THE LONGITUDINAL IMPACT OF SCHOOL-BASED HEALTH CENTER USE ON ACADEMIC PERFORMANCE: THE MEDIATING ROLES OF PHYSICAL ACTIVITY AND HEALTH STATUS

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A THESIS

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

Psychology – Master of Arts

2019

ABSTRACT

THE LONGITUDINAL IMPACT OF SCHOOL-BASED HEALTH CENTER USE ON ACADEMIC PERFORMANCE: THE MEDIATING ROLES OF PHYSICAL ACTIVITY AND HEALTH STATUS

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Students who are uninsured, racial or ethnic minorities, and/or low-income often face barriers to healthcare, and may be vulnerable to poor health and academic outcomes. School-based health centers (SBHCs) address youth barriers to healthcare and promote health equity by providing primary medical and mental health services, as well as health education programming. SBHCs have important ramifications for students' health, behaviors, and lives. Historically, SBHC research has largely focused on service utilization; little work examines the longitudinal impact and potential causal mechanisms of SBHCs on student outcomes. Academic outcomes are of particular interest to SBHC practitioners, schools, and families, given the implications for funding and benefits for students. In the present study, a conceptual framework developed by Geierstanger, Amaral, Mansour, and Walters (2004) guided the prediction that SBHC use would indirectly improve student academic performance through increases in general health status and levels of physical activity. These relationships were examined using longitudinal structural equation modeling with data from the Michigan Evaluation of School-based Health Study (McNall, Lichty, Mavis, & Bates, 2010). Results indicated that student SBHC use was not associated with self-reported health status, physical activity, or academic performance. While this study addressed gaps in SBHC literature, such as the lack of longitudinal methods, additional research is needed to better understand these relationships. Implications for future SBHC research, policy, and practice are discussed.

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INTRODUCTION

Health is a human right, and each person should have an equal opportunity to be healthy. Just as there is a societal responsibility to uphold the human rights value of non-discrimination, there is a responsibility to address the health disparities prevalent amongst different social groups (Braveman & Gruskin, 2003). Other social inequities, such as employment, education, and income gaps, will persist until people are able maintain healthy lives (Braveman & Gruskin, 2003; Braveman et al., 2011). For instance, youth who are unhealthy are less likely to achieve academically and are more likely to drop out of school (Basch, 2011). These ramifications could lead to long-term consequences, such as fewer job opportunities and subsequent socioeconomic immobility. Furthermore, these relationships are dynamic and bidirectional. Just as health can influence one's education, education has significant implications for a person's health. Higher educational attainment, as measured by years of school completed, predicts positive health behaviors such as increased physical activity and lower rates of smoking and binge drinking (Clouston, Richards, Cadar, & Hofer, 2015). Thus, a comprehensive approach is necessary to address health disparities, which is essential for the pursuit of equity.

Many individuals continue to unjustly and disproportionately experience poor health. The National Center for Health Statistics (2012) defines health disparities as health differences "that occur by gender, race or ethnicity, education or income, disability, geographic location, or sexual orientation" (p. iii). These health disparities are preventable yet have a substantial impact on traditionally marginalized and disadvantaged populations (Braveman et al., 2011). Health disparities are often used as a measure of health equity, where the lack of disparities means equity has been attained. However, it is important to understand the difference between equality and equity. Equality means each person receives the same resources regardless of need. On the

other hand, equity means people might receive different resources depending on need, but the end goal is for everyone to attain equal status, i.e. the rich do not get richer (Braveman & Gruskin, 2003). Health equity distinguishes itself from the traditional health disparities perspective in that it explicitly focuses on the systemic injustices that are causing health differences and takes on a strong social justice lens (Braveman & Gruskin, 2003; Braveman et al., 2011; Whitehead, 1991).

Health disparities are particularly salient for racial and ethnic minorities, as they are more likely to experience poor health and receive low-quality healthcare compared to their White counterparts (Agency for Healthcare Research and Quality [AHRQ], 2017; Blanchard, Haywood, & Scott, 2003). For example, racial and ethnic minority women are less likely to have access to reproductive health services (Dehlendorf, Rodriguez, Levy, Borrero, & Steinauer, 2010). Additionally, lower socioeconomic status and educational attainment are associated with worse health and health behaviors, such as low levels of physical activity (Braveman, Cubbin, Egerter, Williams, & Pamuk, 2010; Harrison, McElduff, & Edwards, 2006; Trost, Owen, Bauman, Sallis, & Brown, 2002). Quality of health and healthcare falls on an income gradient, such that low-income individuals are worse off than middle-income individuals, and middle-income individuals are worse off than high-income individuals (AHRQ, 2017; Braveman, Cubbin, Egerter, Williams, & Pamuk, 2010). Similar outcomes are seen in people without insurance, as evidenced by the long-term health decline associated with an uninsured status (Baker, Sudano, Albert, Borawski, & Dor, 2001).

Unfortunately, similar patterns of inequalities persist for children and adolescents because health disparities are intergenerational (Cheng, Johnson, & Goodman, 2016). Both lower socioeconomic status and low educational attainment are associated with a poor health status,

more chronic illness, and a shorter life expectancy; and the children of individuals who experience such social determinants are subject to similar health outcomes as their parents (Braveman & Egerter, 2008). Poor maternal health and socioeconomic disadvantage predict health consequences for their children (Hardie & Landale, 2013). Likewise, there are intergenerational effects of education and academic performance, where parental education is related to the education outcomes of their children (Howe, Lawlor, & Propper, 2013). For example, children of parents with higher educational attainment, as measured by years of school completed, score higher on tests and have better grades (Engzell, 2016).

In addition, racial and ethnic minority adolescents are less likely to be insured, experience good health, or have access to quality healthcare when compared to White adolescents (Lau, Lin, Flores, 2012; Lieu, Newacheck, & McManus, 1993; Flores & Lin, 2013; Price, Khubchandani, McKinney, & Braun, 2013). Gelman et al. (2013) found that Latina adolescents were 65% less likely than their White peers to have initiated the Human Papillomavirus (HPV) vaccination series. However, this disparity was explained when the authors accounted for insurance status and whether they had access to a regular source of healthcare. Even with increasing insurance options and healthcare access such as Medicaid expansions and the introduction of the State Children's Health Insurance Plan (SCHIP), adolescents from low-income environments access health services less and are less satisfied with the care they receive (Newacheck, Hung, Park, Brindis, & Irwin, 2003). These findings suggest that quality of care might differ for youth depending on certain demographic characteristics. For example, when compared to White children, racial and ethnic minority children are less likely to have their height and weight checked at the doctor, and the likelihood diminishes even more when they are also of lower socioeconomic status (Berdahl et al., 2010).

It is imperative to also consider other health-related domains, such as health behaviors or life outcomes, that are inherently linked to health disparities and inequalities in access to healthcare. One health behavior that is integral to youth health and development is physical activity. Overall, physical activity declines as youth get older (Whitt-Glover et al., 2009); however, racial and ethnic minority and youth of a low socioeconomic status have lower levels of physical activity and higher levels of sedentary behavior than their White counterparts (Brodersen, Steptoe, Boniface, & Wardle, 2007; Uijtdewilligen et al., 2011). Furthermore, this gap widens as youth age (Gortmaker et al., 2012). Similar patterns are seen in youth academic performance, there is a strong, positive association between socioeconomic status and academic achievement (Sirin, 2005). In addition, racial and ethnic minority youth still have lower academic achievement than White youth of similar socioeconomic status (Burchinal et al., 2011). These achievement gaps remain fairly stable throughout childhood but widen substantially and exponentially when youth enter adolescence. Caro, McDonald, and Willms (2009) found a 20% increase in the achievement gap between youth of color and White youth between the ages of 12-13, and as they got older the gap increased.

LITERATURE REVIEW

Overview of School-Based Health Centers

Clearly, low-income, uninsured, and minority students are impacted by disparities and face barriers in accessing health services. One proposed solution to address these barriers are School-Based Health Centers (SBHCs). SBHCs aim to bring comprehensive healthcare to those least likely to have access and are often located in both urban and rural locales in diverse, low-income high schools (Friedrich, 1999; Lofink Love et al., 2015; Santelli et al., 2003). Individual SBHCs started to emerge in the late 1960's, and the first multi-site, national effort began in the 1980's when the Robert Wood Johnson Foundation started the School-Based Adolescent Health Care Program (Gustafson, 2005; Lear, Gleicher, Germaine, & Porter, 1991). The development of SBHCs were a response to public health concerns regarding the lack of insurance amongst adolescents, as well as the increasing evidence of negative health outcomes associated with certain risk behaviors, such as condom-less sex or drug and alcohol experimentation.

SBHCs have expanded to care for younger children and offer a variety of services such as child-wellness visits, vaccinations and immunizations, mental health counseling, substance abuse prevention, health education programs, and family planning (Fothergill & Ballard, 1998; Lofink Love et al., 2015; Menden Anglin, Naylor, & Kaplan, 1996; Santelli et al., 2003). SBHCs address access barriers by providing convenient locations, affordable services, and flexible appointment options for students and families (Adams & Johnson, 2000). They also play an important role in the movement towards integrated healthcare, as they are located in schools and require frequent communication between students' healthcare providers, teachers, and parents (Lofink Love et al., 2015).

Current State of SBHC Research

As of 2014 there were 2,315 SBHCs in the U.S., and there have been more than 600 new health centers implemented in the past decade (Lofink Love et al., 2015). SBHCs have been successful in increasing child and adolescent access to healthcare services in a variety of contexts, such as in elementary, middle, and high schools, and in both rural and urban locations (Gibson, Santelli, Minguez, Lord, & Schuyler, 2013; Guo, Wade, & Keller, 2008; Kisker & Brown, 1996; Santelli, Kouzis, & Newcomer, 1996a; Wade, Mansour, Line, Huentelman, & Keller, 2008). Students and parents appreciate the confidentiality, convenience, and comfortable environment that SBHCs offer (Albright et al., 2015; Bains, Franzen, & White-Frese, 2014; Soleimanpour, Geierstanger, Kaller, McCarter, & Brindis, 2010; Santelli, Kouzis, & Newcomer, 1996b).

SBHCs are in an excellent position to promote health equity (Knopf et al., 2016). Social dynamics are often considered the driving force behind health disparities, and schools are integral to social determinants of health such as education, access to services, and safety (Huang, Cheng, & Theise, 2013). In fact, several studies provide evidence that SBHCs can close some of the health and healthcare gaps across a variety of sociodemographic factors. Racial and ethnic minority youth are as likely to utilize SBHC services as White youth, and students of all insurance statuses are equally likely to utilize SBHC services (Parasuraman, 2014; Parasuraman & Shi, 2014). In some cases, high-risk, racial and ethnic minority, and uninsured students are more likely to be SBHC users or utilize SBHC services as compared to their peers (Allison et al., 2007; Anglin, Naylor, & Kaplan, 1996; Balassone, Bell, & Peterfreund, 1991; Szumilas, Kutcher, LeBlanc, & Langille, 2010). Additionally, populations that historically face stigma and barriers to accessing mental health care, such as African American and Latino male youth, are

more likely to seek out mental health services at SBHCs than other sources of care (Bains, Franzen, & White-Frese, 2014).

SBHCs and health outcomes. There are clear relationships between SBHC utilization and student health. By increasing students' access to healthcare, SBHC utilization has been associated with an improved health status (Friedrich, 1999; McNall, Lichty, & Mavis, 2010; Wade, Mansour, Line, Huentelman, & Keller, 2008) and improved health-related quality of life (Guo, Wade, & Keller, 2008; Wade, Mansour, Line, Huentelman, & Keller, 2008). Additionally, research has explored the relationship between SBHCs and reproductive health. While additional inquiry is still warranted, there have been numerous evaluations and publications that indicate success. SBHCs have been shown to increase student utilization of counseling and family planning services, and utilization of these services was associated with safer sexual behaviors and positive mental health outcomes (Soleimanpour, Geierstanger, Kaller, McCarter, & Brindis, 2010). SBHC users have increased contraceptive use and STI screening compared to non-SBHC users (Ethier et al., 2011; Minguez, Santelli, Gibson, Orr, & Samant, 2015), as well as reduced rates of teenage pregnancy and births (Lovenheim, Reback, & Wedenoja, 2014). In one study conducted in the UK, teens noted they felt comfortable accessing sexual health services at their SBHC due to the comfortable environment, friendly staff, and confidentiality of their visit (Ingram & Salmon, 2010). These findings suggest that SBHCs go beyond just increasing access to reproductive services. SBHCs can influence health behaviors through increased sexual and mental health education, access or referral to contraceptives and medication, and by offering family planning services.

Additionally, adolescent use of mental health services increases with access to SBHCs (Kaplan et al., 1998). A recent systematic review demonstrated that SBHCs were successful in

increasing access and utilization of mental health services (Bains & Diallo, 2016). The authors found that in most of the studies, students who were female, uninsured or publicly insured, and currently suffering from a mental disorder were the most likely to access or frequently use mental health services. Of the studies that included community health centers or other sources of care as comparison groups, students tended to prefer accessing mental health services at SBHCs than the other sites. Moreover, the studies that collected student feedback reported that students were satisfied with the care they received from their SBHC and were confident in the confidentiality and usefulness of their mental health-related visits. However, it is important to note that only one of the studies in the review measured outcomes associated with access or utilization of mental health services, and they were academic outcomes (Walker, Kerns, Lyon, Bruns, & Cosgrove, 2010).

SBHCs have also been associated with reduced emergency care use across many age groups and diverse populations, which may lead to potential savings to the healthcare system (Guo et al., 2005; Juszczak, Melinkovich, & Kaplan, 2003; Key, Washington, & Hulsey, 2002; Young, D'Angelo, & Davis, 2001). When youth lack primary medical care, emergency departments become a source of non-urgent healthcare (Starfield, Shi, & Macinko, 2005; Wilson & Klein, 2000). By providing convenient and comprehensive healthcare to youth that might not otherwise have access, SBHCs divert costly emergency room visits. For example, children with asthma in schools with SBHCs have fewer hospitalizations, emergency department visits, and asthma-related absences than those in schools without (Guo et al., 2005; Lurie, Bauer, & Brady, 2001; Webber et al., 2003). Moreover, SBHCs maintain relatively low operating costs and have been shown to be a cost-effective intervention (Ran, Chattopadhyay, & Hahn, 2016).

SBHCs and academic outcomes. Academic outcomes are of particular concern to SBHC practitioners and policy makers due to their consequences for funding, both for the schools and the health centers (Geierstanger, Amaral, Mansour, & Walters, 2004). Since the conception of SBHCs, one of the main goals has been to improve student academic performance by way of improving their health (Friedrich, 1999). When the *No Child Left Behind Act* was put forth by the Bush Administration in 2001, the U.S. education system began to concentrate its efforts on closing achievement gaps in public schools. Racial and ethnic minority students, or students of a low socioeconomic status, are often the ones most negatively affected by achievement gaps (Burchinal et al., 2011; Sirin, 2005). Exploring the relationship between SBHCs and academic performance, particularly in diverse populations, is important in order to advocate for SBHC funding and demonstrate success.

In general, few studies examine causal mechanisms of SBHC influence on academic outcomes employing methodologies such as longitudinal designs or comparison groups (Walker, Kerns, Lyon, Bruns, & Cosgrove, 2010). Additionally, academic outcomes can be defined in various ways. Different studies might use attendance (absenteeism or tardiness), disciplinary records, grade point average (GPA), or school progress (graduation rate or grade completion). Certain studies indicate that SBHCs improve academic outcomes for users depending on how they define the outcome variables (Geierstanger, Amaral, Mansour, & Walters, 2004). For example, there is some evidence of improvement when academic outcomes are measured by attendance (Gall, Pagano, Desmond, Perrin, & Murphy, 2000; McCord, Klein, Foy, & Fothergill, 1993; Van Cura, 2010; Walker, Kerns, Lyon, Bruns, & Cosgrove, 2010), grade-point average (GPA) (Knopf et al., 2016; Walker, Kerns, Lyon, Bruns, & Cosgrove, 2010), preparedness for college (Bersamin, Garbers, Gaarde, & Santelli, 2016), school engagement or connectedness

(Stone, Whitaker, Anyon, & Shields, 2013; Strolin-Goltzman, 2010; Strolin-Goltzman, Sisselman, & Auerbach, 2014), or high school dropout rates (Knopf et al., 2016; Kerns et al., 2011; McCord, Klein, Foy, & Fothergill, 1993).

Researchers have also utilized different means of examining the relationship between SBHCs and academic outcomes. While some research examines the presence of a SBHC and its impact on school-wide measures of academic outcomes (Bersamin, Garbers, Gaarde, & Santelli, 2016; Strolin-Goltzman, 2010), other studies look at individual students' academic success (Kerns et al., 2011; McCord, Klein, Foy, & Fothergill, 1993; Stone, Whitaker, Anyon, & Shields, 2013; Strolin-Goltzman, Sisselman, & Auerbach, 2014; Van Cura, 2010; Walker, Kerns, Lyon, Bruns, & Cosgrove, 2010). Additionally, there is conflicting evidence of SBHC impact when multiple measures of academic achievement are employed, such that there are different findings for different measures (Bersamin, Garbers, Gaarde, & Santelli, 2016; Strolin-Goltzman, 2010; Strolin-Goltzman, Sisselman, & Auerbach, 2014). Furthermore, in one study certain services accessed by students had different impacts on their academic outcomes, i.e., accessing medical services impacted a different measure of academic performance than mental health services (Walker, Kerns, Lyon, Bruns, & Cosgrove, 2010).

Challenges and Gaps in SBHC Research

Although SBHCs have shown substantial promise in increasing access to health services and improving student health, many gaps remain in SBHC literature. Reviews demonstrate inconsistent findings on the association between SBHCs and academic outcomes (Bersamin, Garbers, Gaarde, & Santelli, 2016; Geierstanger, Amaral, Mansour, & Walters, 2004), vaccination rates (Allison et al., 2007; Lancman, Pastore, Steed, & Maresca, 2000; Middleman, Robertson, Young, Durant, & Emans, 1999), and Medicaid savings (Guo, Wade, Pan, & Keller,

2010). Additional research is necessary to understand how SBHCs might impact these important outcomes. Furthermore, many of these studies are outdated. In fact, several systematic reviews on SBHC outcomes found that over half of the included studies were over 10 years old at the time of the review, and many were secondary analyses of even older datasets (Bains & Diallo, 2016; Mason-Jones et al., 2012). This is particularly problematic with research on healthcare due to recent policy changes, such as the Affordable Care Act of 2010, that could impact availability of health services and insurance coverage at SBHCs.

