Lifestyle Choices, Environmental Conditions, and Social Issues: A Literature Review

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Abstract

Previous research has addressed the relationship between social issues and chronic disease, and how chronic disease is more prevalent in minority communities due to a long history of social inequality. Social inequality is caused by racial discrimination that leads to socioeconomic and educational inequality, all of which reduce access to a health-promoting lifestyle choices and result in physiological impairments (such as chronic inflammation) and disease. In addition to being a comprehensive literature review, my thesis summarizes lifestyle choices affected by specific aspects of social inequality and the health disparities they cause. In particular, I identified links between social issues and sleep habits, dietary practices, and physical activity levels. I also provide recommendations on how sleep management and relaxation, an anti-inflammatory diet, and regular moderate physical activity can support wellness. It is my hope that an improved understanding of the role of specific lifestyle choices in wellness promotion –and the powerful synergy created by combining baby steps towards improved sleep, diet, and physical activity – will provide simple, cost-effective solutions accessible to people irrespective of race, socioeconomic status, and education level.

Key Concepts:

Social Issues: Race, Socioeconomic Status, and Educational Inequality

Lifestyle Factors: Sleep, Dietary Habits, and Physical Activity

Physiological Mechanisms: Chronic Disease

Introduction

The correlation between race, socioeconomic status, and education levels with adverse health outcomes has long been the subject of social-scientific investigations. The disproportionate affect on minority populations can, in part, be linked to lifestyle factors. This thesis focuses on how social disparities impact lifestyle, and more specifically, sleep habits, dietary practices, and physical activity levels. I will also cover how these factors produce physiological manifestations like chronic disease. I will use insights gained from an integrative literature review to make recommendations for simple, cost-effective solutions to help promote healthy living for all people irrespective of race, class, or education level.

It is vital to understand the profound impact that lifestyle factors — such as sleep habits, dietary practices, and physical activity levels — can have on increasing the risk for chronic diseases and disorders. A person's social environment also contributes to sleep loss, an unbalanced diet, and physical inactivity (Hruby, 2015). My literature review analyzes and synthesizes available evidence on the links between race, socioeconomic status, and education levels on lifestyle that contribute to increased risk of deisease. I tested the hypothesis that disparities caused by social issues profoundly influence lifestyle and elevate disease risks in minority populations. I am looking at how each lifestyle factor influences each social issue individually. My goal is to identify simple, affordable solutions to help reduce disparities resulting from social issues.

Specific research questions addressed include:

- What does the latest social science research reveal about social disparities?
- What external factors are involved?
- What physiological mechanisms are involved?
- How can these insights be used to formulate effective, cost-efficient interventions?

This thesis presents a comprehensive analysis of selected original studies on each lifestyle factor. The results of this analysis for each of the three lifestyle factors are then integrated to show the connectivity between lifestyle factors and social issues. Lastly, I will discuss how, in addition to the large-scale social movement needed to remove health disparities, it may also be beneficial to empower individuals by providing them with the knowledge to identify steps that could be taken in spite of social and economic barriers.

My overarching goal is to minimize medical jargon and scientific terminology to achieve transparency for the non-expert audience and to highlight selected examples of studies that illustrate the links between social disparities, lifestyle, and health outcomes, rather than presenting an exhaustive, encyclopedic overview of the extensive available scholarly literature.

Justification of Approach

The major portion of this thesis will examine the hypothesis that management of each of three environmental factors (sleep, dietary habits, physical activity level) is impacted by socio-economic disparities, and that all three factors can be linked to similar physiological mechanisms (see Figure 1). For example, a common underlying

physiological root cause of chronic diseases and disorders is chronic inflammation (Lopresti, 2013; Figure 1). Chronic disease is today's major public health threat, costing billions of dollars per year in the US alone (Center for Disease Control, 2015). A recent review summarizes how social issues impact inflammation and how sleep management, a balanced diet, or regular physical activity can each lower inflammation and the risk of depression (Lopresti, 2013). Lifestyle factors like sleep, diet, and physical activity can either increase or decrease chronic inflammation depending on environmental quality. I first examine selected studies to summarize the research that has been published on this topic, and I then present a more comprehensive literature review on each lifestyle factor to illustrate the extent of the work that must be done to resolve social issues. The goal of my analysis is to use the identification of disparities to formulate recommendations for lifestyle-based intervention strategies (Figure 1).

