual and family level, parents should be aware and educated on the consequences of bullying and encourage to discourage such behaviors and advocate for those victimized.

Settings where the adolescent population are grouped allow public health practitioners the opportunity to assess and promote positive social change. Screening youth on the positive associations found in my study would identify those at risk and intervention methods could be conducted to target these youth. For example, additional screening questions on video game playing and being bullied for physician's assessments, such as pediatricians as well as physical education teachers in school could be implemented and mandated by policy.

Conclusion

The problem with adolescent suicide is a significant problem world-wide. Research on the reasons why, is critical to reduce and prevent this global health problem and is warranted even more now with the current pandemic. My study addressed suicidality in youth that other studies did not investigate, found positive associations, and created a building block for future studies.

The positive associations within my study implies that activity such as video gaming creates an environment of interacting with video characters could be disconnecting youth socially and discouraging the development of social connections with people as well as physical inactivity causing suicidality. Playing video games in excess creates a decrease in social interactions and contact, and therefore, may lead to suicidality as well as being physical inactive.

It is clear that youth are disconnected from society when occupied by hours of video gaming daily, and prevention efforts could focus on the social environment by providing parent education and awareness, as well as school programs for the youth to influence their individual and interpersonal skills.

Current research is always needed for evidence-based research and public health advocacy in the ever-changing world. Positive social change would not occur if current evidence-based research is not available as it is a powerful tool to induce and create change.

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