Several reviews of SBHC outcomes have noted the lack of rigorous methodologies employed in SBHC research, and that most studies investigate access to services and frequency of service utilization (Bains & Diallo, 2016; Bersamin et al., 2016; Mason-Jones et al., 2012). For example, most evidence of the relationship between SBHC access and reduced Emergency Department use has been association, where youth at a school with an existing SBHC have lower emergency care visit rates compared to youth at schools without SBHCs (Juszczak, Melinkovich, & Kaplan, 2003; Kaplan, Calonge, Guernsey, & Hanrahan, 1998; Kaplan et al., 1999; Key, Washington, & Hulsey, 2002; Santelli, Kouziz, & Newcomer, 1996a). Pre-existing differences between schools and neighborhoods where SBHCs are and are not located were not considered aside from matching schools on basic demographic information, such as the racial/ethnic makeup of the student body, or the proportion of students who receive free and reduced lunch. Moreover, some studies do not employ comparison groups, such as reports of vaccination frequencies within a school with a SBHC (Daley et al., 2009; Gold et al., 2011).

An additional paucity in SBHC research is the lack of longitudinal methods. There are select cases of long-term evaluations (e.g. Guo et al., 2005; Guo, Wade, & Keller, 2008; Schwartz et al., 2016), but they assess a school or health center—not individuals—over time.

One study did assess individuals over time (McNall, Lichty, & Mavis, 2010), and found that after one year, students who used their SBHC had improved health satisfaction and physical activity compared to students who did not, though the effect sizes were small. While there are pragmatic reasons to utilize cross-sectional designs, it is important to invest in long-term longitudinal SBHC research given the dynamic nature of health and healthcare. Without these methods, it is difficult to distinguish the effects of SBHCs from natural changes occurring over time, such as maturational effects or changes to the healthcare system.

Due to the limited methodologies employed in SBHC research, the impact of SBHC use on specific health outcomes remains relatively unknown. Mason-Jones et al. (2012) hoped to examine the impact of SBHCs on outcomes related to mental health as well as reproductive and sexual health. They looked for articles published between 1990 and 2012, and only found 27 that qualified for inclusion for their review. Of those 27 studies, only three assessed mental, reproductive, or sexual health outcomes associated with SBHCs or SBHC use. The focus of most studies was on the amount and types of services offered and rates of student utilization. While they found that SBHCs were popular among students and offered comprehensive primary health services, the authors also noted the lack of experimental, quasi-experimental, and longitudinal designs.

The numerous challenges that arise when conducting SBHC evaluations may be partially responsible for the mixed results and lack of rigorous methodologies. In a previous literature review of SBHC evaluations, Santelli, Morreale, Wigton, and Grason (1996) claimed

> As evidenced by the sources used in this review, outcome evaluation data, which might present a case for the effectiveness of these centers, are limited. Consequently, researchers have had difficulties attempting to uncover the effects of SHCs [School

> Health Centers]. Moreover, it is not clear what outcomes should be expected from these centers. (p. 363)

They called for specification of what outcomes SBHC evaluations should address and the need for more evidence of those outcomes. Despite these issues being debated over 30 years ago, few examples of rigorous SBHC evaluation exist today and this call to action remains relevant in the current SBHC literature. There is still a general lack of research and consensus on what outcomes are most important and how to measure them (Bersamin et al., 2016; Nabors, 2003). It is essential that researchers examine outcomes that are useful for SBHC practitioners and policy makers. While SBHCs have increased access to healthcare, as evidenced by many evaluations and reviews, research should consider what other impacts of SBHCs are relevant to SBHC funding and operations. Although the number and variety of services is a hallmark for SBHCs (Gustafson, 2005; Lofink Love et al., 2015), there is substantial variation in the services offered by SBHCs. Furthermore, due to the numerous ways SBHCS can be funded (Brindis et al., 2003), school and state policies often regulate the services SBHCs can provide (Lofink Love et al., 2015). For instance, the 1998-99 census of SBHCs indicated that the majority of centers reported restrictions on their ability to provide contraceptives, such as condoms and birth control, on-site (Santelli et al., 2003). Such variability in what services SBHCs are legally and fiscally able to provide limits generalizability of large-scale studies.

Despite the rising number of SBHCs, the research has not kept pace. A large quantity of studies on SBHCs were conducted in the 90s and early 2000s, and lack comparison groups and longitudinal methods. Relying on empirical evidence established decades ago is insufficient to effectively build capacity within currently operating centers and inform the design and implementation of new centers. Moreover, healthcare and education policy are constantly in flux,

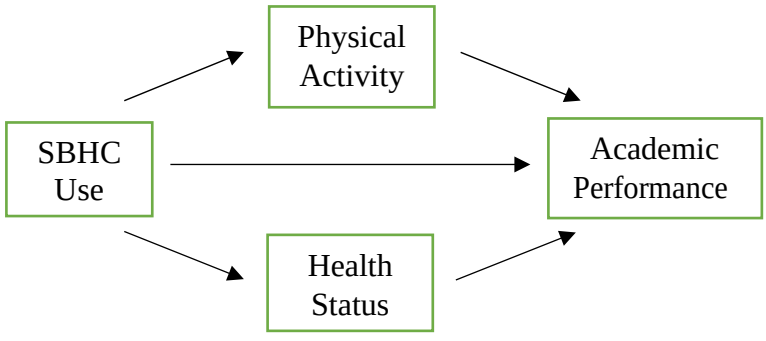
and SBHC research needs to stay relevant and abreast of policy changes. Given these dynamics, a more conceptually-driven, empirical inquiry is warranted on how SBHC use can impact the health and academic outcomes of students.

SBHC Conceptual Framework

To better understand how SBHCs might contribute to student academic performance, Geierstanger, Amaral, Mansour, and Walters (2004) conducted a literature review to develop a conceptual framework. Health behaviors, such as physical activity, and health status were considered integral dynamic factors that contribute to a student's academic performance. SBHCs provide primary medical and mental health services, as well as health education programming, which have important ramifications for student health and health behaviors (NASBHC, 2005). Thus, as seen in Figure 1, SBHC use is expected to have both direct and indirect effects on academic performance through these mechanisms. Their framework was employed in the present study to examine how student health and physical activity mediate the relationship between SBHC use and academic performance.

Figure 1.

SBHC Conceptual Framework.



Health status and academic outcomes. Health disparities can have ripple effects on future life outcomes. For example, a poor health status can lead to negative consequences for

student academic performance and subsequent income level (Basch, 2011). Simply put, healthy students learn better. Self-rated health status has been positively associated with attendance, likelihood of passing courses, GPA, ability to complete homework, and years of school completed (Deberard, Spielmans, & Julka, 2004; De Ridder et al., 2013; Lynch & von Hippel, 2016; Minkkinen et al., 2017; Needham, Crosnoe, & Muller, 2004; Sznitman, Reisel, & Khurana, 2017). Students suffering from various chronic illnesses struggle with absenteeism, low scores on school assessments, school connectedness, and poor grades as compared to healthy students (Basch, 2011; Crump et al., 2013; Forrest, Bevans, Riley, Crespo, & Louis, 2013; Taras & Potts-Datema, 2005; Thies, 1999). Moreover, students dealing with mental illness or socioemotional difficulties often have lower attendance rates, school engagement, and GPAs (Ding, Lehrer, Rosenquist, & Audrain-McGovern, 2009; Gase, Kuo, Coller, Guerrero, & Wong, 2014; McLeod, Uemura, & Rohrman, 2012; Riglin, Petrides, Frederickson, & Rice, 2014; Wang & Peck, 2013).

There are a variety of potential pathways for how a student's health might impact their academic outcomes, such as through its influence on cognition or one's ability to attend school (Basch, 2011; Shaw, Gomes, Polotskaia, & Jankowska, 2015). In addition, factors that are integral to health status, such as health behaviors, might play an important role in the association between health and academic outcomes. Positive health behaviors such as adequate nutrition and physical activity, as well as limited alcohol intake and tobacco use, are associated with increased standardized test scores, grades, GPAs, years of school completed, and attendance (Bradley & Greene, 2013; Busch et al., 2014; Ickovics et al., 2014; Kristjánsson, Sigfúsdóttir, & Allegrante, 2010). Given these findings, it is important to explore health behaviors that might mediate the relationship between health and academic outcomes, such as physical activity.

Physical activity and academic outcomes. The link between physical activity and academic outcomes is not as clear as the one between health and academic outcomes (Daley & Ryan, 2000; So, 2012). Several reviews of the literature have found, overall, that levels of physical activity have a relatively small impact on student academic performance (Donnelly et al., 2016; Taras, 2005). Another literature review claimed significant, positive associations between the two (Singh et al., 2012); however, it was later discovered that when the findings were examined in terms of effect sizes, the magnitude of the relationships were relatively small (Hattie & Clinton, 2012). Yet another review found regular physical activity was associated with better academic performance (Trost, 2007).

While findings are mixed, which may be due to the various methods of data collection and analysis employed (Trudeau & Shephard, 2010), there is some evidence that physical activity is linked to academic performance. More physical activity and higher levels of physical fitness have been associated with improved academic performance (Bezold et al., 2014; Chomitz et al., 2008; Dwyer, Sallis, Blizzard, Lazarus, & Dean, 2001; Esteban-Cornejo et al., 2014; Kristjánsson, Sigfúsdóttir, & Allegrante, 2010; Torrijos-Nino et al., 2014), and this has been supported in longitudinal examinations (London & Castrechini, 2011). Conversely, students who are not as active tend to have worse academic outcomes (Bradley & Greene, 2013; King et al., 2005). Additionally, the well-evidenced relationship between physical activity and benefits to child and adolescent cognition supports the argument that it should in turn increase academic performance (Basch, 2011; Esteban-Cornejo, Tejero-Gonzalez, Sallis, & Veiga, 2015; Sibley & Etnier, 2003).

Potential mechanisms for SBHC influence on academic outcomes. SBHCs have been known to improve the health of the students they serve (Knopf et al., 2016; Wade, Mansour,

Line, Huentelman, & Keller, 2008). Despite the inconsistent findings on the relationship between SBHCs and academic outcomes, it is plausible that SBHC utilization might have an indirect effect on student academic performance via health status and physical activity (Geierstanger, Amaral, Mansour, & Walters, 2004; NASBHC, 2005). The National Assembly on School-Based Health Centers (NASBHC) adopted a position statement in 2005 that called for additional research on SBHCs and student academic performance. However, they encouraged a focus on student educational behaviors, such as attendance, rather than educational outcomes, such as GPA. Given that SBHCs aim to serve disenfranchised students, the students who are also likely to be struggling academically, standardized educational outcomes might not be an appropriate metric.

There is also conflicting evidence on the association between physical activity and academic performance, and additional research is warranted. However, given the known association between physical activity and cognition, there is reason to predict a relationship between the two. Limited research examines the connection between SBHC utilization and increased student physical activity, with the exception of McNall, Lichty, and Mavis (2010). However, given the variety of health education and promotion programs implemented by SBHCs (Lofink Love et al., 2015), it is also plausible to anticipate an association between SBHC utilization and levels of student physical activity.

THE CURRENT STUDY

The present study aims to fill several gaps in SBHC literature employing secondary data analysis of a longitudinal SBHC evaluation (McNall, Lichty, Mavis, & Bates, 2010). Primarily, it addresses the current lack of rigorous methodologies employed in SBHC research, such as longitudinal methods, as well as the lack of inquiry into how SBHC utilization frequency impacts student outcomes. Additionally, it examines the association between SBHCs and academic outcomes, as well as attempts to identify causal mechanisms for this relationship. The study aims to answer the following research question: *To what extent do physical activity and health status mediate the relationship between SBHC use and academic performance among high school students over time?* The hypotheses are threefold: (a) High school students' use of SBHCs will be positively associated with academic outcomes over time, (b) SBHC use will be positively associated with physical activity and health status among high school students over time, and (c) The relationship between high school students' physical activity and health status will be partially explained by physical activity and health status over time.

METHODS

The data for the present study come from the Michigan Evaluation of School-based Health (MESH) Study (McNall, Lichty, Mavis, & Bates, 2010).

The MESH Study

The MESH study surveyed students from 7 middle schools and 9 high schools in Michigan. Students were surveyed annually over a three-year period from 2006-2009. The goals of the evaluation were to: (a) Evaluate if SBHCs were delivering services that were pertinent to students, and (b) Determine SBHCs' impact on health and life outcomes for the students they serve.

The study protocol for the MESH Study was reviewed and approved by the institutional review boards of Michigan State University and the Michigan Department of Community Health.

Data collection procedures. Schools were sampled from urban communities that represented diverse populations and settings. First, the MESH team developed a list of schools with SBHCs that represented a pool of geographically and demographically diverse sites was developed. Second, comparison sites were matched based on key characteristics, such as the grade, race, and socioeconomic makeup of the student body, as well as school size. Five schools had established SBHCs, six schools had recently implemented SBHCs, and five schools did not have SBHCs. To recruit the student sample, parental consent letters were mailed to the homes of all students in 6^{th} or 9^{th} grade. Parents of student participants also completed a survey asking about demographic information such as household income, education status, and work status.

Each student was informed of their rights as research participants and provided a consent form. Students who consented completed the self-administered Child and Illness Profile –

Adolescent Edition (CHIP-AE) survey once every three years (see Appendix B). The CHIP-AE, developed by Starfield et al. (1999), is a 107-item survey geared towards adolescents that focuses on various biopsychosocial domains of health. Research staff visited each school annually to administer the survey and answer any questions. Students were paid $5.00 in years 2 and 3 for their participation. Over three years, 1,038 student surveys were completed (381 middle school, 422 high school). Qualitative data such as focus groups, and objective measures such as clinic service records, were also collected.

MESH sample. In total, 1,134 students submitted consent to participate. Nine hundred fifty-eight students completed wave 1 surveys (91%; 349 middle school students, 609 high school students). In year 2, 80% of the original sample completed the survey (317 middle school students, 516 high school students). In year 3, 64% of the original sample completed the survey (381 middle school students, 657 high school students).

Present study sample. Because the investigation of school-level effects of SBHCs on academic outcomes are outside the purview of the present study, only high school students who were in schools with existing or newly implemented SBHCs were retained for analyses (N = 468). Of that sample, only students whose SBHC use clinic data was available for at least one of the survey waves were retained for analyses (N = 413). Survey completion was 92% at Wave 1 (N = 378), 79% at Wave 2 (N = 326), and 68% (N = 282) at Wave 3. On average, students were 15.70 years old at Wave 2 (*SD* = 0.63); 55% were female (N = 228), 38% were White (N = 155), and 37% were Black (N = 152). Approximately 70% of students (N = 291) used their SBHC at some point over the three waves, ranging from 1 to 197 visits (*M* = 14.36, *SD* = 22.46). The students came from six different schools; three schools had established SBHCs (52% of the sample) and three had recently implemented SBHCs (48% of the sample).

Research Questions and Hypotheses

The overall aim of the present study was to examine to the relationships between SBHC use, physical activity, health status, and academic performance of high school students over time. Several research questions and hypotheses were posed:

RQ1: *What is the effect of SBHC use on the academic performance of high school students over time?*

H1: SBHC use will be positively associated with academic performance over time.

RQ2: *What is the effect of SBHC use on the self-rated health status and physical activity of high school students over time?*

H2: SBHC use will be positively associated with physical activity and health status over time.

RQ3: *To what extent do physical activity and health status mediate the relationship between SBHC use and the academic performance of high school students over time?*

H3: The relationship between SBHC use and academic performance will be partially explained by increased physical activity and increased health status over time.

Human Protections and IRB Oversight

The IRB application for the present study was submitted on 7/30/2018. The proposed study was determined exempt by the Michigan State University HRPP on 7/31/2018 (see Appendix A).

Variables and Measures

In the present study, all variables except for SBHC use are derived from the CHIP-AE (see Appendix B) employed by the MESH Study (Starfield et al., 1999). The included variables and covariates are specified in Table 1.

Table 1.

Associated Variables for the Present Study.

Variable	Operationalization and Measurement
Independent Variable	
SBHC Use	One item that measures how many times a student used their SBHC at Waves 1, 2, and 3.
Dependent Variables	
Health Status	One item where students reported their general health status at Waves 1, 2, and 3 (five-point ordinal scale with categorical identifiers, ranging from poor to excellent).
Physical Activity	Five items where students reported their physical activity at Waves 1, 2, and 3. Items included how much time students spent exercising and the number of times they performed certain physical activities (five-point ordinal scales with categorical identifiers).
Academic Performance	Seven items where students reported their academic performance at Waves 1, 2, and 3. Items assessed student perceptions of their general academic performance (four-point ordinal scales with categorical identifiers), and specific school successes and failures (two categorical options; yes or no).
Covariates	
Race/Ethnicity	One item where students reported their racial/ethnic identity (six categorical options); used data from first available report.
Gender	One item where students reported their sex (two categorical options; male or female); used data from first available report.
Age	One item where students wrote in their age; used data from Wave 2 report.
Maternal Education	One item where students reported the highest education achieved by their mother (six-point ordinal scales with categorical identifiers); used data from first available report.
Paternal Education	One item where students reported the highest education achieved by their father (six-point ordinal scales with categorical identifiers); used data from first available report.

Table 1. (cont.)

Socioeconomic Status	Six items where students reported the employment (nine-point ordinal scales with categorical identifiers) and education status (six-point ordinal scale with categorical identifiers) of their guardians, family structure (11 categorical options; checked all that applied), and food assistance (three categorical options; no, yes, or don't know); used data from first available report.

SBHC use. SBHC use was measured with one item that measures how many times a student used their SBHC at Waves 1, 2, and 3. Usage was reported by the school health clinics.

Health status. Health status was measured with a one-item question, "How is your health in general?" with five options ranging from "poor" to "excellent."

Physical activity. Physical activity was measured with a composite scale of five items and scored as directed by the CHIP-AE manual, with higher scores indicating higher levels of physical activity (Starfield et al., 1999). Four items assessed the level of physical activity over the past four weeks: the number of days exercised (five options ranging from "no days" to "21 or more days"), number of sit-ups (five options ranging from "no sit ups" to "51 or more sit-ups"), distance walked (five options ranging from "I didn't walk at all" to "more than 1 mile [more than 12 blocks]"), and amount of time spent running without stopping (five options ranging from "I didn't run" to "30 minutes or more"). One item assessed the level of physical activity over the last year, "How often did you play on a team that has a coach, other than gym class?" with three options ("never," "once or twice," or "several times").

Academic performance. Academic performance was measured with a composite scale of seven items and scored as directed by the CHIP-AE manual, with higher scores indicating better academic performance (Starfield et al., 1999). Two items assessed their academic performance over the past four weeks: how well they did in school (four options ranging from "below average student" to "excellent student") and how well they did their homework (four

options ranging from “could have done much better” to “did very well, could not do better”). Five items were measured dichotomously (“yes” or “no”) and asked students whether they were on the honor roll, received a school award, failed a subject, failed a grade, and if they were a club officer, over the past two years. For the dichotomous items, if it indicated positive academic performance it was assigned a value of “4” and if it indicated negative academic performance it was assigned a value of “1” (Starfield et al., 1999).