What are Environmental Conditions?

There are many external influences that affect the brain, the body, and human behavior more boradly. Genetics do not operate alone; they are profoundly impacted by outside factors like the social environments which people live in (Figure 1). Human social environments incorporate "physical surroundings and social relationships" (Barnett, 2001). Certain characteristics of a social environment include "social and economic processes; wealth; social, human, and health services; power relations; race relations; social inequality" and more (Barnett, 2001; Figure 1). The social environment often embodies many parts of a physical environment, for example, resource

accessibility and environmental hazards. Social environments are also fluid as they change over time due to both inner and outer influences (Barnett, 2001).

What are Social Disparities?

Understanding and interpreting social disparities in the healthcare field is quite complex, as there are multiple factors which play into the concept of a "disparity" (Messer, 2008). Understanding the term "disparity," is complex because the word is "laden with implicit assumptions (e.g., programs designed to reduce disparities are effective at doing so); value judgments (e.g., health equity is a worthy goal); and the weight of usual practice (e.g., health outcome assessment should be stratified by race or ethnicity)" (Messer, 2008). For the use of this paper, I understand social disparity as referring to and bound up with race, socioeconomic status, and education level (Figure 1).

Although the concept of race is widely regarded as a social construct (Ford, 2010), it nonetheless results in a wide range of experiences and different treatment among different populations within society. The construct of race focuses solely on skin color, rather than on other biological differences. For example, having a different hair color does not have the same connotation that having a specific skin color has. Despite the profound social implications of race, there is no scientific nor anthropological basis for singling out skin color as a meaningful socio-biological concept (Ford, 2010). Researchers have concluded that there are more biological differences within so-called races than there are between these different "races" and that there is no biological basis for assigning race to skin color (Cohen, 2015). Despite this, "race" continues to play a profound role in US society as a foundation for prejudice and discrimination, which

indirectly leads to profoundly different health outcomes, or health disparities, among populations (Ford, 2010; Figure 1). This thesis focuses on the mechanisms that lead to these health disparities and how they may be avoided. An alternative concept to race is ethnicity (Sandefur, 2005). While ethnicity is also a term that sometimes refers to biological/physiognomic similarities or differences among groups of people, ethnicity focuses on cultural practices, viewpoints, and social aspects like ancestry, language, and religion, that differentiate one group from another. Unlike race, ethnicity is not seen as a strictly inherited trait, but something that is learned over time based on an individual's surroundings and their cultural immersion. Based on personal interest and the current political climate in the United States, I have decided to only focus on race, rather than ethnicity, as a social delimiter in this thesis.

Social disparity is linked to several variables, including socioeconomic status and educational inequality (Lago, 2018; Figure 1). Socioeconomic status is a social factor that takes financial and sociological aspects into consideration by including a person's profession, financial status, and education, and comparing it to the rest of society (Anderson, 2004). Socioeconomic status has transformed into a social issue used to differentiate groups of people. Three main categories commonly used to define socioeconomic status, or class, include high, middle, and low income. People who have a higher socioeconomic status typically have a higher level of education. People who fall in the low-income category, often have a limited level of education, typically exhibit a wide variety of health issues, including respiratory difficulties, cardiac problems, and mental-health burdens (De Hart, 2011). These physiological mechanisms could be caused by environmental factors or labor conditions. In low-income regions, people

often focus on acquiring their basic needs for survival, like food, housing, and security. Since these necessities are usually more scarce in these regions, people don't prioritize education as much. As a result, adolescents living in lower-income regions are at higher risk for health and social difficulties, like teen pregnancies, drug use, and obesity (Institute of Medicine, 2011).