Covariates. Given the social determinants of health and academic achievement, it was important to include covariates in the analyses to determine the unique contributions of SBHC use and to consider the role that development and maturation play in adolescent health. For this study, covariates included demographics, parental education level, and socioeconomic status.

Demographics. Demographic variables included gender and race/ethnicity. Gender was measured dichotomously, with the question “What is your sex?” Participants could select either male or female. Participants were asked to identify their race/ethnicity based on five categories (i.e., “White, not Hispanic,” “Black/African American, not Hispanic,” “Hispanic/Latino,” “American Indian or Alaskan,” or “Asian or Pacific Islander.” Furthermore, participants whose racial/ethnic identity were not listed (i.e., “Other”) were given the opportunity to write in their own racial/ethnic identity. Age was measured with one item, asking “How old are you?” and participants wrote in their own age.

Maternal education. Maternal education was measured with the question “What is the highest grade in school that your mother/female guardian finished?”. There were six response options ranging from “did not finish high school” to “finished graduate school, law school, or medical school.” Participants were also allowed to select “don’t know.”

Paternal education. Paternal education was measured with the question "What is the highest grade in school that your father/male guardian finished?". There were six response options ranging from "did not finish high school" to "finished graduate school, law school, or medical school." Participants were also allowed to select "don't know."

Socioeconomic status. Socioeconomic status was measured with a composite scale of six items as compiled and scored by McNall, Lichty, Mavis, and Bates (2010). Higher values indicate a higher socioeconomic status. Participants were asked about the employment status of their male and female guardians (eight options, including "not working and not looking for work," "working full time," and "don't know."). They were also asked about the educational attainment of their mother or female guardian (six options, ranging from less than high school to a graduate degree, as well as "don't know"). One item asked about family structure (11 categorical options where students reported the people that lived in their home) and was subsequently dichotomized to assess whether the students lived in a single parent home or had multiple parents at home. Additionally, "yes," "no," or "don't know" responses were recorded for whether their family qualified for and used food stamps and free and reduced lunch.

Reliability of scales. The composite scales of physical activity and academic performance were tested for reliability for the present study at Waves 1, 2, and 3 (see Table 2). Chronbach's alpha values ranged from $\alpha = 0.69$ to $\alpha = 0.71$ for the physical activity scale, and from $\alpha = 0.62$ to $\alpha = 0.64$ for the academic performance scale. No items were identified that would improve reliability if removed. While the academic performance scale in the present sample falls below the standard $\alpha = 0.70$, it is similar to what has been reported in previous studies that employed the CHIP-AE. For example, Starfield et al. (1995) found the academic

performance scale had Cronbach's alpha values ranging from α = 0.53 to α = .67, with a test-retest reliability coefficient of *r* = .80.

Table 2.

Cronbach's α for Composite Outcome Variables.

	Physical Activity	Academic Performance
Wave 1	0.69	0.62
Wave 2	0.71	0.64
Wave 3	0.70	0.64

Validity of scales. Various aspects of validity for the CHIP-AE have been assessed in previous work. All proposed items were initially sent out to 50 adolescent health content experts for feedback prior to survey administration (Starfield et al., 1993). In addition, the developers administered the survey to groups of adolescents whose health and illness profiles should differ (i.e. healthy youth and youth with chronic illnesses). They compared the adolescents' CHIP-AE scores and found the expected group differences (Starfield et al., 1995). Predictive validity was also assessed for the academic performance scale by correlating adolescent academic performance scores with their end-of-year school grades, with a range of *r* = 0.34 to 0.54 (Starfield et al., 1995). Validity was not examined for the physical activity subdomain or general health status scale in the CHIP-AE.

While validity is unknown for the physical activity and health status scales in the present study, other self-report measures of adolescent health and physical activity have been validated. For example, youth self-report health status and physical activity have been triangulated with parent reports and medical tests (Fosse & Haas, 2009; Ortega et al., 2011). Furthermore, other indicators of health status, such as morbidity, often do not apply to a total population. Some youth who perceive they are in poor health may not have the illnesses or symptoms being captured in an assessment, and some youth who perceive they are in good health might report

symptoms that can be recorded. Youth self-report measures of health allow for these idiosyncrasies (Topolski, Edwards, & Patrick, 2004).

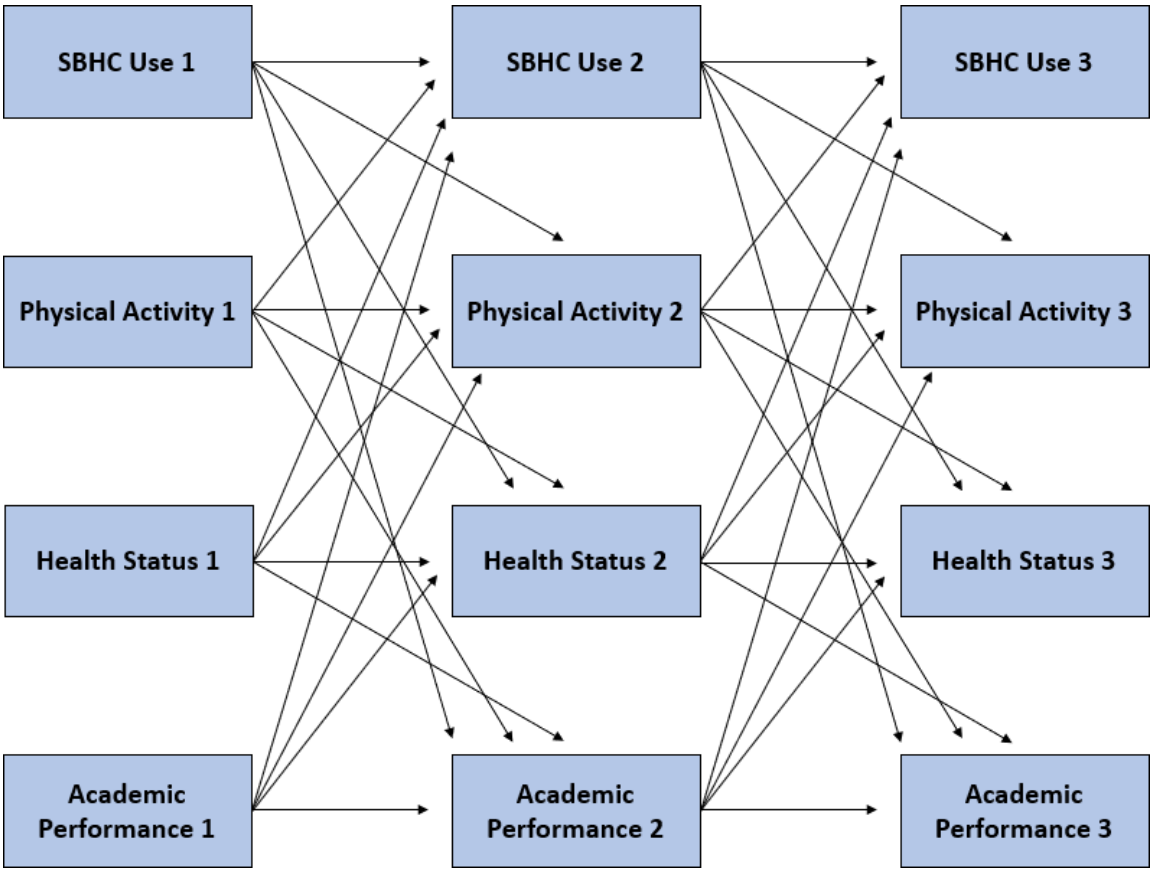
Analysis

Structural equation modeling (SEM) with panel data was used to test the extent to which SBHC use has a direct effect on academic performance, as well as the indirect effects of health satisfaction and physical activity on academic performance. Panel data are longitudinal data that collect information from the same individuals over time (Hsiao, 2014). A specific type of SEM, path analysis, was employed as all variables in the present study are directly observed. Path analysis examines an overall model of hypothesized relationships allowing for multiple IVs and DVs (Stage, Carter, & Nora, 2004), and thus is an ideal approach to answer the proposed research question. All SEM analyses were run in Mplus Version 8.

The hypothesized model, which examines the outcomes within individuals over time, is displayed in Figure 2. Annual SBHC use, physical activity, health status, and academic performance at Wave 1 are exogenous variables that were hypothesized to predict, directly and indirectly, all endogenous outcome variables. Here, the outcome variables are student annual SBHC use and student scores of physical activity, health status, and academic performance at Waves 2 and 3.

Figure 2.

Hypothesized Path Analysis Model.



Note. Residuals and correlations between variables are expected but not included for clarity.

Procedures

First, an autoregressive analysis was run to test stability over time for all outcome variables at Waves 1, 2, and 3. Next, the hypothesized model was estimated, and model fit was assessed on a variety of indices described below. Nested models were compared on indices of model fit to determine which best fit the data. Pathways were then examined for the best fitting model with modifications as needed. Finally, significant covariates were added to the model.

Autoregressive analysis. Two autoregressive models were run for each outcome variable, with Wave 1 scores predicting Wave 2 scores, and Wave 2 scores predicting Wave 3 scores. An unconstrained model, where all regression coefficients in the model are free to vary,

was tested for model fit. A constrained model, where all regression coefficients are constrained to equivalent values, was also tested for model fit. Both models were then compared, and the model that best fit the data was used in the larger hypothetical model. If the unconstrained model fit the data better, this might be an indication of instability between time points and suggests that the outcome varied within individuals over time (Selig & Little, 2012).

Hypothesized model. Once the autoregressive models were examined, the hypothesized model was fit to the data by adding pathways between outcomes. The model with fewer parameters is considered "nested" within the larger model because the two models use the same set of variables and cases (Ullman & Bentler, 2012). Thus, as pathways were added, the nested models were compared and only parameters that improved model fit were retained in the final model. Coefficients were calculated for each pathway indicated by the arrows in Figure 2 above. Modification Indices (MIs) were employed if they were sensical and theoretically feasible, as well as resulted in a change in the overall model X^2 greater than 10. Finally, several covariates were considered in the final model: SES, age, race and ethnicity, gender, and parental education. These variables all served as controls in the regression parameter estimations.

Model Fit

Using multiple indices of model fit is best practice in SEM to examine how the hypothesized model fits the data (Tabachnick & Fidell, 2018). For the present study, four common indices were used: Chi-Square (X^2), Comparative Fit Index (CFI), Root Mean Square Error of Approximation (RMSEA), and Standardized Root Mean Square Residual (SRMR).

***X*².** Chi-Square tests were conducted to determine whether the estimated covariance matrix statistically significantly differs from the sample covariance matrix. If this test is statistically significant at $p < .05$, it is an indicator of poor model fit because it means the

estimated values are not comparable to the observed values (Hu & Bentler, 1999; Mulaik et al., 1989). However, X^2 is extremely sensitive to sample size. A large sample might produce a statistically significant result due to the high power of the test; due to this limitation, the X^2 index was used in conjunction with other indices of model fit (Fan, Thompson, & Wang, 1999; Ullman & Bentler, 2012).

CFI. Comparative Fit Index values were calculated, where the hypothesized model was compared to an independent model with unrelated variables. CFI values can range from 0 to 1, with higher values signifying better model fit. Good model fit is indicated by a CFI > .95, fair model fit by a CFI > .90, and poor model fit by a CFI < .90 (Bentler, 1990; Hu & Bentler, 1999).

RMSEA. Root Mean Square Error of Approximation tests were conducted, where the lack of fit for the hypothesized model is calculated by its differences from a perfect (saturated) model. Higher values signify more differences from the saturated model, and thus worse model fit. RMSEA values range from 0 to 1, with RMSEA < .05 indicating good model fit, RMSEA <.08 indicating fair model fit, and RMSEA > .10 indicating poor model fit (Hu & Bentler, 1999; Steiger, 1998).

SRMR. Standardized Root Mean Square Residual tests were conducted, where the residuals between the estimated and sample variances and covariances are calculated. SRMR values also range from 0 to 1, with lower values signifying smaller residuals and thus better model fit. Good model fit will be indicated by a SRMR < .05, and fair model fit by a SRMR < .08 (Hu & Bentler, 1999).

Model Comparison

Nested models were compared on several fit indices to determine which model best fit the data. The model with lower RMSEA and SRMR values and a higher CFI value was determined to have better model fit. In addition, a X^2 test was used to compare the two models.

X^2 LRT. A Chi-Square Likelihood Ratio Test assesses the difference between X^2 values of two nested models. For this test, the X^2 LRT values that were previously calculated to assess model fit for the unconstrained and constrained models were compared. A statistically significant X^2 LRT, signified by $p < .05$, indicates that the two models differ. Because X^2 tests are sensitive to sample size, multiple indices of model comparison were used (Fan, Thompson, & Wang, 1999; Ullman & Bentler, 2012).

Data Preparation and Management

The MESH dataset is stored in SPSS, which was used to run descriptive analyses. SBHC use was stored in separate Excel files for each wave. These three files were merged with the dataset in SPSS, matching participants by their MESH ID. Data preparation was an iterative process, and multiple challenges had to be addressed prior to conducting SEM analyses.

Outliers. Univariate outliers were examined by computing z-scores for each continuous variable and using the standard critical value of 3.29 (Tabachnick & Fidell, 2018). No univariate outliers were detected for SES, health status, physical activity, or academic performance across all waves. However, multiple univariate outliers were identified at Wave 1 (n = 12), Wave 2 (n = 7), and Wave 3 (n = 4) for SBHC use. Multivariate outliers were also examined using the Mahalanobis distance test statistic. With a critical X^2 value of 32.91 for statistical significance at $p < .001$, five multivariate outliers were identified. Leverage values were calculated, and three influential cases were identified (range = 0.19 to .30). Further examination indicated that the

multivariate outliers and influential cases were individuals who tended to have high SBHC use across all waves. Given that frequent SBHC use is often an indicator of chronic disease management or of poor health, no transformations or case deletions were made.

Missing data. Due to the longitudinal nature of the data, some attrition was anticipated, and rates of missing cases were expected to be higher than cross-sectional designs (Twisk & de Vente, 2002). A preliminary missing value analysis was conducted for all covariates and variables included in the model. SES, race and ethnicity, age, and gender all had fewer than 1% of missing cases from the total sample (N = 413). As seen in Table 3, parental education and Waves 1, 2, and 3 of health status, physical activity, and academic performance had modest rates of missing cases. These values correspond to the survey completion rate, which was 92% at Wave 1 (N = 378), 79% at Wave 2 (N = 326), and 68% (N = 282) at Wave 3.

Table 3.

Missing Cases by Variable.

	n	Number Missing	Percent Missing
Maternal Education	401	12	2.9%
Paternal Education	404	9	2.2%
Wave 1			
SBHC Use	409	4	1.0%
Health Status	376	37	9.0%
Physical Activity	376	37	9.0%
Academic Performance	374	39	9.4%
Wave 2			
SBHC Use	343	70	16.9%
Health Status	326	87	21.1%
Physical Activity	325	88	21.3%
Academic Performance	324	89	21.5%
Wave 3			
SBHC Use	272	141	34.1%
Health Status	282	131	31.7%
Physical Activity	282	131	31.7%
Academic Performance	280	133	32.2%

Note. SES, race and ethnicity, age, and gender all had fewer than 1% of missing cases.

Missing cases were further examined to determine the type of missingness present in the data (i.e., missing completely at random, missing at random, or not missing at random). Dummy coding results indicated that there were a few statistically significant differences between cases with and without missing values. However, for the variables that had mean differences between cases with missing values and cases without, either the two groups were vastly different in sample size (e.g., differences of 300 or more), or the mean difference was extremely small (d = .01, d = .12). Furthermore, Little's MCAR test was not statistically significant, supporting that the data were missing completely at random. Thus, Full Information Maximum Likelihood (FIML) estimation in Mplus was used to estimate missing values. FIML is an estimation method that uses all values in the dataset to estimate missing data; it retains meaningful information that might be lost with listwise deletion (Enders & Bandalos, 2001; Muthén, Kaplan, & Hollis, 1987).

Non-independence of observations. Because the students came from different schools, a multilevel analysis was run on academic performance to determine whether a multilevel model would be necessary to account for nesting effects. Students within a school may be more likely to have similar experiences and exposure to programming, and academic performance could systematically vary between schools due to factors outside of SBHC use. As seen in Table 4, the estimates for the intercept random effects were not statistically significant at Waves 1, 2, or 3. In other words, the schools did not statistically significantly vary in their academic performance at any of the time points and there was no evidence of school-level effects.

Table 4.

Multilevel Analysis of Academic Performance.

Academic Performance	Grand Mean	*SE*	Intercept	*p value*
Wave 1	2.75	.04	.003	.56
Wave 2	2.65	.05	.010	.30
Wave 3	2.63	.05	.004	.55

RESULTS

The first step was to conduct autoregressive analyses to test for stability over time. Log Likelihood (LL) values were estimated for constrained and unconstrained pathway models for each of the outcome variables. If the X^2 LRT test was statistically significant, it indicated that the model with additional parameters (unconstrained) was a better fit. As seen in Table 5, model fit was better for the unconstrained pathway models for SBHC use and health status, suggesting that these outcomes varied within individuals over the three waves of the study (Selig & Little, 2012). However, for physical activity and academic performance, model fit was better for the constrained pathway models (see Table 5), indicating that these outcomes were stable within individuals over the three waves (Selig & Little, 2012). These autoregressive models were retained in the larger path analysis model.

Table 5.

Autoregressive Analysis Results.

	Constrained LL	Unconstrained LL	X^2 *LRT*	*p* value
SBHC Use	-2267.42	-2263.8	5.75	.017
Health Status	-607.76	-604.93	6.76	.009
Physical Activity	-617.25	-617.23	0.04	.840
Academic Performance	-363.81	-363.79	0.05	.819

Model fit indices of the larger path analysis model (Figure 2) suggested fair model fit: $X^2(24) = 96.23$, $p < .001$; RMSEA = 0.09; CFI = 0.93; SRMR = 0.04. Modification suggestions were employed if they were sensical, theoretically feasible, and resulted in a change in the overall model X^2 of 10 or more. MIs were entered into the larger model one at a time. Overall model fit was assessed after each recommended path was added. Three paths were added to the overall model based on the MIs to the model: (a) physical activity at Wave 1 as a predictor of physical activity at Wave 3 ($\Delta X^2 = 27.40$), (b) health status at Wave 1 as a predictor of health status at Wave 3 ($\Delta X^2 = 19.03$), and (c) academic performance at Wave 1 as a predictor of

academic performance at Wave 3 ($\Delta X^2 = 15.31$). The inclusion of the paths suggested by the modification indices improved overall model fit: $X^2(15) = 34.49$, $p = .003$; $X^2\ LRT = 56.60$, $p < .001$; RMSEA = 0.06; CFI = 0.98; SRMR = 0.03.

Finally, covariates were considered in the larger path analysis model. Student SES, age, race and ethnicity, gender, and parental education were all set to predict each outcome variable in the model. Only two covariates emerged as statistically significant. Gender predicted health status at Wave 2, academic performance at Wave 2, SBHC use at Wave 3, and physical activity at Waves 2 and 3. Maternal education predicted SBHC use at Waves 2 and 3. These pathways were included in the final model, with model fit indices suggesting model fit improved slightly: $X^2(24) = 40.26$, $p = .020$; $X^2\ LRT = 2563.31$, $p < .001$; RMSEA = 0.04; CFI = 0.99; SRMR = 0.03.

Final Model

The final model with unstandardized pathway coefficients is displayed in Figure 3, and both standardized and unstandardized results are reported in Appendix C. The initial hypotheses in the present study were not supported. SBHC use was not associated with academic performance over time. Academic performance at Wave 2 was predicted by academic performance at Wave 1, and academic performance at Wave 3 was predicted by academic performance at Waves 1 and 2. The only statistically significant predictors of SBHC use were previous SBHC use (Figure 3) and maternal education. Higher maternal education predicted higher SBHC use at Wave 2 (B = 0.56, $p = .020$; $\beta = 0.12$, $p = .025$) and lower SBHC use at Wave 3 (B = -0.85, $p = .010$; $\beta = -0.13$, $p = .004$). Gender also predicted academic performance at Wave 2, such that being female was associated with higher academic performance (B = 0.21, $p = .001$; $\beta = 0.15$, $p = .001$).

SBHC use also did not predict student health status or physical activity. For health status at Wave 2, the statistically significant predictors were health status at Wave 1 (Figure 3), gender, and physical activity at Wave 1, respectively. Gender predicted health at Wave 2, such that being female was associated with worse health (B = -0.19, p = .034; β = -0.11, p = .032). For health status at Wave 3, the statistically significant predictors were health status at Waves 1 and 2 (Figure 3). Physical activity at Wave 2 was predicted by physical activity at Wave 1 (Figure 3), gender, and academic performance at Wave 1 (Figure 3), respectively. Physical activity at Wave 3 was predicted by physical activity at Waves 1 and 2 (Figure 3), as well as gender. Gender predicted physical activity such that being female was associated with less physical activity at Wave 2 (B = -0.27, p = .001; β = -0.14, p = .001) and Wave 3 (B= -0.24, p = .007; β = -0.11, p = .007).

There were also associations between the outcome variables within waves, such that health status, physical activity, and academic performance were statistically significantly correlated with each other across all waves (r = 0.15 to r = 0.30), with the exception of health status and academic performance at Wave 2 (Table 6). SBHC use was not correlated with the outcomes within any of the waves of the study.

Table 6.

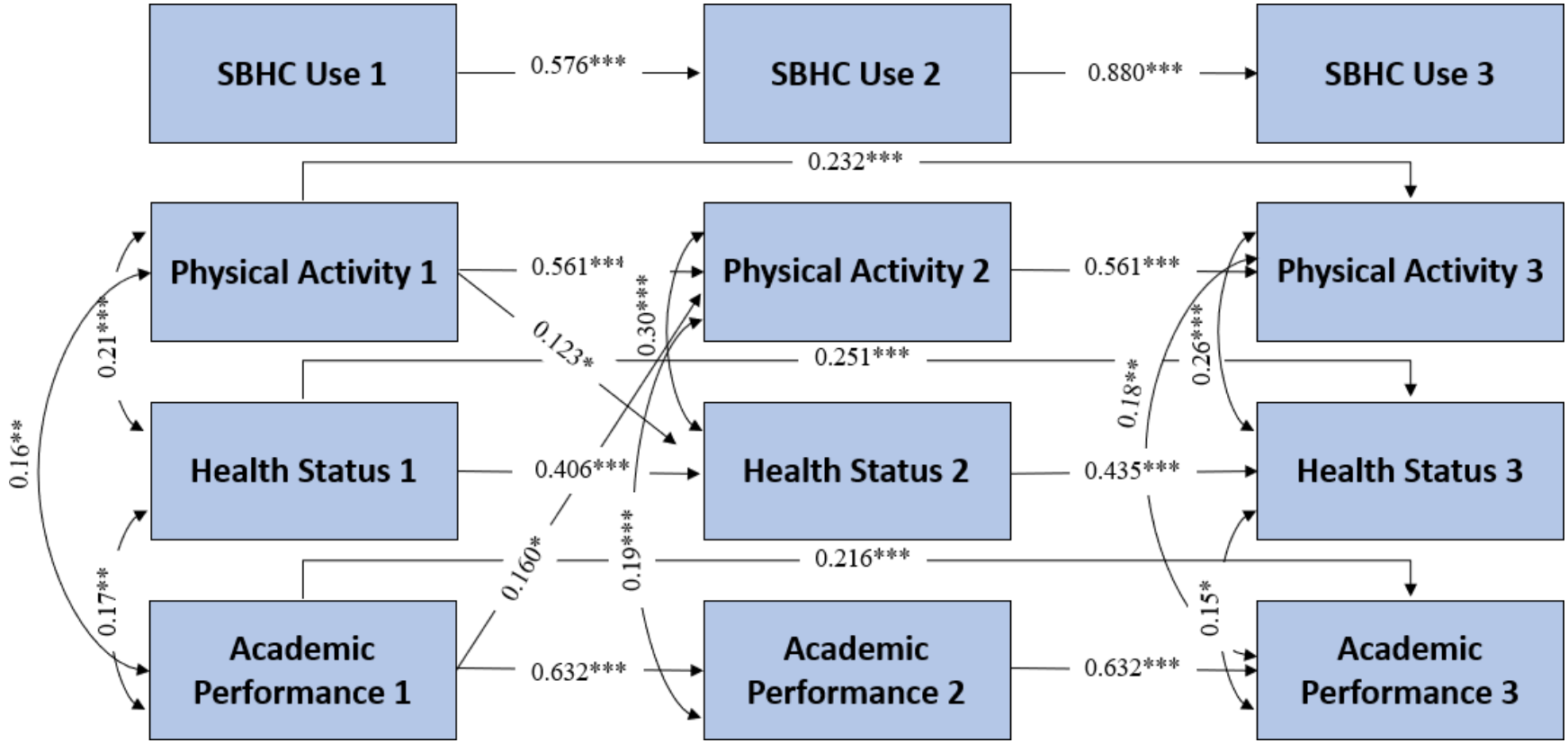
Correlations Between Outcomes by Wave.

	SBHC Use	Health Status	Physical Activity
Wave 1			
Health Status	-0.01		
Physical Activity	0.04	0.21***	
Academic Performance	-0.07	0.17**	0.16**
Wave 2			
Health Status	-0.01		
Physical Activity	0.12	0.30***	
Academic Performance	-0.02	0.07	0.19***
Wave 3			
Health Status	-0.05		
Physical Activity	0.04	0.26***	
Academic Performance	0.04	0.15*	0.18**

*$p < .05$, **$p < .01$, ***$p < .001$.

Figure 3.

Final Path Analysis Model with Unstandardized Pathways.



Notes: Covariate pathways are reported separately for clarity. *$p < .05$, **$p < .01$, ***$p < .001$. $X^2(24) = 40.26$, $p = 0.02$; RMSEA = 0.04; CFI = 0.99; SRMR = 0.03.

DISCUSSION

This study examined the relationships between SBHC use, physical activity, health status, and academic performance of high school students over time. Three hypotheses were originally posed: (a) SBHC use will be positively associated with academic performance over time, (b) SBHC use will be positively associated with physical activity and health status over time, and (c) the relationship between SBHC use and academic performance will be partially explained by increased physical activity and increased health status over time. The results of the final path analysis model did not support any of the initial hypotheses; SBHC use was not associated with the outcomes of interest. These findings contradict the body of evidence that suggests SBHC use improves student health outcomes (Guo, Wade, & Keller, 2008; McNall, Lichty, & Mavis, 2010; Soleimanpour, Geierstanger, Kaller, McCarter, & Brindis, 2010; Wade, Mansour, Line, Huentelman, & Keller, 2008) and echo the inconsistent literature on SBHCs' ability to impact student academic performance (Bersamin, Garbers, Gaarde, & Santelli, 2016; Geierstanger, Amaral, Mansour, & Walters, 2004). In the following sections the null, cross-sectional, and longitudinal results of the present study are described and interpreted in further detail.

Null Findings

There are several factors that may contribute to the null findings in the present study: (a) the measurement approach; (b) intermediary mechanisms; and (c) the directionality of the relationship between academic outcomes and health status.

Measurement. Few studies that focus on SBHCs and student health examine self-rated, general health status. Most of the literature is focused on specific health outcomes, such as asthma-related hospitalizations (Guo et al., 2005; Lurie, Bauer, & Brady, 2001; Webber et al., 2003) or use of contraceptives (Ethier et al., 2011; Minguez, Santelli, Gibson, Orr, & Samant,

2015; Lovenheim, Reback, & Wedenoja, 2014). SBHCs might in fact impact certain domains of student health that are directly linked to health care. For example, students having access to family planning services or contraceptives at their SBHC is associated with reproductive health outcomes such as increased use of birth control and lower teen birth rates (Lovenheim, Reback, & Wedenoja, 2014; Soleimanpour, Geierstanger, Kaller, McCarter, & Brindis, 2010). However, SBHC impact on more complex or broad self-conceptualizations of health might be harder to understand.

While it was surprising that SBHC use did not predict any student outcomes, the unclear relationship between SBHC utilization and academic performance has been documented elsewhere (Bersamin, Garbers, Gaarde, & Santelli, 2016; Geierstanger, Amaral, Mansour, & Walters, 2004). There is limited consensus in SBHC literature on the operationalization of academic performance, with different studies employing different measures, such as GPA, attendance, graduation rates, etc. In the present study, academic performance was measured with a scale where students rated their general academic performance and self-reported specific school successes and failures. These self-reported measures might have been insufficient, considering there is evidence of improvement associated with SBHC use when academic outcomes are measured objectively, e.g., GPA (Knopf et al., 2016; Walker, Kerns, Lyon, Bruns, & Cosgrove, 2010) and high school dropout rates (Knopf et al., 2016; Kerns et al., 2011; McCord, Klein, Foy, & Fothergill, 1993).

Intermediary mechanisms. Given the unclear relationship between SBHCs and academic outcomes, it seems important to better understand the intermediary mechanisms by which SBHC utilization could affect student academic performance. For example, SBHCs have been demonstrated to positively impact attendance rates (Gall, Pagano, Desmond, Perrin, &

Murphy, 2000; McCord, Klein, Foy, & Fothergill, 1993; Van Cura, 2010; Walker, Kerns, Lyon, Bruns, & Cosgrove, 2010). In one study, Webber and colleagues (2003) examined children with asthma in schools with and without SBHCs and found that access to SBHCs was associated with a gain of 3 school days. Attendance can be difficult for students dealing with chronic health issues (Forrest, Bevans, Riley, Crespo, & Louis, 2013), particularly ones that require regular maintenance such as asthma (Taras & Potts-Datema, 2005), and when these students lose days in school it can lead to worse academic performance (Moonie, Sterling, Figgs, & Castro, 2008). Thus, one potential pathway to improving student academic performance is providing specific health services that support students' ability to attend school.

Directionality of the relationship. By way of increasing attendance, improvements in academic performance might only be seen in students that would otherwise miss school, or that have specific health needs that can be addressed by their SBHC. An additional perspective warrants consideration; frequent access to care may actually be an indication that academic intervention is necessary, rather than an agent of change. For example, Homlong, Rosvold, and Haavet (2013) found that the number of visits to school health clinics and community health centers by adolescents was positively associated with dropping out of high school. If students are suffering from poor health conditions that could lead to school-related difficulties, SBHCs might be an opportunity to connect them to academic resources instead of operating as isolated interventions.

Cross-Sectional Relationships

Despite SBHC use not being associated with student outcomes, several other important relationships emerged. Student health status, physical activity, and academic performance were all positively related to each other within study waves, with the exception of health status and

academic performance at Wave 2. This supports the notion that healthy students learn better (Deberard, Spielmans, & Julka, 2004; De Ridder et al., 2013; Lynch & von Hippel, 2016; Minkkinen et al., 2017; Needham, Crosnoe, & Muller, 2004; Sznitman, Reisel, & Khurana, 2017). Additionally, it emphasizes the importance of improving student academic outcomes by way of improving student health and well-being, such as through enhanced cognition or being healthy enough to attend school (Basch, 2011; Shaw, Gomes, Polotskaia, & Jankowska, 2015).

Longitudinal Relationships

There was also evidence of several longitudinal relationships in the present study. Physical activity at Wave 1 predicted health status at Wave 2, converging with prior findings that adolescent physical activity is positively associated with various health-related domains, such as self-rated health, bone health, mental health, physical fitness, and a reduced likelihood of obesity (Biddle & Asare, 2011; Biddle, Gorely, & Stensel, 2004; Hallal, Victora, Azevedo, & Wells, 2006; Herman, Hopman, & Sabiston, 2015; Sallis, Prochaska, & Taylor, 2000; Strong et al., 2005). Interestingly, academic performance at Wave 1 predicted physical activity at Wave 2. This relationship was originally conjectured inversely, such that physical activity might affect academic outcomes through its influence on cognition and health. While studies show cross-sectional relationships between these constructs (Bezold et al., 2014; Chomitz et al., 2008; Dwyer, Sallis, Blizzard, Lazarus, & Dean, 2001; Esteban-Cornejo et al., 2014; Kristjánsson, Sigfúsdóttir, & Allegrante, 2010; Torrijos-Nino et al., 2014), they do not suggest adolescent academic performance predicts physical activity levels. Nonetheless, the state of research on the connection between physical activity and academic performance remains unclear (Daley & Ryan, 2000; Donnelly et al., 2016; Hattie & Clinton, 2012; So, 2012; Taras, 2005).

Several of the covariates emerged as predictors of student outcomes. Maternal education predicted SBHC use at both waves, however, in different directions. Higher maternal education predicted higher SBHC use at Wave 2 and lower SBHC use at Wave 3. Maternal education might be negatively associated with SBHC use due to its clear link to poverty level and family income (Braveman, Cubbin, Marchi, Egerter, & Chavez, 2001; De Civita, Pagani, Vitaro, & Tremblay, 2004). Yet, other studies have found that higher maternal education is associated with increased healthcare utilization (Britto, Klostermann, Bonny, Altum, & Hornung, 2001). Maternal education was included as a covariate to account for the intergenerational effects of educational attainment (Engzell, 2016; Howe, Lawlor, & Propper, 2013), but these conflicting findings indicate it might have important implications for adolescent healthcare utilization.

Interestingly, student racial and ethnic identity and SES were not associated with health, physical activity, or academic performance, which was anticipated based off prior research (e.g., Brodersen, Steptoe, Boniface, & Wardle, 2007; Burchinal et al., 2011; Price, Khubchandani, McKinney, & Braun, 2013; Sirin, 2005; Uijtdewilligen et al., 2011). Gender was the only covariate that emerged as a predictor for these student outcomes. Gender predicted health at Wave 2, such that being female was associated with worse health. This relationship is congruent with other findings that being female is a predictor of poor physical and mental health amongst adolescents (Jerdén, Burell, Stenlund, Weinehall, & Bergstrom, 2011; Vingilis, Wade, & Seeley, 2002), and tends to be one of the most important predictors, even when factors such as race and SES are considered (Swallen, Reither, Haas, & Meier, 2005). Consistent with prior literature that female high school students tend to outperform male students in various academic domains such as class performance, GPA, and high school completion (Ghazvini, & Khajehpour, 2011; Pomerantz, Altermatt, & Saxon, 2002; Saunders, Davis, Williams, & Herbert Williams, 2004),

being female predicted better academic performance at Wave 2. Gender also predicted physical activity, such that being female was associated with less physical activity at Waves 2 and 3, which builds on prior research findings that being male is positively associated with physical activity for children and adolescents (Sallis, Prochaska, & Taylor, 2000).

Limitations

There are several limitations to note in this study. As discussed in the prior section, the measures of academic performance, health status, and physical activity were self-reported by the students. While there is evidence that subjective measures of health are accurate (Andresen, Catlin, Wyrwich, & Jackson-Thompson, 2003), additional objective measures of health and health behaviors would increase the validity of the findings. Furthermore, only one item was used to assess student health status, which asked about students' health in general; this might be insufficient to capture such a multifaceted, complex concept. In fact, in the original MESH study, McNall, Lichty, Mavis, and Bates (2010) found a cross-sectional relationship between SBHC use and health when student health was measured by indicators of physical discomfort, and a longitudinal relationship between SBHC use and health satisfaction.

In addition, SBHC use varied widely across students, with some students never using their SBHC throughout the three waves of the study, and one student using it up to 115 times during one study wave. One of the justifications for maintaining outliers of frequent SBHC use was that it could be an indication of disease maintenance. However, students use SBHCs for a variety of reasons, which were not captured in this study, including sports physicals, asthma maintenance, illness, and more. Different reasons for SBHC utilization might result in different relationships with student outcomes. Furthermore, one might expect a student who frequently uses their SBHC to have poor health, making it important to understand these relationships over

time. While autoregressive models were employed to account for student outcomes varying between students over time, they do not capture the change that occurs within students over time (Selig & Little, 2012). Because of this, the various reasons and number of times students visited their SBHCs limits the ability to interpret the relationship.

Another limitation is that SBHC services and programming likely differ school-to-school. While all the schools were in the state of Michigan and follow the same state-level policies, there is still expected variation between how each center operates within individual schools. Differences in the physical environment, school staff involvement, or quality of healthcare might impact SBHC operations. Moreover, because the evaluation was conducted in Michigan, the findings of the study cannot be generalized to other areas of the country. State level education policies dictate what services SBHCs can offer, as well as the amount of funding allocated by the state (Lofink Love et al., 2015).

Implications and Future Directions

Despite limitations, the present study's findings have important implications for SBHC research, practice, and policy.

Research. The association between SBHC use and various aspects of student health and health behaviors has been documented in previous work (Friedrich, 1999; Guo, Wade, & Keller, 2008; McNall, Lichty, & Mavis, 2010; Wade, Mansour, Line, Huentelman, & Keller, 2008; Soleimanpour, Geierstanger, Kaller, McCarter, & Brindis, 2010). However, in the present study these relationships were not supported; SBHC use was not associated with student health outcomes. Few studies to date assess how frequently students use their SBHCs. Additional research is warranted that looks at the relationship between SBHC use frequency and student outcomes.