One overarching sociological question in the U.S. is why socioeconomic disadvantages remain skewed around the construct of race, despite historical attempts towards inclusivity and equity nation. This nation is considered a mosaic of different races, languages, and religions, a nation that values liberty and equality. This leads us to the question, "why is poverty still so colored? How can we alleviate this inevitable cycle?" (Lin, 2009). Experts like Murray (2006) conclude that social issues do not stem from a single cause, but are instead a snowball effect resulting from many disadvantages. For example, those disadvantaged in one aspect of life are also more exposed to other forms of difficulty (Woolf, 2013). When social issues promote one race over others, the resulting disadvantages have long-term implications that impact health outcomes, educational inequality, and exposure to other adverse environmental factors (Woolf, 2013). In turn all these factors are inter related. While race is not the primary indicator for quality-of-life in the United States, it has become a driver of a repeating cycle that directly impacts economic and social policies, and increases social issues in the nation. Experts like Woolf (2003) have argued that to reach a stage in our nation where social issues are no longer related to skin color, we must tackle the underlying issue of racism. In order to get to the root of the problem and to create effective reform, it is crucial to focus on the racial gap in the United States rather than on isolated specific

contributors to social issues. Although education is just one contributing factor in the socioeconomic calculus, I specifically wanted to focus on education because it is a major tool in improving one's lifestyle.

Educational inequality occurs when educational resources such as school funding, instructors, supplies, and technologies are more accessible to one social group than to other groups (Smedley, 2001). Throughout history, inequality has targeted marginalized communities by denying them access to these resources (Hanks, 2018). Inequality results in a pronounced gap in academic achievement or productivity because people in marginalized communities lack economic security (Hanks, 2018). Financial instability has caused educational inequality, which has been prominent in the United States of America for many generations (Garcia, 2017). It has influenced and shaped our nation's history, social structure, and culture on many levels (Garcia, 2017). Garcia (2017) posits that all levels of government have failed in creating policies to remedy social divides like educational inequality. The consequences of these shortcomings lead to more disadvantages and setbacks for an entire community (Garcia, 2017; Figure 1).

The predominant American philosophy for remedying social issues is to fund and encourage programs, which are based on the assumption that individuals are accountable and responsible for their own social outcomes (Resnik, 2007). An alternative to this approach is a direct commitment to economic redistribution. Kim and Lee (2018) show that the willingness to support economic redistribution is higher in countries where there is widespread awareness of structural inequality of opportunity. While American's are genuinely committed to the possibilities of upward mobility

(Resnik, 2007), they often do not take into account the structural socio-economic conditions of race and class that produce substantial disadvantages. I propose that increasing recognition of the strong impact of lifestyle on achievement, wellness, and health will promote an understanding that these outcomes are determined primarily by access to a healthy lifestyle rather than personal attributes. I hope that increasing recognition of the vicious cycle between adverse outcomes and lack of access to a healthful lifestyle will increase public commitment to adressing the socioeconomic gradient.

Widespread current misconceptions in US society, about the interrleation of poverty, poor health and achievement, contribute to the maintenance of a social divide which influences how white, wealthy communities interact with poorer communities of people of color. At the same time, there is overwhelming scientific evidence for the negative impact of socioeconomic disadvantage on achievement and health. Social disparities, such as household resources, time available for parenting, and stress level, account for a substantial achievement gap along the lines of race even before a child is enrolled in primary school (Quintana, 2012). For example, African American and Caucasian children enroll in kindergarten at completely dissimilar levels of preparation (Quintana, 2012). These divides that are present at the very start of the education system frequently result in “longer-term gaps, including high school and college completion and the kinds of jobs students secure as adults” (Porter, 2019). Individuals who are living through the inevitable cycle of social issues, particularly minors, are not at fault for causing their inequity (Thomas, 2011). People in the community who have more power and more resources regulate society (Thomas, 2011). Public school

systems have been shaped to mirror and implement these regulations (Thomas, 2011). A continuous achievement gap is a truthful representation of public school systems preserving inequity and privilege (Thomas, 2011).

In summary, race, socioeconomic status, and educational inequality are social issues which create a certain social environment. The following section addresses how these environmental conditions and social issues work together to influence lifestyle factors.

Sleep: Social Issues and Environmental Conditions

Social issues like race, socioeconomic status, and educational inequality have created a social environment that has influenced sleep-related wellness in minority communities (Figure 1; Table 1).