The present study addressed several gaps in the current state of SBHC research. It examined the relationship between SBHCs and academic outcomes, which is currently lacking in the literature (Geierstanger, Amaral, Mansour, & Walters, 2004; Walker, Kerns, Lyon, Bruns, & Cosgrove, 2010). The present study also examined the association between physical activity and academic outcomes, which has conflicting evidence and is often done with cross-sectional designs (Daley & Ryan, 2000; Taras, 2005; Trudeau & Shephard, 2010), and results indicated that academic performance at Wave 1 predicted physical activity levels at Wave 2. While the findings did not further elucidate these relationships, future research on school-based health should consider the longitudinal relationships between SBHCs, student health, physical activity, and academic outcomes.

In general, it might be that increasing student access to healthcare is not sufficient to shift academic-related outcomes. In Lovenheim, Reback, and Wedenoja's (2014) study of SBHCs, teen birth rates, and high school dropout rates, they found that SBHCs offering on-site contraceptives were linked to reduced teen fertility rates, but not dropouts. The authors, however, argue that "This is not to suggest that providing such services does not improve these students' lives, but it does suggest that any positive health benefits of this care access does not translate to much more educational investment." (pp. 29). The unclear relationship between SBHCs and student outcomes does not make them any less important or impactful for youth, nonetheless, does merit additional study. Future directions might include the examination of intermediary mechanisms of change for SBHCS, such as increasing access to disease management services leading to fewer absences and subsequent improved academic performance. Once these intermediary mechanisms are better understood, an investigation into SBHC impact on a broader scope of student outcomes is warranted.

Additionally, there are opportunities for smaller-scale qualitative studies of SBHC influence on academic outcomes. Qualitative interviewing might elucidate how a student's level of physical activity or health status contribute to their academic performance. Moreover, in order to understand how SBHC health programming and outreach impacts student health and physical activity, it would be beneficial to examine how these mechanisms occur with qualitative interviewing. Qualitative methods can also clarify why students access certain services, and what might increase SBHC utilization.

Practice. Better understanding how SBHCs impact student outcomes could help practitioners identify facets of SBHC care that are particularly salient to the health center or the school's goals. For instance, if physical activity plays an important role in student academic performance, SBHC practitioners should consider implementing additional health education programming about physical fitness. The results of the present study suggest that the relationship between SBHCs and student outcomes is unclear, and perhaps SBHCs are not impacting health status, physical activity, and academic performance, as measured here. However, there were clear relationships within time points between these outcomes. It is important that both SBHC practitioners and school staff and administrators recognize the relationship between student health and health behaviors and academic outcomes, which might in turn increase their collaborations. Through increased collaborations, rather than understanding SBHCs as an isolated entity, they might become a mechanism to target students who frequently access health services and need other supports, such as academic intervention.

It is also important for practitioners and schools to understand that access to healthcare only accounts for a small portion of student health and health behaviors. For example, physical activity is constrained by geographic locale, such that living in a neighborhood without fitness or

recreation centers is associated with lower levels of physical activity (Gordon-Larsen, Nelson, Page, & Popkin, 2006). If students live in areas with limited access to safe places to exercise, utilizing their SBHC would not change their ability to exercise, although it might increase their motivation. Furthermore, new research on Medicaid suggests that increased insurance coverage and access to care has a minimal effect on a person's health status (Miller & Wherry, 2017). This is not to say that access to healthcare is not important, in fact, it is a basic human right. However, in order to comprehensively address health, it is also important for SBHCs to collaborate with their communities to work towards shifting local conditions and creating a healthy environment in which youth can thrive.

Policy. Historically, SBHCs have been implemented as an isolated, top-down intervention rather than working with the community to respond to local needs. Silberberg and Cantor (2008) critique the SBHC model, in that they are continuously being implemented despite the limited evidence base on their efficacy and impact. Their primary critique is that different communities have different needs, and broadly funding programs that offer similar services in diverse communities might not be an effective model. The authors posit that SBHCs need to be designed and funded in a way that reflects the local conditions of the community and are responsive to community needs and resource gaps. SBHCs are normally state-funded or funded through private organizations, and this amount varies greatly depending on state budgets and policies (Lofink Love et al., 2015). Supplementing these funds with grant or foundation monies might offer the flexibility SBHCs need to adapt to their community's local conditions.

On the other hand, if future research can show SBHCs improve academic performance, there is an argument to be made that they should also receive federal funding. The federal government sets education standards for public schools in the U.S. (Jennings & Rentner, 2006)

and has allocated money to improving these standards, especially for those at a disadvantage. As there is increasing evidence of SBHCs' ability to promote equity for disadvantaged students (Knopf et al., 2016), it is imperative that the federal government recognizes the important role school-based health plays in both academic and life outcomes for students.

Conclusion

This study employed a conceptual framework that posits SBHCs should indirectly improve student academic performance through increases in general health status and levels of physical activity (Geierstanger, Amaral, Mansour, & Walters, 2004). These relationships were examined using longitudinal structural equation modeling with data from the MESH Study (McNall, Lichty, Mavis, & Bates, 2010). Findings indicated that student SBHC use was not associated with self-reported health status, physical activity, or academic performance. While this study addressed gaps in SBHC literature, such as the lack of longitudinal methods, additional research is needed to better understand these relationships.

APPENDICES

MICHIGAN STATE
UNIVERSITY

DETERMINED NOT "HUMAN SUBJECTS"

July 31, 2018

To: Jennifer Ann Gruber

Re: **MSU Study ID:** STUDY00001216
Principal Investigator: Jennifer Ann Gruber
Determination Date: 7/31/2018

Title: The Longitudinal Impact of School-Based Health Centers on Academic Achievement, School Connectedness, and Health

The activity described in this submission was determined not to meet the definition of "human subjects" as defined by the U.S. Department of Health and Human Services (DHHS) regulations for the protection of human research subjects.

Definition of Human Subject

For DHHS, "human subject" means "a living individual about whom an investigator (whether professional or student) conducting research obtains: (1) Data through intervention or interaction with the individual, or (2) Identifiable private information." [45 CFR 46.102(f)].

Office of Regulatory Affairs Human Research Protection Program

4000 Collins Road
Suite 136
Lansing, MI
48910

517-355-2180
Fax: 517-432-4503
Email: irb@msu.edu
www.hrpp.msu.edu

Determination

Study uses Michigan Evaluation of School-Based Health (McNall, Lichty, Mavis, & Bates, 2010); a de-identified dataset for secondary data analysis. There will be no interaction with subjects.

Hence, the activity does not involve human subjects.

Therefore, the federal regulations for the protection of human subjects would not apply to this project and Michigan State University (MSU) IRB approval is not needed to proceed. However, please note that while MSU IRB approval is not required, other federal, state, or local regulations or requirements or ethical or professional standards may still be applicable based on the activity.

Modifications: If any of the activities described in this submission change, please contact the IRB office as the activity may involve human subject research and require IRB approval. For example, this determination is not applicable to activities that may be regulated by U.S. Food & Drug Administration (FDA), such as those involving drugs, medical devices, human food additives, color additives, electronic products, or any other test articles regulated by the FDA.

Modifications to Project Funding: Changes in project funding may alter this determination. For example, MSU IRB review and approval is required if MSU receives an award through a grant, contract, or cooperative agreement directly from a federal agency, even where all non- exempt research involving human subjects are carried out by employees or agents of another institution.

For More Information: See HRPP Manual Section 4-3, Determination of Human Subject Research (available at https://hrpp.msu.edu/msu-hrpp-manual-table- contents-expanded).

Contact Information: If we can be of further assistance or if you have questions, please contact us at 517-355-2180 or via email at IRB@ora.msu.edu. Please visit hrpp.msu.edu to access the HRPP Manual, templates, etc.

TEEN HEALTH PROFILE

CHIP-AE^{tm}

INSTRUCTIONS *Please read this page!*

Thank you for agreeing to complete our health survey. Please read these instructions carefully before answering the questions in the survey. Wherever you see this symbol, it means that important instructions follow which you must read before answering the next question(s). If you see, an arrow, -, it means that if you checked that box, you should answer the question that follows. Given below are some examples of the different ways you will answer the questions.

For some questions, you will put a **CHECK MARK IN THE BOX (✓)** that goes with your answer, like this:

EXAMPLE 1:

In the **PAST 4 WEEKS**, on how many days. . .

	No days	**1 to 3 days**	**4 to 6 days**	**7 to 14 days**	**15 to 28 days**
1. Did you feel really sick?	☐	☐	☑	☐	☐

EXAMPLE 2:

2. Is English the language you speak at home most of the time?

☐ No

✓☐ Yes

For some questions, you will **WRITE A NUMBER ON THE ANSWER LINE**, like this:
EXAMPLE 3:

3. How many days did you exercise in the **PAST MONTH**?

Number of days: 9

Go to next page and begin

SECTION A

For each statement below, write in the answer or check the box that applies.

1. What is today's date?

   _____ /_____/_____
   Month Day Year

2. How old are you?

   Age: _____

3. What is the month, day, and year you were born?

   _____ /_____/_____
   Month Day Year

4. What is your sex?

   ☐Male

   ☐Female

5. Which of these best describes you?

   ☐White, not Hispanic

   ☐Black/African American, not Hispanic

   ☐Hispanic/Latino

   ☐American Indian or Alaskan

   ☐Asian or Pacific Islander

   ☐Other - Please describe: _____

6. Is English the language you speak at home most of the time?

☐No

☐Yes

7. Circle the number of the school grade you are in now:

5 6 7 8 9 10 11 12 Not in School

8. How many people are living in your home?
Please count yourself

Number of people: _____

9. Who are all the people living in your home?
Check the box next to each person who lives in your home

☐Mother

☐Father

☐Grandmother

☐Grandfather

☐Stepmother

☐Stepfather

☐Foster parents

☐Brothers

☐Sisters

☐Other relatives

☐Other people not related to you

10. What is the highest grade in school that your mother (or female guardian) finished?

☐She did not finish high school

☐She got a high school diploma or GED

☐She had some college

☐She finished college

☐She finished graduate school, law school, or medical school

☐Don't know

11. Is your mother (or female guardian) now . . .
Check all boxes that apply.

☐Working full-time

☐Working part-time

☐Not working and looking for work

☐Disabled and not working

☐Not working and not looking for work

☐Retired

☐Full-time student

☐Part-time student

☐Don't know

12. What is the highest grade in school that your father (or male guardian) finished?

☐He did not finish high school

☐He got a high school diploma or GED

☐He had some college

☐He finished college

☐He finished graduate school, law school, or medical school

☐Don't know

13. Is your father (or male guardian) now . . .

Check all boxes that apply.

☐Working full-time

☐Working part-time

☐Not working and looking for work

☐Disabled and not working

☐Not working and not looking for work

☐Retired

☐Full-time student

☐Part-time student

☐Don't know

14. Does your family get a welfare check?

☐No

☐Yes

☐Don't know

15. Does your family get food stamps?

☐No

☐Yes

☐Don't know

16. Do you or any of your brothers or sisters get free or reduced cost school lunches?

☐No

☐Yes

☐Don't know

Section B

For statements 1 to 11, check the box below the line to show if you **completely agree**, **mostly agree, agree a little,** or **do not agree** with the statement.

		Completely Agree	Mostly Agree	Agree A Little	Do not Agree
1.	I am full of energy	☐	☐	☐	☐
2.	I resist illness very well	☐	☐	☐	☐
3.	When I get sick, I usually recover	☐	☐	☐	☐
4.	I amwell coordinated	☐	☐	☐	☐
5.	I have a lot of good qualities	☐	☐	☐	☐
6.	I am very physically fit	☐	☐	☐	☐
7.	I have much to be proud about	☐	☐	☐	☐
8.	I like being the way I am	☐	☐	☐	☐
9.	I am satisfied with how I live my life	☐	☐	☐	☐
10.	My muscle strength is really good	☐	☐	☐	☐
11.	I feelsocially accepted	☐	☐	☐	☐

12. How is your health in general?

- ☐ Excellent
- ☐ Very good
- ☐ Good
- ☐ Fair
- ☐ Poor

SECTION C

These questions are about how you have been feeling over the **PAST 4 WEEKS**.

Please check the box to indicate your answer to each question.

In the PAST 4 WEEKS, on how many days. . .

	No days	1 to 3 days	4 to 6 days	7 to 14 days	15 to 28 days
1. Did you feel really sick?	☐	☐	☐	☐	☐
2. Did you wake up feeling tired?	☐	☐	☐	☐	☐
3. Did you tire easily or feel like you had no energy?	☐	☐	☐	☐	☐
4. Did you have watery or itchy eyes?	☐	☐	☐	☐	☐
5. Did you have skin problems, such as itching or pimples?	☐	☐	☐	☐	☐
6. Did you have a cough?	☐	☐	☐	☐	☐
7. Did you have a fever or chills?	☐	☐	☐	☐	☐
8. Were you dizzy?	☐	☐	☐	☐	☐
9. Did you have wheezing or trouble breathing (when you weren't exercising)?	☐	☐	☐	☐	☐
10. Did you have chest pain?	☐	☐	☐	☐	☐
11. Did you have a headache?	☐	☐	☐	☐	☐
12. Did you have aches, pains or soreness in your muscles or joints?	☐	☐	☐	☐	☐
13. Did you have a stomach ache?	☐	☐	☐	☐	☐
14. Did you have pain that really bothered you?	☐	☐	☐	☐	☐

In the PAST 4 WEEKS, on how many days. . .

	No days	1 to 3 days	4 to 6 days	7 to 14 days	15 to 28 days
15. Did you vomit or feel like vomiting?	☐	☐	☐	☐	☐
16. Did you have an usual discharge from your sex organs?	☐	☐	☐	☐	☐
17. Did you have trouble passing your urine (peeing) or have burning when you urinated?	☐	☐	☐	☐	☐
18. Did you have trouble eating or have a poor appetite?	☐	☐	☐	☐	☐
19. Did you have trouble falling asleep or staying asleep?	☐	☐	☐	☐	☐
20. Did you have diarrhea or loose bowel movements?	☐	☐	☐	☐	☐
21. Did you have constipation or hard bowel movements?	☐	☐	☐	☐	☐
22. Did you feel depressed or blue?	☐	☐	☐	☐	☐
23. Did you have trouble relaxing?	☐	☐	☐	☐	☐
24. Were you nervous or uptight?	☐	☐	☐	☐	☐
25. Were you moody?	☐	☐	☐	☐	☐
26. Were you irritable or grouchy?	☐	☐	☐	☐	☐
27. Did you cry a lot?	☐	☐	☐	☐	☐
28. Were you afraid of things?	☐	☐	☐	☐	☐
29. ***FOR GIRLS ONLY:*** did you have menstrual problems?	☐	☐	☐	☐	☐

Thinking about our *good* feelings,
in the PAST 4 WEEKS, on how many days. . .

	No days	1 to 3 days	4 to 6 days	7 to 14 days	15 to 28 days
30. Were you free of pain?	☐	☐	☐	☐	☐
31. Did you wake up feeling refreshed?	☐	☐	☐	☐	☐
32. Did you feel really healthy?	☐	☐	☐	☐	☐
33. Did you feel like you were doing everything just right?	☐	☐	☐	☐	☐
34. Did you feel loved and wanted?	☐	☐	☐	☐	☐

In the PAST 4 WEEKS, on how many days did a *health or emotional problem* cause you to. . .

	No days	1 to 3 days	4 to 6 days	7 to 14 days	15 to 28 days
35. Miss more than a half day of school or work?	☐	☐	☐	☐	☐
36. Stay in bed more than half a day, but not miss school or work?	☐	☐	☐	☐	☐
37. Cut down on other things you usually do, but not miss school or stay in bed?	☐	☐	☐	☐	☐
38. Have trouble walking?	☐	☐	☐	☐	☐
39. Have trouble running?	☐	☐	☐	☐	☐
40. Have trouble bending, lifting, stooping or reaching?	☐	☐	☐	☐	☐
41. Have trouble using your hands or fingers, like writing with a pencil, tying your shoelaces, or buttoning clothing?	☐	☐	☐	☐	☐

42. **In the PAST 4 WEEKS**, have you lost weight without trying?

- ☐ No
- ☐ Yes, 1 to 4 pounds
- ☐ Yes, 5 to 9 pounds
- ☐ Yes, 10 to 14 pounds
- ☐ Yes, more than 15 pounds

In the PAST 12 MONTHS,
how many times did you do the following?

	None	Once or twice	Several times
43. Vomit on purpose to lose weight?	☐	☐	☐
44. Go on an eating binge (you could not stop eating)?	☐	☐	☐

45. Have you **ever** tried to seriously hurt yourself or kill yourself?

- ☐ No, never
- ☐ Yes, more than a year ago
- ☐ Yes, in the past year
- ☐ Yes, in the past 4 weeks
- ☐ Yes, in the past 7 days

SECTION D

1. In the PAST 4 WEEKS, on how many days did you exercise or play sports hard enough to make you breathe hard, make your heart beat fast, or make you sweat for 20 minutes or more?

   ☐ No days

   ☐ 1 to 9 days

   ☐ 10 to 13 days

   ☐ 14 to 20 days

   ☐ 21 or more days

2. In the PAST 4 WEEKS, how many sit-ups did you do the last time you did them?

   ☐ No sit-ups

   ☐ 1-10 sit-ups

   ☐ 11-20 sit-ups

   ☐ 21-50 sit-ups

   ☐ 51 or more sit-ups

3. In the PAST 4 WEEKS, how far did you walk at any one time without resting and without getting tired?

   ☐ I didn't walk at all

   ☐ Less than a quarter of a mile (less than 2 blocks)

   ☐ A quarter mile to one half mile (3 to 6 blocks)

   ☐ One half mile to one mile (6 to 12 blocks)

   ☐ More than one mile (more than 12 blocks)

4. In the PAST 4 WEEKS, what is the longest time you ran without stopping?

   ☐ I didn't run

   ☐ 1 to 10 minutes

   ☐ 11 to 19 minutes

   ☐ 20 to 29 minutes

   ☐ 30 minutes or more

5. In the **PAST 12 MONTHS**, how often did you play on a team that has a coach, otherthan in gym class?

   ☐ Never

   ☐ Once or twice

   ☐ Several times

SECTION E

The questions on the next few pages are about different things you might do.

In the PAST 12 MONTHS,
how many times did you do the following?

	None	Once or twice	Several times
1. Race on a bike, skateboard or in a boat or car for excitement?	☐	☐	☐
2. Do something risky or dangerous on a dare?	☐	☐	☐
3. Break a rule that your parents set just for the thrill of seeing whether you could get away with it?	☐	☐	☐
4. Steal or shoplift?	☐	☐	☐
5. Slip out at night when your parents thought you were asleep?	☐	☐	☐
6. Willingly ride in a car with someone you knew would drive dangerously?	☐	☐	☐

7. In the **PAST 4 WEEKS**, about how many hours did you usually watch TV orvideos on an average **school day**?

☐ None

☐ Less than 1 hour

☐ 1 to 2 hours

☐ 3 to 4 hours

☐ 4 or more hours

When was the last time you did this?

	Never	More than a year ago	In the past year	In the past month	In the past week
8. Rode a bicycle?	☐	☐	☐	☐	☐
9. Wore a helmet when riding a bicycle?	☐	☐	☐	☐	☐
10. Rode a motorbike (motorcycle, minibike or ATV – all terrain vehicle)?	☐	☐	☐	☐	☐
11. Wore a helmet when riding a motorbike?	☐	☐	☐	☐	☐
12. Drove a car?	☐	☐	☐	☐	☐
13. Drank alcohol or used drugs before driving a car or riding a motorbike?	☐	☐	☐	☐	☐
14. Wore a seat belt in a car or truck?	☐	☐	☐	☐	☐
15. Carried a weapon, such as a gun, razor, or big knife, for protection?	☐	☐	☐	☐	☐
16. Belonged to a gang?	☐	☐	☐	☐	☐
17. Smoked cigarettes?	☐	☐	☐	☐	☐
18. Chewed or dipped tobacco, used snuff or clove cigarettes	☐	☐	☐	☐	☐
19. Drank beer, wine or wine coolers?	☐	☐	☐	☐	☐
20. Drank hard liquor or mixed drinks?	☐	☐	☐	☐	☐
21. Had 5 or more drinks in a row (like in one night or at a party)?	☐	☐	☐	☐	☐

When was the last time you did this?

	Never	More than a year ago	In the past year	In the past month	In the past week
22. Used marijuana?	☐	☐	☐	☐	☐
23. Injected steroids to help build your muscles?	☐	☐	☐	☐	☐
24. Used inhalants such as airplane glue or white out?	☐	☐	☐	☐	☐
25. Used any kind of cocaine, ice or crack?	☐	☐	☐	☐	☐
26. Used or injected (shot up) any other type of illegal drug, such as LSD, PCP, mushrooms, speed, downers or heroin?	☐	☐	☐	☐	☐
27. Ran away from home?	☐	☐	☐	☐	☐
28. Threatened to hurt someone?	☐	☐	☐	☐	☐
29. Physically attacked someone?	☐	☐	☐	☐	☐
30. Stole something worth more than $10?	☐	☐	☐	☐	☐
31. Destroyed something belonging to someone else?	☐	☐	☐	☐	☐

How many of your friends would you say do the following:

Check only one box	None	Some	Most	All
32. Smoke cigarettes	☐	☐	☐	☐
33. Drink alcohol	☐	☐	☐	☐
34. Smoke marijuana	☐	☐	☐	☐
35. Use other drugs (cocaine, stimulants, pills)	☐	☐	☐	☐
36. Have sexual intercourse	☐	☐	☐	☐

37. Have you ever had sexual intercourse (made love or gone all the way)?

☐ No *Go to question 38*

☐ Yes *Answer questions A to E*

☐ Don't know *Go to question 38*

A. How old were you when you had sexual intercourse for the first time?

☐ Younger than age 13

☐ Age 13

☐ Age 14

☐ Age 15

☐ Age 16 or older

B. How many people of the **opposite sex** have you had sex with?

☐ No opposite-sex partner

☐ One opposite-sex partner

☐ Two opposite-sex partners

☐ Three opposite-sex partners

☐ Four or more opposite-sex partners

C. How many people of the **same sex** have you had sex with?

☐ No same-sex partner
☐ One same-sex partner
☐ Two same-sex partners
☐ Three same-sex partners
☐ Four or more same-sex partners

D. Which of the following did you or your partner use to prevent pregnancyor sexually transmitted diseases (STDs) or VD the **last time** you had sexualintercourse?

Check all boxes that apply.

☐ Nothing
☐ Birth control pill, Norplant, or Depo Provera
☐ Foam, cream, jelly, or suppository
☐ Diaphragm or sponge
☐ Rubber or condom
☐ Withdrawal or pulling out
☐ Something else

E. Have you ever been pregnant (***GIRLS***) or gotten someone pregnant (***BOYS***)?

☐ No
☐ Yes
☐ Don't know

	No	**Yes**	**Don't Know**
38. Is there a working smoke detector or smoke alarm in your home?	☐	☐	☐
39. Does anyone in your home smoke cigarettes? *Don't count yourself if you smoke*	☐	☐	☐
40. Is there a working fire extinguisher in your home?	☐	☐	☐
41. Are there any guns in your home?	☐	☐	☐

42. In general, is there a certain time of night when you have to be home on **SCHOOL NIGHTS?**

- ☐ Not usually permitted to go out on school nights
- ☐ Have to be in by 8:00 pm
- ☐ Have to be in by 9:00 pm
- ☐ Have to be in by 10:00 pm
- ☐ No particular time

The next questions are about how you would deal with a common problem

IMAGINE:

You have had a big fight with a close friend and you think that he or she did not understand you and would not listen to what you were saying.

For each statement below, decide how Likely you would be to act that way…

	Very Unlikely	**Somewhat Unlikely**	**Somewhat Likely**	**Very Likely**
43. I would talk to others to get advice	☐	☐	☐	☐
44. I would try to see the good that could come out of the situation	☐	☐	☐	☐
45. I would figure out who has to blame for the situation, and blame them (or myself)	☐	☐	☐	☐
46. I would try to solve the problem directly	☐	☐	☐	☐
47. I would talk about how I was feeling to a friend	☐	☐	☐	☐
48. I would try to calm myself down	☐	☐	☐	☐
49. I would keep thinking and wishing this thing had never happened	☐	☐	☐	☐
50. I would turn to my family or other adult to help me feel better	☐	☐	☐	☐
51. I would do something else	☐	☐	☐	☐

In the PAST 4 WEEKS, how often did you eat the following types of foods…

	Rarely or Never	A few days a month	Several days a week	About every day	More than once a day
52. Fruits or vegetables?	☐	☐	☐	☐	☐
53. Meat, chicken or fish that was not fried?	☐	☐	☐	☐	☐
54. 2% or skim milk, or yogurt?	☐	☐	☐	☐	☐
55. Grains and cereals like whole-wheat bread, bran cereals, or beans?	☐	☐	☐	☐	☐
56. Fast foods, such as fried chicken, French fries, onion rings, and hamburgers?	☐	☐	☐	☐	☐
57. Salty foods, such as salted pretzels, chips, or pickles?	☐	☐	☐	☐	☐
58. Sweets such as regular soda, doughnuts, candy bars?	☐	☐	☐	☐	☐

SECTION F

This section is about health problems that you had in the **PAST 12 MONTHS.**

In the PAST 12 MONTHS, how many times did you have…

	None	Once	2 Times	3 Times	4 or More Times
1. A cold or flu?	☐	☐	☐	☐	☐
2. Sinus trouble or sinusitis?	☐	☐	☐	☐	☐
3. A sore throat or tonsillitis?	☐	☐	☐	☐	☐
4. An ear infection?	☐	☐	☐	☐	☐
5. Upset stomach with vomiting or diarrhea or fever?	☐	☐	☐	☐	☐
6. Bronchitis?	☐	☐	☐	☐	☐
7. A skin infection?	☐	☐	☐	☐	☐
8. Pneumonia?	☐	☐	☐	☐	☐
9. A bladder infection or urinary tract infection?	☐	☐	☐	☐	☐
10. Any fungal diseases like athlete's foot or ringwork?	☐	☐	☐	☐	☐
11. Infection mononucleosis (mono)?	☐	☐	☐	☐	☐

Do you NOW have…	**No**	**Yes**
12. A speech problem such as lisp, stammering or stuttering?	☐	☐
13. A part of your body that is disabled or deformed?	☐	☐
14. A vision problem?	☐	☐
15. A hearing problem?	☐	☐

Has a doctor ever said you had…

	No, never	Yes, but NO PROBLEMS with it in last 12 months	Yes, and HAD PROBLEMS with it in last 12 months
16. Serious acne, eczema or other allergic rashes?	☐	☐	☐
17. Gum disease (not tooth cavities)?	☐	☐	☐
18. Asthma?	☐	☐	☐
19. Sugar diabetes (sugar in the blood)?	☐	☐	☐
20. Hepatitis?	☐	☐	☐
21. Sickle cell anemia?	☐	☐	☐
22. Anemia, tired or thin blood?	☐	☐	☐
23. Rheumatic fever?	☐	☐	☐
24. Heart disease or a heart condition?	☐	☐	☐
25. Migraine headaches?	☐	☐	☐
26. Epilepsy (seizures or fits)?	☐	☐	☐
27. Arthritis or any joint disease or joint problem?	☐	☐	☐
28. Curvature of the spine or scoliosis?	☐	☐	☐
29. Any other condition affecting the bone, cartilage, muscle or tendon?	☐	☐	☐
30. An emotional/mental problem or behavior problem?	☐	☐	☐
31. A learning disability or attention disorder?	☐	☐	☐

Has a doctor ever said you had…

	No, never	Yes, but NO PROBLEMS with it in last 12 months	Yes, and HAD PROBLEMS with it in last 12 months
32. An eating disorder like anorexia or bulimia?	☐	☐	☐
33. Lead poisoning?	☐	☐	☐
34. Hay fever or allergies?	☐	☐	☐
35. A sexually transmitted disease (STD) or venereal disease (VD) like gonorrhea (clap), syphilis, chlamydia, genital warts, or genital herpes?	☐	☐	☐
36. Any other serious disease?	☐	☐	☐
- ***If yes, please describe:***			
37. ***FOR GIRLS ONLY:*** Pelvic inflammatory disease (PID)?	☐	☐	☐

38. About how many tooth cavities have you ever had?

☐ None
☐ 1 or 2 cavities
☐ 3 or 4 cavities
☐ 5 or more cavities
☐ Don't know

In the PAST 12 MONTHS, did you have any of the following injuries…	No, never	Yes, but I DID NOT see a doctor or a nurse	Yes, and I DID see a doctor or a nurse
39. A bad cut or scrape?	☐	☐	☐
40. A bad sprain or torn ligament?	☐	☐	☐

In the PAST 12 MONTHS, did you have any of the following injuries…	No, never	Yes, but I DID NOT see a doctor or a nurse	Yes, and I DID see a doctor or a nurse
41. A broken bone, dislocated joint, or broken nose?	☐	☐	☐
42. A bad head injury or concussion?	☐	☐	☐
43. A gun shot wound or stab wound?	☐	☐	☐
44. A bite from another person or animal?	☐	☐	☐
45. A bad burn?	☐	☐	☐

46. During the **PAST 12 MONTHS**, how many times did anyone physically hurt you on purpose?

☐ None ***Go to Section G***

☐ 1 time

☐ 2 times

☐ 3 times

☐ 4 or more times

A. Did being hurt by someone…	No	Yes
(1) Cause a change in your feelings (like fear or depression)?	☐	☐
(2) Cause a change in what you do (like where you go and how you act)?	☐	☐
(3) Cause a physical injury?	☐	☐
(4) Cause you to get medical treatment?	☐	☐

B. Did you know any of the people who hurt you?

☐ No

☐ Yes

SECTION G

Thinking about your family, about how many days in the PAST 4 WEEKS did your parents or other adults in your family…

	No days	1 to 3 days	4 to 6 days	7 to 14 days	15 to 28 days
1. Spend time with you doing something fun?	☐	☐	☐	☐	☐
2. Talk with you or listen to your opinions and ideas?	☐	☐	☐	☐	☐
3. Eat meals with you?	☐	☐	☐	☐	☐

In the PAST 4 WEEKS, on how many days…

	No days	1 to 3 days	4 to 6 days	7 to 14 days	15 to 28 days
4. Have you liked being a member of your family?	☐	☐	☐	☐	☐
5. Did you and your family get along?	☐	☐	☐	☐	☐
6. Did you lie or cheat?	☐	☐	☐	☐	☐
7. Did you argue a lot?	☐	☐	☐	☐	☐
8. Did you hang around with others who get into trouble?	☐	☐	☐	☐	☐

In the PAST 4 WEEKS that you were in school, on how many days did you…

	No days	1 to 3 days	4 to 6 days	7 to 14 days	15 to 28 days
9. Disobey at school?	☐	☐	☐	☐	☐
10. Have trouble getting along with your teachers?	☐	☐	☐	☐	☐
11. Have trouble concentrating or paying attention at school?	☐	☐	☐	☐	☐
12. Have trouble getting your school work done?	☐	☐	☐	☐	☐

13. Which of the following statements best describes how you did in school in the **PAST 4 WEEKS?**

If you are not in school now, think about the last month you were in school.

☐ Excellent student

☐ Good student

☐ Average student

☐ Below average student

14. Which of the following statements best describes how you did your homework in the **PAST 4 WEEKS?**

If you are not in school now, think about the last month you were in school.

☐ Did very well, could not do better

☐ Did about as well as I could

☐ Could have done a little better

☐ Could have done much better

Have you done any of the following things in the PAST 2 SCHOOL YEARS?

(Including this school year)	**No**	**Yes**
15. I dropped out of school.	☐	☐
16. I was on the honor roll.	☐	☐
17. I received a school award or prize.	☐	☐
18. I failed a subject.	☐	☐
19. I failed a grade (had to repeat a year).	☐	☐
20. I was suspended or expelled.	☐	☐
21. I was an officer in a school club or organization.	☐	☐

The following questions are about work, things like a part-time job, babysitting, a paper route, or mowing lawns.

22. During the **PAST 4 WEEKS**, did you earn any money **other than** from work you do at home?

☐ No *Go to Question 27*

☐ Yes

A. About how many days do you work for pay **each week**?

a. 1 day
b. 2 days
c. 3 days
d. 4 days
e. 5 or more days

B. About how many hours do you usually work for pay **each week**?

a. 1 to 5 hours
b. 6 to 10 hours
c. 11 to 15 hours
d. 16 to 20 hours
e. 20 or more hours

In the PAST 4 WEEKS, how often did you do the following…

	Never	**Once or twice**	**Several times**
23. I was late for work.	☐	☐	☐
24. I was absent from work.	☐	☐	☐
25. I failed to do the things I was supposed to do.	☐	☐	☐
26. I had trouble getting my work done.	☐	☐	☐

Do you feel that…

	No	Yes
27. There is an adult you could turn to for help if you have a real problem?	☐	☐
28. There are any adults who are really interested in what you do and encourage you to do your best?	☐	☐
29. You are safe in school?	☐	☐
30. You are safe in your neighborhood?	☐	☐
31. Overall, you are challenged to do your best?	☐	☐

If you want us to know anything else about your health, please write below.

Appendix C: Table of Parameter Estimates

Table 7.

Parameter Estimates for the Final Path Analysis Model.

	Unstandardized			Standardized		
	B	SE	*p*	*β*	SE	*p*
SBHC Use Wave 2						
SBHC Use 1	0.58***	0.12	<0.001	0.41***	0.07	<0.001
Health Status 1	-1.05	0.66	0.113	-0.10	0.06	0.094
Physical Activity 1	0.73	0.46	0.108	0.07	0.05	0.115
Academic Performance 1	0.06	0.90	0.943	0.00	0.06	0.943
Maternal Education	0.56*	0.24	0.020	0.12*	0.05	0.025
Health Status Wave 2						
SBHC Use 1	0.00	0.01	0.658	-0.02	0.05	0.660
Health Status 1	0.41***	0.05	<0.001	0.44***	0.05	<0.001
Physical Activity 1	0.12*	0.05	0.017	0.14*	0.06	0.017
Academic Performance 1	-0.03	0.08	0.730	-0.02	0.06	0.730
Gender	-0.19*	0.09	0.034	-0.11*	0.05	0.032
Physical Activity Wave 2						
SBHC Use 1	0.00	0.01	0.584	0.02	0.04	0.585
Health Status 1	0.07	0.05	0.120	0.07	0.05	0.115
Physical Activity 1	0.56***	0.04	<0.001	0.56***	0.04	<0.001
Academic Performance 1	0.16*	0.07	0.024	0.11*	0.05	0.024
Gender	-0.27**	0.09	0.001	-0.14**	0.04	0.001
Academic Performance Wave 2						
SBHC Use 1	0.00	0.00	0.607	-0.02	0.04	0.608
Health Status 1	0.04	0.03	0.276	0.05	0.05	0.276
Physical Activity 1	0.03	0.03	0.338	0.04	0.04	0.338
Academic Performance 1	0.63***	0.04	<0.001	0.61***	0.03	<0.001
Gender	0.21**	0.06	0.001	0.15**	0.04	0.001
SBHC Use Wave 3						
SBHC Use 2	0.88***	0.14	<0.001	0.61***	0.07	<0.001
Health Status 2	-0.72	0.78	0.357	-0.04	0.05	0.343
Physical Activity 2	-0.91	0.61	0.136	-0.06	0.04	0.134
Academic Performance 2	1.88	1.13	0.096	0.09	0.05	0.077
Gender	2.43	1.28	0.058	0.09	0.05	0.062
Maternal Education	-0.85*	0.33	0.010	-0.13**	0.04	0.004

Table 7. (Cont.)

Health Status Wave 3						
SBHC Use 2	0.00	0.00	0.880	-0.01	0.04	0.881
Health Status 2	0.44***	0.07	<0.001	0.43***	0.06	<0.001
Physical Activity 2	0.06	0.05	0.242	0.06	0.05	0.241
Academic Performance 2	0.08	0.06	0.195	0.06	0.05	0.195
Health Status 1	0.25***	0.06	<0.001	0.27***	0.00	<0.001
Physical Activity Wave 3						
SBHC Use 2	0.00	0.00	0.746	0.01	0.04	0.745
Health Status 2	0.05	0.05	0.362	0.04	0.04	0.359
Physical Activity 2	0.56***	0.04	<0.001	0.53***	0.05	<0.001
Academic Performance 2	0.07	0.06	0.257	0.04	0.04	0.258
Physical Activity 1	0.23***	0.06	<0.001	0.22***	0.05	<0.001
Gender	-0.24**	0.09	0.007	-0.11**	0.04	0.007
Academic Performance Wave 3						
SBHC Use 2	0.00	0.00	0.388	-0.03	0.03	0.394
Health Status 2	0.01	0.03	0.720	0.01	0.04	0.720
Physical Activity 2	0.01	0.03	0.691	0.02	0.04	0.690
Academic Performance 2	0.63***	0.04	<0.001	0.63***	0.04	<0.001
Academic Performance 1	0.22***	0.05	<0.001	0.21***	0.05	<0.001

*$p < .05$, **$p < .01$, ***$p < .001$.

REFERENCES

REFERENCES

Adams, E. K. & Johnson, V. (2000). An elementary school-based health clinic: Can it reduce Medicaid costs? *Pediatrics, 105*(4), 780-788.