Race and Sleep: Studies have been conducted on racial gaps in self-reported sleep duration in urban neighborhoods. Specifically, one study (Gerontol et al., 2015) measured sleep duration of people of color for one month and related this parameter to variables like age, sex, education, poverty level, and residential area. The results showed that “African Americans were more likely than whites to report short sleep duration (i.e., 6-7 hr vs. >7 hrs of sleep)” (Gerontol et al., 2015). The findings of this study are directly linked to social issues, as the results were categorized racially. Stress levels vary between races, and stress has a direct impact on sleep quality. The reason sleep duration may be shorter for people of color is that they face more social challenges than Caucasians, which may also increase their stress levels. These

increased stress levels result in reduced sleep. For example, African Americans may feel they have to work harder than Caucasians because of societal pressure and stereotypes associated with race. This eventually leads to long-term consequences on an individual's health. Over time, people of color have experienced a social environment with high expectations, limitations, and prejudice. This environment negatively alters stress levels, which impacts sleep quality, ultimately affecting long-term health (Figure 1).

Socioeconomic Status and Sleep: Socioeconomic status, as a social issue, also influences sleep quality. Kashani et al. (2012) studied the association between stress and cardiovascular disease. Individuals with high-stress experience more frequent sleep disturbances and lower overall sleep quality. Social issues can also impact an individual's stress level by affecting work-life balance and financial stability. Socioeconomic status plays a role since individuals in low-income communities face higher stress levels due to financial instability, which may, in turn, contribute to lower sleep quality because of longer work hours and less free time compared to individuals who enjoy greater financial security and more flexible professions (Figure 1). Financial instability causes stress about paying for basic needs. Going to sleep hungry or stressing about the next meal will have significant impact on sleep quality. Another environmental condition that could lead to higher sleep disturbance is neighborhood noise levels, which may also be related to quality-of-life in the communities.

Educational Inequality and Sleep: A literature review by Becker *et al.* (2015) analyzed the relationship between stress and sleep quality by using categories "such as age, employment status, type of work, and level of education." Stress impacted sleep quality for those who had lower levels of education (Becker et al., 2015). These findings directly connect to educational inequality because individuals who did not have an opportunity to receive a good education may be left working minimum-wage, blue-collar jobs with long hours. Since most of their time is spent working, they may not have as much time to focus on other aspects of life. The little time left in the day may be spent on familial or personal responsibilities, which cuts into sleep duration. Juggling many components of life can cause stress and can affect how well a person is sleeping.

Summary of Findings on Sleep: Stress levels often play a huge role in how well an individual is sleeping. This stress is exacerbated by racial divides, socioeconomic differences, or gaps in education. In summary, social issues burdening minorities impact sleep, which has resulted in higher stress and chronic diseases (Figure 1).

Authors	**Year**	**Title of Study**	**Type of Study**	**# of Participants or Studies reviewed**
Becker et al.	2015	*Sleep Quality and Stress: a Literature Review*	Literature review	15 studies reviewed
Gerontol et al.	2015	*Racial differences in self-reports of short sleep duration in an urban-dwelling environment*	Original study	207 participants

Kashani et al.	2012	*Perceived stress correlates with disturbed sleep: A link connecting stress and cardiovascular disease*	Original study	350 participants

Table 1: Authors, year, and title of studies reviewed here on the topic of stress and environment.

Dietary Habits: Social Issues and Environmental Conditions

Social issues have created an environment that has had a profound impact on dietary choices within minority communities. Factors like accessibility to healthy food, food costs, and food preparation have shaped dietary wellness and lifestyle (Figure 1; Table 2).

Race and Diet: In a study, Martinez-Donate et al. (2016) assessed sociodemographic factors, like race and neighborhood restaurant quality, to compare urban and non-urban neighborhoods. A variety of neighborhoods were tested, including food deserts in poor inner-city urban areas compared to more affluent suburban areas. Throughout history, as Caucasians migrated to suburbia, urbanization caused people of color to settle in cities. This divide has led to less healthful food sources, like farmers markets and grocery stores, in urban areas. As a result, residents in urban areas resort to unhealthy food sources like fast food because they are confined to a food desert, defined as an urban region where inexpensive or nutritious food is scarce (Figure 1).

Socioeconomic Status and Diet: Socioeconomic status impacts how much money people spend on food, which ultimately affects their health. In addition, by affecting stress level and work-life balance, socioeconomic status also shapes dietary habits (Sobal et al., 1989). A literature review by Sobal et al. (1989) addresses the relationship between socioeconomic status (SES) and obesity in a number of different countries. A general trend was found for “an increasing proportion of positive associations for countries with high SES and a decreasing proportion of negative associations for countries with low SES” (Sobal et al., 1989). An original study by Ogden et al. (2008) showed that “among both boys and girls obesity prevalence decreases as income increases” (National Center for Health Statistics, 2008). The connection between economic stability and obesity may involve education level and work-life balance. Individuals with more flexible, high-paying jobs may have more time to prepare meals for their families and may also live in areas with access to nutritious food sources rather than in food deserts. A literature review by Wang (2001) compared the frequency of obesity with socioeconomic status across various nations. A complex relationship was found between obesity and SES in the United States and across the globe (Wang, 2001). While obesity tends to be overall more common in richer versus poorer nations (Wang, 2001), this trend reverses along the socioeconomic gradient within a country. For example, in the United States people who fell into lower socioeconomic status were at higher risk for obesity (Wang, 2001). This result is consistent with the assumption that lower SES leads to a less nutritious diet from a young age on. Child obesity has become a more prevalent, worldwide issue, and groups with lower levels of socioeconomic security face greater risks and obstacles.

Educational Inequality and Diet: Healthy eating habits may begin at an early age, and parents with higher education levels may have more knowledge to impart on healthful and balanced lifestyle habits, which may lead to disparities between communities with differential access to high-quality resources that have long-term benefits on their health. For example, families with higher levels of education may have more knowledge on how to maintain a balanced diet. For instance, Larson et al. (2015) linked racial gaps in the residential environments of adolescents to dietary habits and weight. Parenting that "encouraged their children to take part in healthy eating resulted in a lower intake of sugar-sweetened beverages" (Larson et al., 2015). However, this outcome was found only for youths from White, African American, Asian, and mixed/other ethnic/racial groups but not for adolescents who identified as Hispanic or Native American.

An original study by Schafft et al. (2009) utilized a Geographic Information System (GIS) method to detect food desert zones in rural parts of the nation, quantified the number of school districts located in such food-desert zones and compared these data with body-mass index (BMI) of students from schools in these various areas. A direct relationship between food deserts and obesity was found, with students attending schools in areas flagged as food deserts exhibiting higher rates of obesity (Schafft et al., 2009). This finding connects to educational inequality because a lower education level leads to lesser professional opportunities, income, and general quality-of-life. Specifically, individuals with limited levels of education who also live in an urban food desert may not know where to find healthful food sources and may consequently consume solely cheap foods of poor nutritional quality that are readily available in the food desert in which they

reside. Fox et al. (2009) utilized public-school interventions to tackle childhood obesity by focusing on the connection between school food and weight and using interviews with school principals and faculty as well as having trained data collectors record the weight of each student. This study found that “among elementary school children, offering French fries and similar potato products in subsidized school meals more than once per week and offering dessert more than once per week were each associated with a significantly higher likelihood of obesity” (Fox et al., 2009). Schools with low levels of funding may not be able to afford nutritious lunch options for students and may, therefore, buy cheap food that is unhealthy. By serving unhealthy food, these schools are failing in educating students from an early age on how to eat healthily. This will, in turn, expand the level of social issues in society for future generations.

Summary of Findings on Diet: Social issues that lead to certain environmental circumstances shape how healthy individuals are eating and whether or not they are maintaining a healthy weight. Healthy eating habits can be challenging when an individual has other more urgent priorities, like living with socio-economic disadvantages created by society. These social issues promote unbalanced eating habits and lead to obesity (Figure 1).