Agency for Healthcare Research and Quality. 2016 National Healthcare Quality & Disparities Report. Rockville, MD: Agency for Healthcare Research and Quality; 2017. Retrieved from https://www.ahrq.gov/research/findings/nhqrdr/nhqdr16/index.html

Albright, K., Barnard, J., O'Leary, S., Federico, S., Saville, A., Lockhart, S., ... & Kempe, A. (2016). School-based health centers as medical homes: Parents' and adolescents' perspectives. *Academic Pediatrics, 16*(4), 381-386.

Allison, M. A., Crane, L. A., Beaty, B. L., Davidson, A. J., Melinkovich, P., & Kempe, A. (2007). School-based health centers: Improving access and quality of care for low income adolescents. *Pediatrics, 120*(4), 887-894.

Andresen, E. M., Catlin, T. K., Wyrwich, K. W., & Jackson-Thompson, J. (2003). Retest reliability of surveillance questions on health-related quality of life. *Journal of Epidemiology & Community Health, 57*(5), 339-343.

Anglin, T. M., Naylor, K. E., & Kaplan, D. W. (1996). Comprehensive school-based health care: high school students' use of medical, mental health, and substance abuse services. *Pediatrics, 97*(3), 318-330.

Bains, R. M. & Diallo, A. F. (2016). Mental health services in school-based health centers: Systematic review. *The Journal of School Nursing, 32*(1), 8-19.

Bains, R. M, Franzen, C. W., & White-Frese, J. (2014). Engaging African American and Latino adolescent males through school-based health centers. *The Journal of School Nursing, 30*(6), 411-419.

Baker, D. W., Sudano, J. J., Albert, J. M., Borawski, E. A., & Dor, A. (2001). Lack of health insurance and decline in overall health in late middle age. *The New England Journal of Medicine, 345*(15), 1106-1112.

Balassone, M. L., Bell, M., & Peterfreund, N. (1991). A comparison of users and nonusers of a school-based health and mental health clinic. *Journal of Adolescent Health, 12*(3), 240 246.

Basch, C. E. (2011). Healthier students are better learners: A missing link in school reforms to close the achievement gap. *Journal of School Health, 81*(10), 593-598.

Bentler, P. M. (1990). Comparative fit indexes in structural models. *Psychological*

Bulletin, 107(2), 238-246.

Berdahl, T., Owens, P. L., Dougherty, D., McCormick, M. C., Pylypchuk, Y., & Simpson, L. A. (2010). Annual report on health care for children and youth in the United States: racial/ethnic and socioeconomic disparities in children's health care quality. *Academic Pediatrics, 10*(2), 95-118.

Bersamin, M., Garbers, S., Gaarde, J., & Santelli, J. (2016). Assessing the impact of school based health centers on academic achievement and college preparation efforts: using propensity score matching to assess school-level data in California. *The Journal of School Nursing, 32*(4), 241-245.

Bersamin, M., Garbers, S., Gold, M. A., Heitel, J., Martin, K., Fisher, D. A., & Santelli, J. (2016). Measuring success: Evaluation designs and approaches to assessing the impact of school-based health centers. *Journal of Adolescent Health, 58*(1), 3-10.

Bezold, C. P., Konty, K. J., Day, S. E., Berger, M., Harr, L., Larkin, M., ... & Stark, J. H. (2014). The effects of changes in physical fitness on academic performance among New York City youth. *Journal of Adolescent Health, 55*(6), 774-781.

Biddle, S. J., & Asare, M. (2011). Physical activity and mental health in children and adolescents: A review of reviews. *British Journal of Sports Medicine, 45*(11), 886-895.

Biddle, S. J., Gorely, T., & Stensel, D. J. (2004). Health-enhancing physical activity and sedentary behaviour in children and adolescents. *Journal of Sports Sciences, 22*(8), 679-701.

Blanchard, J. C., Haywood, Y. C., & Scott, C. (2003). Racial and ethnic disparities in health: An emergency medicine perspective. *Academy of Emergency Medicine, 10*(11), 1289-1293.

Bradley, B. J., & Greene, A. C. (2013). Do health and education agencies in the United States share responsibility for academic achievement and health? A review of 25 years of evidence about the relationship of adolescents' academic achievement and health behaviors. *Journal of Adolescent Health, 52*(5), 523-532.

Braveman, P. A., Cubbin, C., Egerter, S., Williams, D. R., & Pamuk, E. (2010). Socioeconomic disparities in health in the United States: What the patterns tell us. *American Journal of Public Health, 100*(S1), S186-S196.

Braveman, P., Cubbin, C., Marchi, K., Egerter, S., & Chavez, G. (2001). Measuring socioeconomic status/position in studies of racial/ethnic disparities: Maternal and infant health. *Public Health Reports, 116*(5), 449.

Braveman, P. & Egerter, S. (2008). Overcoming obstacles to health: Report from the Robert Wood Johnson Foundation to the Commission to Build a Healthier America, *Robert Wood Johnson*, February, 2008.

Braveman, P. & Gruskin, S. (2003). Defining equity in health. *Journal of Epidemiology and Community Health, 57*(4), 254-258.

Braveman, P. A., Kumanyika, S., Fielding, J., LaVeist, T., Borrell, L. N., Manderscheid, R., & Troutman, A. (2011). Health disparities and health equity: The issue is justice. *American Journal of Public Health, 101*(S1), 149-155.

Brindis, C. D., Klein, J., Schlitt, J., Santelli, J., Juszczak, L., & Nystrom, R. J. (2003). School based health centers: accessibility and accountability. *Journal of Adolescent Health, 32*(6), 98-107.

Britto, M. T., Klostermann, B. K., Bonny, A. E., Altum, S. A., & Hornung, R. W. (2001). Impact of a school-based intervention on access to healthcare for underserved youth. *Journal of Adolescent Health, 29*(2), 116-124.

Brodersen, N. H., Steptoe, A., Boniface, D. R., & Wardle, J. (2007). Trends in physical activity and sedentary behaviour in adolescence: Ethnic and socioeconomic differences. *British Journal of Sports Medicine, 41*(3), 140-144.

Burchinal, M., McCartney, K., Steinberg, L., Crosnoe, R., Friedman, S. L., McLoyd, V., & Pianta, R. (2011). Examining the Black–White achievement gap among low-income children using the NICHD study of early child care and youth development. *Child Development, 82*(5), 1404-1420.

Busch, V., Loyen, A., Lodder, M., Schrijvers, A. J., van Yperen, T. A., & de Leeuw, J. R. (2014). The effects of adolescent health-related behavior on academic performance: a systematic review of the longitudinal evidence. *Review of Educational Research, 84*(2), 245-274.

Caro, D., McDonald, T., & Willms, J. D. (2009). Socio-economic status and academic achievement trajectories from childhood to adolescence. *Canadian Journal of Education, 32*(3), 558-590.

Cheng, T. L., Johnson, S. B., & Goodman, E. (2016). Breaking the intergenerational cycle of disadvantage: The three generation approach. *Pediatrics,* 137(6), 1-12.

Chomitz, V. R., Slining, M. M., McGowan, R. J., Mitchell, S. E., Dawson, G. F., & Hacker, K. A. (2009). Is there a relationship between physical fitness and academic achievement? Positive results from public school children in the northeastern United States. *Journal of School Health, 79*(1), 30-37.

Clouston, S. A., Richards, M., Cadar, D., & Hofer, S. M. (2015). Educational inequalities in health behaviors at midlife: Is there a role for early-life cognition? *Journal of Health and Social Behavior, 56*(3), 323-340.

Crump, C., Rivera, D., London, R., Landau, M., Erlendson, B., & Rodriguez, E. (2013). Chronic

health conditions and school performance among children and youth. *Annals of Epidemiology*, *23*(4), 179-184.

Daley, M. F., Curtis, C. R., Pyrzanowski, J., Barrow, J., Benton, K., Abrams, L., ... & Kempe, A. (2009). Adolescent immunization delivery in school-based health centers: a national survey. *Journal of Adolescent Health*, *45*(5), 445-452.

Daley, A. J., & Ryan, J. (2000). Academic performance and participation in physical activity by secondary school adolescents. *Perceptual and Motor Skills*, *91*(2), 531-534.

DeBerard, M. S., Spielmans, G., & Julka, D. (2004). Predictors of academic achievement and retention among college freshmen: A longitudinal study. *College Student Journal*, *38*(1), 66-80.

De Civita, M., Pagani, L., Vitaro, F., & Tremblay, R. E. (2004). The role of maternal educational aspirations in mediating the risk of income source on academic failure in children from persistently poor families. *Children and Youth Services Review*, *26*(8), 749-769.

De Ridder, K. A., Pape, K., Johnsen, R., Holmen, T. L., Westin, S., & Bjørngaard, J. H. (2013). Adolescent health and high school dropout: A prospective cohort study of 9000 Norwegian adolescents (The Young-HUNT). *PloS One*, *8*(9), e74954.

Dehlendorf, C., Rodriguez, M. I., Levy, K., Borrero, S., & Steinauer, J. (2010). Disparities in family planning. *American Journal of Obstetrics and Gynecology*, *202*(3), 214-220.

Ding, W., Lehrer, S. F., Rosenquist, J. N., & Audrain-McGovern, J. (2009). The impact of poor health on academic performance: New evidence using genetic markers. *Journal of Health Economics*, *28*(3), 578-597.

Donnelly, J. E., Hillman, C. H., Castelli, D., Etnier, J. L., Lee, S., Tomporowski, P., ... & Szabo Reed, A. N. (2016). Physical activity, fitness, cognitive function, and academic achievement in children: a systematic review. *Medicine and Science in Sports and Exercise*, *48*(6), 1197.

Dwyer, T., Sallis, J. F., Blizzard, L., Lazarus, R., & Dean, K. (2001). Relation of academic performance to physical activity and fitness in children. *Pediatric Exercise Science*, *13*(3), 225-237.

Enders, C. K., & Bandalos, D. L. (2001). The relative performance of full information maximum likelihood estimation for missing data in structural equation models. *Structural Equation Modeling*, *8*(3), 430-457.

Engzell, P. (2016). *Intergenerational persistence and ethnic disparities in education* (Doctoral dissertation, Department of Sociology, Stockholm University).

Ethier, K. A., Dittus, P. J., DeRosa, C. J., Chung, E. Q., Martinez, E., & Kerndt, P. R. (2011).

School-based health center access, reproductive health care, and contraceptive use among sexually experienced high school students. *Journal of Adolescent Health, 48*(6), 562-565.

Esteban-Cornejo, I., Tejero-González, C. M., Martinez-Gomez, D., Del-Campo, J., González Galo, A., Padilla-Moledo, C., ... & Up & Down Study Group. (2014). Independent and combined influence of the components of physical fitness on academic performance in youth. *The Journal of Pediatrics*, *165*(2), 306-312.

Esteban-Cornejo, I., Tejero-Gonzalez, C. M., Sallis, J. F., & Veiga, O. L. (2015). Physical activity and cognition in adolescents: A systematic review. *Journal of Science and Medicine in Sport*, *18*(5), 534-539.

Fan, X., Thompson, B., & Wang, L. (1999). Effects of sample size, estimation methods, and model specification on structural equation modeling fit indexes. *Structural Equation Modeling: A Multidisciplinary Journal*, *6*(1), 56-83.

Flores, G., & Lin, H. (2013). Trends in racial/ethnic disparities in medical and oral health, access to care, and use of services in US children: Has anything changed over the years?. *International Journal for Equity in Health*, *12*(1), 10.

Forrest, C. B., Bevans, K. B., Riley, A. W., Crespo, R., & Louis, T. A. (2013). Health and school outcomes during children's transition into adolescence. *Journal of Adolescent Health*, *52*(2), 186-194.

Fosse, N. E., & Haas, S. A. (2009). Validity and stability of self-reported health among adolescents in a longitudinal, nationally representative survey. *Pediatrics*, *123*(3), e496 e501.

Fothergill, K. & Ballard, E. (1998). The school-linked health center: A promising model of community-based care for adolescents. *Journal of Adolescent Health, 23*(1), 29-38.

Friedrich, M. J. (1999). 25 years of School-Based Health Centers. *Journal of the American Medical Association, 281*(9), 781-782.

Gall, G., Pagano, M. E., Desmond, M. S., Perrin, J. M., & Murphy, J. M. (2000). Utility of psychosocial screening at a school-based health center. *Journal of School Health*, *70*(7), 292-298.

Gase, L. N., Kuo, T., Coller, K., Guerrero, L. R., & Wong, M. D. (2014). Assessing the connection between health and education: Identifying potential leverage points for public health to improve school attendance. *American Journal of Public Health, 104*(9), e47 e54.

Geierstanger, S. P., Amaral, G., Mansour, M., & Walters, S. R. (2004). School-based health centers and academic performance: Research, challenges, and recommendations. *Journal of School Health*, *74*(9), 347-352.

Gelman, A., Miller, E., Schwarz, E. B., Akers, A. Y., Jeong, K., & Borrero, S. (2013). Racial disparities in human papillomavirus vaccination: Does access matter? *Journal of Adolescent Health, 53*(6), 756-762.

Ghazvini, S. D., & Khajehpour, M. (2011). Gender differences in factors affecting academic performance of high school students. *Procedia-Social and Behavioral Sciences, 15*, 1040-1045.

Gibson, E. J., Santelli, J. S., Minguez, M., Lord, A., & Schuyler, A. C. (2013). Measuring school health center impact on access to and quality of primary care. *Journal of Adolescent Health, 53*(6), 699-705.

Gold, R., Naleway, A. L., Jenkins, L. L., Riedlinger, K. K., Kurosky, S. K., Nystrom, R. J., & Kurilo, M. B. (2011). Completion and timing of the three-dose human papillomavirus vaccine series among adolescents attending school-based health centers in Oregon. *Preventive Medicine, 52*(6), 456-458.

Gordon-Larsen, P., Nelson, M. C., Page, P., & Popkin, B. M. (2006). Inequality in the built environment underlies key health disparities in physical activity and obesity. *Pediatrics, 117*(2), 417-424.

Gortmaker, S. L., Lee, R., Cradock, A. L., Sobol, A. M., Duncan, D. T., & Wang, Y. C. (2012). Disparities in youth physical activity in the United States: 2003–2006. *Medicine & Science in Sports & Exercise, 44*(5), 888-893.

Guo, J. J., Jang, R., Keller, K. N., McCracken, A. L., Pan, W., & Cluxton, R. J. (2005). Impact of school-based health centers on children with asthma. *Journal of Adolescent Health, 37*(4), 266-274.

Guo, J. J., Wade, T. J., & Keller, K. N. (2008). Impact of school-based health centers on students with mental health problems. *Public Health Reports, 123*(6), 768-780.

Guo, J. J., Wade, T. J., Pan, W., & Keller, N. (2010). School-based health centers: Cost-benefit analysis and impact on health disparities. *American Journal of Public Health, 100*(9), 1617-1623.

Gustafson, E. M. (2005). History and overview of school-based health centers in the US. *Nursing Clinics of North America, 40*(4), 595-606.

Hallal, P. C., Victora, C. G., Azevedo, M. R., & Wells, J. C. (2006). Adolescent physical activity and health. *Sports Medicine, 36*(12), 1019-1030.

Hardie, J. H., & Landale, N. S. (2013). Profiles of risk: Maternal health, socioeconomic status, and child health. *Journal of Marriage and Family, 75*(3), 651-666.

Harrison, R. A., McElduff, P., & Edwards, R. (2006). Planning to win: Health and lifestyles associated with physical activity amongst 15,423 adults. *Public Health, 120*(3), 206-212.

Hattie, J., & Clinton, J. (2012). Physical activity is not related to performance at school. *Archives of Pediatrics & Adolescent Medicine, 166*(7), 678-679.

Herman, K. M., Hopman, W. M., & Sabiston, C. M. (2015). Physical activity, screen time and self-rated health and mental health in Canadian adolescents. *Preventive Medicine, 73*, 112-116.

Homlong, L., Rosvold, E. O., & Haavet, O. R. (2013). Can use of healthcare services among 15 16-year-olds predict an increased level of high school dropout? A longitudinal community study. *BMJ Open, 3*(9), e003125.

Howe, L. D., Lawlor, D. A., & Propper, C. (2013). Trajectories of socioeconomic inequalities in health, behaviours and academic achievement across childhood and adolescence. *Journal of Epidemiology and Community Health, 67*(4), 358-364.

Hsiao, C. (2014). *Analysis of Panel Data* (No. 54). Caimbridge, United Kingdom: Cambridge University Press.

Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal, 6*(1), 1-55.

Huang, K. Y., Cheng, S., & Theise, R. (2013). Schools contexts as social determinants of child health: Current practices and implications for future public health practice. *Public Health Reports, 128*(3), 21-28.

Ickovics, J. R., Carroll-Scott, A., Peters, S. M., Schwartz, M., Gilstad-Hayden, K., & McCaslin, C. (2014). Health and academic achievement: cumulative effects of health assets on standardized test scores among urban youth in the United States. *Journal of School Health, 84*(1), 40-48.

Ingram, J., & Salmon, D. (2010). Young people's use and views of a school-based sexual health drop-in service in areas of high deprivation. *Health Education Journal, 69*(3), 227-235.

Jennings, J., & Rentner, D. S. (2006). Ten big effects of the No Child Left Behind Act on public schools. *Phi Delta Kappan, 88*(2), 110-113.

Jerdén, L., Burell, G., Stenlund, H., Weinehall, L., & Bergström, E. (2011). Gender differences and predictors of self-rated health development among Swedish adolescents. *Journal of Adolescent Health, 48*(2), 143-150.

Juszczak, L., Melinkovich, P., & Kaplan, D. (2003). Use of health and mental health services by adolescents across multiple delivery sites. *Journal of Adolescent Health, 32*(6), 108-118.

Kaplan, D. W., Brindis, C., Naylor, K. E., Phibbs, S. L., Ahlstrand, K. R., & Melinkovich, P. (1998). Elementary school-based health center use. *Pediatrics, 101*(6), e1-e7.

Kaplan, D. W., Brindis, C. D., Phibbs, S. L., Melinkovich, P., Naylor, K., & Ahlstrand, K. (1999). A comparison study of an elementary school-based health center: Effects on health care access and use. *Archives of Pediatric Adolescent Medicine, 153*(3), 235-243.

Kaplan, D. W., Calonge, B. N., Guernsey, B. P., & Hanrahan, M. B. (1998). Managed care and school-based health centers: Use of health services. *Archives of Pediatrics & Adolescent Medicine, 152*(1), 25-33.

Kerns, S. E., Pullmann, M. D., Walker, S. C., Lyon, A. R., Cosgrove, T. J., & Bruns, E. J. (2011). Adolescent use of school-based health centers and high school dropout. *Archives of Pediatrics & Adolescent Medicine, 165*(7), 617-623.