Authors	Year	Title of Study	Type of Study	# of Participants or Studies reviewed
Schafft et al.	2009	*Deserts and Overweight Schoolchildren: Evidence from Pennsylvania*	Original study	N/A
Fox et al.	2009	*Association between School Food Environment and Practices and Body Mass Index of US Public School Children*	Original study	2,228 participants
Larson et al.	2015	*Ethnic/racial disparities in adolescents' home food environments and linkages to dietary intake and weight status*	Original study	2,374 participants
Martinez-Donate et al.	2016	*Neighborhood Disparities in Restaurant Food Environment*	Original study	259 participants
Sobal et al.	1989	*Socioeconomic Status and Obesity*	Literature review	333 studies reviewed
Ogden et al.	2008	*Obesity and Socioeconomic Status in Children and Adolescents*	Original study	N/A
Wang	2001	*Cross-national comparison of childhood obesity: the epidemic and the relationship between obesity and socioeconomic status*	Original study	N/A

Table 2: Authors, year, and title of studies reviewed here on the topic of diet and environment.

Physical Activity: Social Issues and Environmental Conditions

Social factors like race, socioeconomic status, and educational inequality have created an environment that favors physical inactivity within minority communities. Numerous scientific studies have provided evidence that an individual's social and physical surroundings impact physical activity levels (Figure 1; Table 3).

Race and Physical Activity: Song (2014) examined racial gaps in physical activity levels and found a profound racial difference between white and non-white communities. The study found that "African Americans were 72–76% less likely than Whites to meet [physical activity] guidelines" (Song, 2014). The physical-activity gap between communities of color and Caucasian communities may be due to environmental factors, including neighborhood safety and access to space that allows the physical activity. The author(s) of this study proposes creating interventions that provide the opportunity for physical activity specifically for African American communities and suggests that "culturally relevant interventions" may help remedy the racial variances in physical-activity level and improve health outcomes.

Socioeconomic Status and Physical Activity: Davidson et al. (2006) assessed the physical environment and physical activity in children and found a strong positive relationship between physical activity and access to public "recreational infrastructure [recreational facilities and schools] and transport infrastructure" like sidewalks, controlled intersections, and public transportation. Since people in areas of high versus low socioeconomic status have access to more resources, they have a better chance to

improve their lifestyle by exercising more. Another study (Bowser et al., 2011) assessed physical-activity levels among children in relation to social factors like socioeconomic status. Children enrolled in schools located in neighborhoods with higher overall socioeconomic status (SES) “were more active and had higher fitness levels than those from schools with overall lower SES levels” (Bowser et al., 2016). This shows that people with high income have healthier lifestyles than people with low income because they exercise more.

Educational Inequality and Physical Activity: Shaw et al. (2008) assessed the connection between education level and physical activity by measuring physical activity levels of individuals on a daily basis and found a relationship between education and exercise level. People with low education had “reduced physical activity, whereas for highly educated individuals the reverse was true” (Shaw et al., 2008). Health problems were more frequent in individuals who had lower levels of education (Shaw et al., 2008), which could be due to the fact that people with lower education levels do not know the health benefits that result from regular physical activity. Often, public schools emphasize the importance of physical activity by incorporating physical education classes into their curriculum, but people from schools with limited funding may not have space or resources to encourage physical activity.

Environment and Physical Activity: Social environmental factors, such as access to safe parks, work-life balance, and financial availability, can affect how often an individual engages in physical activity or fitness. Derose et al. (2018) addressed the

relationship between gender and park-use in high-poverty areas within Los Angeles via interviews with a randomly selected population of adults who all resided within one mile of a park. Men were found to have significantly higher park usage than women as well as longer park visits, and this gender-based difference in park usage may be related to neighborhood safety. The higher crime rates in many lower-income neighborhoods may be a contributing factor of the gender disparity in park usage, as many women may not feel safe using parks in areas with high crime rates. The authors of this study concluded that interventions are needed to alleviate these gender disparities and increase levels of physical activity in high-poverty neighborhoods (Figure 1).

Summary of Findings on Physical Activity: Social issues create environments that influence the frequency with which members of certain communities engage in regular physical activity. While most people aspire to live a healthy life, many do not implement health-promoting habits because of insufficient free time or money. Simple, cost-efficient, and effective recommendations can be used to improve the lifestyle of the members of these communities (Figure 1).