Key, J. D., Washington, E. C., & Hulsey, T. C. (2002). Reduced emergency department utilization associated with school-based clinic enrollment. *Journal of Adolescent Health, 30*(4), 273-278.

King, G., McDougall, J., DeWit, D., Hong, S., Miller, L., Offord, D., ... & LaPorta, J. (2005). Pathways to children's academic performance and prosocial behaviour: Roles of physical health status, environmental, family, and child factors. *International Journal of Disability, Development and Education*, *52*(4), 313-344.

Kisker, E. E. & Brown, R. S. (1996). Do school-based health centers improve adolescents' access to healthcare, health status, and risk-taking behavior? *Journal of Adolescent Health, 18*(5), 335-343.

Knopf, J. A., Finnie, R. K., Peng, Y., Hahn, R. A., Truman, B. I., Vernon-Smiley, M., ... & Hunt, P. C. (2016). School-based health centers to advance health equity: A Community Guide systematic review. *American Journal of Preventive Medicine, 51*(1), 114-126.

Lancman, H., Pastore, D. R., Steed, N., & Maresca, A. (2000). Adolescent Hepatitis B vaccination: Comparison among 2 high school-based health centers and an adolescent clinic. *Archives of Pediatric Adolescent Medicine, 154*(11), 1085-1088.

Lau, M., Lin, H., & Flores, G. (2012). Racial/ethnic disparities in health and health care among U.S. adolescents. *Health Services Research, 47*(5), 2031-2059.

Lear, J. G., Gleicher, H. B., Germaine, A. S., & Porter, P. J. (1991). Reorganizing health care for adolescents: The experience of the school-based adolescent health care program. *Journal of Adolescent Health, 12*(6), 450-458.

Lieu, T. A., Newacheck, P. W., & McManus, M. A. (1993). Race, ethnicity, and access to ambulatory care among US adolescents. *American Journal of Public Health, 83*(7), 960-965.

Lofink Love, H., Schelar, E., Taylor, K., Schlitt, J., Even, M., Burns, A., . . . Windham, D. (2015). 2013-14 Digital Census Report. Washington, DC: School-Based Health Alliance.

Kristjánsson, Á. L., Sigfúsdóttir, I. D., & Allegrante, J. P. (2010). Health behavior and academic achievement among adolescents: the relative contribution of dietary habits, physical activity, body mass index, and self-esteem. *Health Education & Behavior, 37*(1), 51-64.

London, R. A., & Castrechini, S. (2011). A longitudinal examination of the link between youth physical fitness and academic achievement. *Journal of School Health, 81*(7), 400-408.

Lovenheim, M. C., Reback, R., & Wedenoja, L. (2014). How does access to health care affect health and education? Evidence from school-based health center openings. *Cornell University, Ithica, NY.*

Lurie, N., Bauer, E. J., & Brady, C. (2001). Asthma outcomes at an inner-city school-based health center. *Journal of School Health, 71*(1), 9-16.

Lynch, J. L., & von Hippel, P. T. (2016). An education gradient in health, a health gradient in education, or a confounded gradient in both?. *Social Science & Medicine, 154*, 18-27.

Mason-Jones, A. J., Crisp, C., Momberg, M., Koech, J., De Koker, P., & Matthews, C. (2012). A systematic review of the role of school-based healthcare in adolescent sexual, reproductive, and mental health. *Systematic Reviews, 1*(49), 1-12.

McCord, M. T., Klein, J. D., Foy, J. M., & Fothergill, K. (1993). School-based clinic use and school performance. *Journal of Adolescent Health, 14*(2), 91-98.

McLeod, J. D., Uemura, R., & Rohrman, S. (2012). Adolescent mental health, behavior problems, and academic achievement. *Journal of Health and Social Behavior, 53*(4), 482 497.

McNall, M. A., Lichty, L. F., & Mavis, B. (2010). The impact of school-based health centers on the health outcomes of middle school and high school students. *American Journal of Public Health, 100*(9), 1604-1610.

McNall, M., Lichty, L., Mavis, B., & Bates, L. (2010). The Michigan evaluation of school-based health: Final report. *Community Evaluation and Research Collaborative.* Michigan State University.

Menden Anglin, T., Naylor, K. E., & Kaplan, D. W. (1996). Comprehensive school-based health care: High school students' use of medical, mental health, and substance abuse services. *Pediatrics, 97*(3), 318-330.

Middleman, A. B., Robertson, L. M., Young, C., Durant, R. H., & Emans, S. J. (1999). Predictors of time to completion of the Hepatitis B vaccination series among adolescents.

Journal of Adolescent Health, 25(5), 323-327.

Miller, S., & Wherry, L. R. (2017). Health and access to care during the first 2 years of the ACA Medicaid expansions. *New England Journal of Medicine, 376*(10), 947-956.

Minguez, M., Santelli, J. S., Gibson, E., Orr, M., & Samant, S. (2015). Reproductive health impact of a school health center. *Journal of Adolescent Health, 56*(3), 338-344.

Minkkinen, J., Lindfors, P., Kinnunen, J., Finell, E., Vainikainen, M. P., Karvonen, S., & Rimpelä, A. (2017). Health as a Predictor of Students' Academic Achievement: A 3 Level Longitudinal Study of Finnish Adolescents. *Journal of School Health, 87*(12), 902-910.

Moonie, S., Sterling, D. A., Figgs, L. W., & Castro, M. (2008). The relationship between school absence, academic performance, and asthma status. *Journal of School Health, 78*(3), 140-148.

Mulaik, S. A., James, L. R., Van Alstine, J., Bennett, N., Lind, S., & Stilwell, C. D. (1989). Evaluation of goodness-of-fit indices for structural equation models. *Psychological Bulletin*, *105*(3), 430.

Muthén, B. O. (2002). Beyond SEM: General latent variable modeling. *Behaviormetrika*, *29*(1), 81-117.

Muthén, B., Kaplan, D., & Hollis, M. (1987). On structural equation modeling with data that are not missing completely at random. *Psychometrika*, *52*(3), 431-462.

Nabors, L. A. (2003). Evaluation in school-based health centers. *Psychology in the Schools*, *40*(3), 309-320.

National Assembly on School-Based Health Care (NASBHC). Position statement on documentation of the relationship between school-based health centers and the academic accomplishments of students. Washington, DC. 2005.

National Center for Health Statistics. Health, United States, 2012: With special feature on emergency care. Hyattsville, MD. 2013.

Needham, B. L., Crosnoe, R., & Muller, C. (2004). Academic failure in secondary school: The inter-related role of health problems and educational context. *Social Problems*, *51*(4), 569-586.

Newacheck, P. W., Hung, Y. Y., Park, M. J., Brindis, C. D., & Irwin, C. E. (2003). Disparities in adolescent health and healthcare: Does socioeconomic status matter? *Health Services Research, 38*(5), 1235-1252.

Ortega, F. B., Ruiz, J. R., Espana-Romero, V., Vicente-Rodriguez, G., Martínez-Gómez, D.,

Manios, Y., ... & Sjöström, M. (2011). The International Fitness Scale (IFIS): usefulness of self-reported fitness in youth. *International Journal of Epidemiology*, *40*(3), 701-711.

Parasuraman, S. R. (2014). The role of school-based health centers in increasing universal and targeted delivery of primary and preventive care among adolescents. *Journal of School Health*, *84*(8), 524-532.

Parasuraman, S. R. & Shi, L. (2014). Differences in access to care among students using school based health centers. *The Journal of School Nursing*, *31*(4), 291-299.

Pomerantz, E. M., Altermatt, E. R., & Saxon, J. L. (2002). Making the grade but feeling distressed: Gender differences in academic performance and internal distress. *Journal of Educational Psychology*, *94*(2), 396.

Preacher, K. J., Zyphur, M. J., & Zhang, Z. (2010). A general multilevel SEM framework for assessing multilevel mediation. *Psychological Methods*, *15*(3), 209.

Price, J. H., Khubchandani, J., McKinney, M., & Braun, R. (2013). Racial/ethnic disparities in chronic diseases of youths and access to health care in the United States. *BioMed Research International*, *2013*, 1-12.

Ran, T., Chattopadhyay, S. K., & Hahn, R. A. (2016). Economic evaluation of school-based health centers: A community guide systematic review. *American Journal of Preventive Medicine*, *51*(1), 129-138.

Riglin, L., Petrides, K. V., Frederickson, N., & Rice, F. (2014). The relationship between emotional problems and subsequent school attainment: A meta-analysis. *Journal of Adolescence*, *37*(4), 335-346.

Sallis, J. F., Prochaska, J. J., & Taylor, W. C. (2000). A review of correlates of physical activity of children and adolescents. *Medicine and Science in Sports and Exercise*, *32*(5), 963 975.

Santelli, J., Kouzis, A., & Newcomer, S. (1996a). School-based health center and adolescent use of primary care and hospital care. *Journal of Adolescent Health*, *19*(4), 267-275.

Santelli, J., Kouzis, A., & Newcomer, S. (1996b). Student attitudes toward school-based health centers. *Journal of Adolescent Health*, *18*(5), 349-356.

Santelli, J., Morreale, M., Wigton, A., & Grason, H. (1996). School health centers and primary care for adolescents: A review of the literature. *Journal of Adolescent Health*, *18*(5), 357-366.

Santelli, J. S., Nystrom, R. J., Brindis, C., Juszczak, L., Klein, J. D., Bearss, N., ... & Schlitt, J. (2003). Reproductive health in school-based health centers: findings from the 1998–99 census of school-based health centers. *Journal of Adolescent Health*, *32*(6), 443-451.

Saunders, J., Davis, L., Williams, T., & Williams, J. H. (2004). Gender differences in self perceptions and academic outcomes: A study of African American high school students. *Journal of Youth and Adolescence*, *33*(1), 81-90.

Schwartz, K. E., Monie, D., Scribani, M. B., Krupa, N. L., Jenkins, P., Leinhart, A., & Kjolhede, C. L. (2016). Opening school-based health centers in a rural setting: Effects on Emergency Department use. *Journal of School Health*, *86*(4), 242-249.

Selig, J. P., & Little, T. D. (2012). Autoregressive and cross-lagged panel analysis for longitudinal data. In B. Laursen, T. D. Little, & N. A. Card (Eds), *Handbook of Developmental Research Methods* (pp. 265-278). New York: The Guilford Press.

Shaw, S. R., Gomes, P., Polotskaia, A., & Jankowska, A. M. (2015). The relationship between student health and academic performance: Implications for school psychologists. *School Psychology International*, *36*(2), 115-134.

Sibley, B. A., & Etnier, J. L. (2003). The relationship between physical activity and cognition in children: a meta-analysis. *Pediatric Exercise Science*, *15*(3), 243-256.

Silberberg, M., & Cantor, J. C. (2008). Making the case for school-based health: Where do we stand?. *Journal of Health Politics, Policy and Law*, *33*(1), 3-37.

Singh, A., Uijtdewilligen, L., Twisk, J. W., Van Mechelen, W., & Chinapaw, M. J. (2012). Physical activity and performance at school: a systematic review of the literature including a methodological quality assessment. *Archives of Pediatrics & Adolescent Medicine*, *166*(1), 49-55.

Sirin, S. R. (2005). Socioeconomic status and academic achievement: A meta-analytic review of research. *Review of Educational Research*, *75*(3), 417-453.

So, W. Y. (2012). Association between physical activity and academic performance in Korean adolescent students. *BMC Public Health*, *12*(1), 258.

Soleimanpour, S., Geierstanger, S. P., Kaller, S., McCarter, V., & Brindis, C. D. (2010). The role of school-based health centers in health care access and client outcomes. *American Journal of Public Health, 100*(9), 1597-1603.

Stage, F. K., Carter, H. C., & Nora, A. (2004). Path analysis: An introduction and analysis of a decade of research. *The Journal of Educational Research*, *98*(1), 5-13.

Starfield, B., Ensminger, M., Riley, A., McGauhey, P., Skinner, A., Kim, S., ... & Green, B. (1993). Adolescent health status measurement: development of the Child Health and Illness Profile. *Pediatrics*, *91*(2), 430-435.

Starfield, B., Riley, A. W., Green, B. F., Ensminger, M. E., Forrest, C. B., Robertson, J., ... & Harris, S. K. (1999). Manual for the child health and illness profile: Adolescent edition (CHIP-AE). *Baltimore: The Johns Hopkins University*.

Starfield, B., Riley, A. W., Green, B. F., Ensminger, M. E., Ryan, S. A., Kelleher, K., ... & Vogel, K. (1995). The adolescent child health and illness profile: A population-based measure of health. *Medical Care, 33*(5), 553-566.

Starfield, B., Shi, L., & Macinko, J. (2005). Contributions of primary care to health systems and health. *The Millbank Quarterly, 83*(3), 457-502.

Steiger, J. H. (1998). A note on multiple sample extensions of the RMSEA fit index. *Structural Equation Modeling, 5*(4), 411-419.

Stone, S., Whitaker, K., Anyon, Y., & Shields, J. P. (2013). The relationship between use of school-based health centers and student-reported school assets. *Journal of Adolescent Health, 53*(4), 526-532.

Strolin-Goltzman, J. (2010). The relationship between school-based health centers and the learning environment. *Journal of School Health, 80*(3), 153-159.

Strolin-Goltzman, J., Sisselman, A., Melekis, K., & Auerbach, C. (2014). Understanding the relationship between school-based health center use, school connection, and academic performance. *Health & Social Work, 39*(2), 83-91.

Strong, W. B., Malina, R. M., Blimkie, C. J., Daniels, S. R., Dishman, R. K., Gutin, B., ... & Rowland, T. (2005). Evidence based physical activity for school-age youth. *The Journal of Pediatrics, 146*(6), 732-737.

Swallen, K. C., Reither, E. N., Haas, S. A., & Meier, A. M. (2005). Overweight, obesity, and health-related quality of life among adolescents: The National Longitudinal Study of Adolescent Health. *Pediatrics, 115*(2), 340-347.

Sznitman, S. R., Reisel, L., & Khurana, A. (2017). Socioeconomic background and high school completion: Mediation by health and moderation by national context. *Journal of Adolescence, 56*, 118-126.

Szumilas, M., Kutcher, S., LeBlanc, J. C., & Langille, D. B. (2010). Use of school-based health centres for mental health support in Cape Breton, Nova Scotia. *The Canadian Journal of Psychiatry, 55*(5), 319-328.

Tabachnick, B. G. & Fidell, L. S. (2018). *Using multivariate statistics, 6th edition.* Uttar Pradesh, India: Pearson Education, Inc.

Taras, H. (2005). Physical activity and student performance at school. *Journal of School Health, 75*(6), 214-218.

Taras, H., & Potts-Datema, W. (2005). Obesity and student performance at school. *Journal of School Health, 75*(8), 291-295.

Thies, K. M. (1999). Identifying the educational implications of chronic illness in school children. *Journal of School Health, 69*(10), 392-397.

Topolski, T. D., Edwards, T. C., & Patrick, D. L. (2004). Toward youth self-report of health and quality of life in population monitoring. *Ambulatory Pediatrics, 4*(4), 387-394.

Torrijos-Nino, C., Martínez-Vizcaíno, V., Pardo-Guijarro, M. J., García-Prieto, J. C., Arias Palencia, N. M., & Sánchez-López, M. (2014). Physical fitness, obesity, and academic achievement in schoolchildren. *The Journal of Pediatrics, 165*(1), 104-109.

Trost, S. G. (2007). Active education: Physical education, physical activity and academic performance. Fall 2007 research brief. *Active Living Research: A National Program of The Robert Wood Johnson Foundation.*

Trost, S. G., Owen, N., Bauman, A. E., Sallis, J. F., & Brown, W. (2002). Correlates of adults' articipation in physical activity: Review and update. *Medicine & Science in Sports & Exercise*, 34(12), 1996-2001.

Trudeau, F., & Shephard, R. J. (2010). Relationships of physical activity to brain health and the academic performance of schoolchildren. *American Journal of Lifestyle Medicine, 4*(2), 138-150.

Twisk, J., & de Vente, W. (2002). Attrition in longitudinal studies: How to deal with missing data. *Journal of Clinical Epidemiology, 55*(4), 329-337.

Uijtdewilligen, L., Nauta, J., Singh, A. S., van Mechelen, W., Twisk, J. W., van der Horst, K., & Chinapaw, M. J. (2011). Determinants of physical activity and sedentary behaviour in young people: A review and quality synthesis of prospective studies. *British Journal of Sports Medicine, 45*(11), 896-905.

Ullman, J. B., & Bentler, P. M. (2012). Structural equation modeling. In I. B. Weiner (Ed), *Handbook of Psychology, Second Edition* (pp. 661-690). New Jersey: John Wiley & Sons.

Van Cura, M. (2010). The relationship between School-Based health centers, rates of early dismissal from school, and loss of seat time. *Journal of School Health, 80*(8), 371-377.

Vingilis, E. R., Wade, T. J., & Seeley, J. S. (2002). Predictors of adolescent self-rated health. *Canadian Journal of Public Health, 93*(3), 193-197.

Wade, T. J., Mansour, M. E., Line, K., Huentelman, T., & Keller, K. N. (2008). Improvements in health-related quality of life among school-based health center users in elementary and middle school. *Ambulatory Pediatrics, 8*(4), 241-249.

Walker, S. C., Kerns, S. E., Lyon, A. R., Bruns, E. J., & Cosgrove, T. J. (2010). Impact of school-based health center use on academic outcomes. *Journal of Adolescent*

Health, *46*(3), 251-257.

Wang, M. T., & Peck, S. C. (2013). Adolescent educational success and mental health vary across school engagement profiles. *Developmental Psychology*, *49*(7), 1266.

Webber, M. P., Carpiniello, K. E., Oruwariye, T., Lo, Y., Burton, W. B., & Appel, D. K. (2003). Burden of asthma in inner-city elementary school children: Do school-based health centers make a difference? *Archives of Pediatric and Adolescent Medicine, 157*(2), 125 129.

Whitehead, M. (1991). The concepts and principles of equity and health. *Health Promotion International*, *6*(3), 217-228.

Whitt-Glover, M. C., Taylor, W. C., Floyd, M. F., Yore, M. M., Yancey, A. K., & Matthews, C. E. (2009). Disparities in physical activity and sedentary behaviors among US children and adolescents: prevalence, correlates, and intervention implications. *Journal of Public Health Policy*, *30*(1), S309-S334.

Wilson, K. M. & Klein, J. D. (2000). Adolescents who use the emergency department as their usual source of care. *Archives of Pediatrics and Adolescent Medicine*, *154*(4), 361-365.

Young, T. L., D'Angelo, S. L., & Davis, J. (2001). Impact of a school-based health center on emergency department use by elementary school students. *Journal of School Health, 71*(5), 196-198.