Authors	Year	Title of Study	Type of Study	# of Participants or Studies reviewed
Shaw et al.	2008	*Examining the Association Between Education Level and Physical Activity Changes During Early Old Age Measurements*	Original study	7,595 participants
Davidson et al.	2006	*Do Attributes in the Physical Environment Influence Children's Physical Activity? A Review of the Literature*	Literature review	33 studies reviewed
Bowser et al.	2011	*Disparities in Fitness and Physical Activity Among Children*	Original study	3,798 participants
Derose et al.	2018	*Gender Disparities in Park Use and Physical Activity among Residents of High-Poverty Neighborhoods in Los Angeles*	Original study	2,973 participants

Table 3: Authors, year, and title of studies reviewed here on the topic of physical activity and environment.

Recommendations: Concrete Steps

Sleep Recommendations: Issues with major impact on sleep-related wellness for minorities include work-related stress because of racial societal pressure, financial insecurity, and unskilled, physically demanding jobs. De Neit, (2009) demonstrated an association between music-assisted relaxation and sleep quality, which serves as a solution to remedy stress-induced sleep quality. De Neit recommended that “music-assisted relaxation can be used without intensive investment in training and materials and is therefore cheap, easily available” (De Neit, 2009) as a solution to help improve

sleep quality (Figure 1). The recommendations from this study provide a stress-relieving outlet to improve sleep quality, for all people, despite race, socioeconomic status, and educational inequality.

Diet Recommendations: Race influences diet, as urbanization has led to high levels of food deserts in urban, minority-populated areas. Socioeconomic status impacts diet because unhealthy foods, like fast food, are cheaper than healthy alternatives. Educational inequality affects diet because some communities are deprived of basic knowledge of healthy eating habits. People often believe that healthful eating must be expensive and time-consuming. However, there are many simple tips and recommendations for healthful eating that are easy, quick, and affordable. Healthful food not only lowers the risk for many chronic diseases that develop over time, but also improves mood, attention, memory, and performance at all ages (ref perhaps Adams et al. 2016?). Many simple, affordable, healthy meal options can provide nutrition similar to what more expensive foods offer. For example, foods with inflammation-fighting properties include not only fresh fruit and vegetable that may not be available everywhere but also more available and storable dried herbs and spices. Throughout history, spices and herbs have been incorporated in culinary traditions, cosmetics, colognes, and medical remedies used on a daily basis (Dog, 2006). Dog (2006) concluded that spices like ginger, coriander, cumin, turmeric, chili, and peppercorn are extremely beneficial in improving digestion as well as other conditions. Spices and herbs are cost-effective and can be taken on-the-go, purchased in food deserts, and eaten with any type of meals to add flavor and health benefits (Figure 1).

Physical Activity Recommendations: People of color often live in high-crime neighborhoods, which impacts how frequently they exercise. Low-income neighborhoods do not always have adequate infrastructure to encourage physical activity. In addition to the lack of resources, some communities also lack education on the health benefits of exercise. Education and simple recommendations can promote low-cost physical activity options with health benefits similar to an expensive gym membership. Advertising public information can help people discover low-cost stress-relief options that fit into busy, stressful lives. A study conducted by Harvard University (2018) showed that deep breathing was an easy, cost-free method for relieving stress and promoting good health. The physiological mechanisms involved in breathing cause shallow breathing to restrict movement in the diaphragm because the lower lungs are not completely exposed to oxygenated air, which can cause symptoms like shortness of breath, stress, and anxiety (Harvard, 2018). In contrast, taking big, deep breaths allows oxygen to completely exchange in the lungs and allows carbon dioxide to be released (Harvard, 2018). Practicing deep breathing can lower heart rate and blood pressure. Deep breathing is one of the simplest solutions that does not depend on environmental conditions, such as neighborhood safety, financial income, or access to resources. An effective way to teach healthy, cost-free habits is through public school curricula. Regardless of social issues like educational inequality and educational funding breathing is an accessible tool for all individuals.

The Power of Synergy

Focusing on the synergy of factors that impact health is a relatively new concept in the health-care field. There are many dietary and lifestyle factors that can contribute to causing chronic diseases (Dulloo, 2016). In recent years, many studies have assessed the individual roles of sleep hygiene, dietary practices, and physical activity levels in contributing to illnesses (Dulloo, 2016). However, these different factors do not act in isolation but rather act in synergy with one another (Dulloo, 2016). This synergy multiplies the harmful outcomes when an unbalanced diet, chronic stress, and physical inactivity are combined. These behaviors disturb the connection between management of the “circadian clock and metabolic physiology” (Dulloo, 2016) and can alter an individual’s energy levels and diet (Dulloo, 2016). Conversely, the synergy between balanced diet, stress/sleep management, and regular moderate physical activity can multiply the benefits of these lifestyle factors. Since sleep, diet, and exercise go hand-in-hand to help promote a healthy lifestyle, the concept of synergy could be very beneficial in ensuring long-term benefits, with baby steps, in weight management and preventing lifestyle-related disease. The synergy between sleep, diet, and physical activity is important because each influences the other. For instance, if individuals have a balanced diet and exercise regularly, but their sleep quality is poor, they are not optimizing their health benefits. There may still be a risk for chronic disease and illness due to their unbalanced lifestyle. Adding at least one easy recommendation in each category could maximize long-term health benefits because of the effectiveness of the categories' synergy.

Conclusions

Social disparities caused by racial bias, socioeconomic status, and education level have led to increased levels of chronic disease in marginalized communities and these are in turn linked to poor sleep habits, dietary practices, and physical activity levels (Figure 1). Social disparities and gaps in resource accessibility for health-promoting lifestyle choices cause disparities in health outcomes among communities. An improved understanding of the roles of sleep, diet, and exercise in the support of wellness would provide the public with some simple, cost-effective solutions accessible to everyone regardless of social status (Figure 1). Systemic inequities and differential power relations have created a social environment that can adversely shape the lives of certain marginalized socio-economic and racial groups. These social factors have impacted physiological mechanisms that result in chronic disease for these marginalized communities. Poorer and minority communities face higher levels of stress which impact their sleep quality but can can be alleviated by music relaxation therapy. Marginalized communities living in food deserts which have limited access to healthy food sources, may find solutions by obtaining rich nutrients found in herbs and spices. People facing socio-economic disadvantagesmay not have the opportunity to exercise regularly, due to recreational infrastructural limitations and unsafe environments. In such instances, deep breathing is a simple, cost-free solution that promotes health while maneuvering through external obstacles. Understanding the synergy between these three lifestyle choices could improve one's lifestyle and health without completely shifting one's entire lives.

Study Limitations: Although this thesis reviews studies conducted by multiple researchers around the world, there are still limitations to the conclusions that can be drawn. This thesis is not exhaustive and does not include all possible solutions that can contribute to removing social disparities. There are many other aspects of social disparities in the lives of minorities that I was not able to address here. Given additional time, I would include more literature on the topics I selected. In addition, I would really be interested in focusing on collecting my own data in, an experiment testing any of the physiological mechanisms, and gaining first-hand evidence of the results.

Acknowledgments and Reflection

As a very enthusiastic, motivated, and hard-working student, I can certainly say that completing an honors thesis in the Department of Ecology and Evolutionary Biology was an unforgettable and once-in-a-lifetime experience for me. This opportunity opened so many doors for me, to expand my knowledge in science, meet new people, and gain research experience. I noticed that my active participation in my past experiences, diverse background, and passion for biology helped me positively contribute to this amazing project. I love learning, challenging myself, working with people, and building connections; through this course, I could exercise these things. This honors thesis has helped me decide my future profession and has allowed me to identify my next steps. Once I complete my undergraduate studies, my goal is to attend medical school. Not only was I able to study a new topic that I feel passionate about, but I was also able to further my knowledge in the field I have spent numerous hours exploring throughout my undergraduate journey. Through this process, I had the opportunity to shape myself into

a young researcher and explore possible interests that could cultivate my future. I feel that it is my responsibility to utilize the abundance of resources I have around me to take myself to the highest level of education and service work. I wake up every day knowing that I am closer to being a major force in the ongoing efforts to prevent health disparities and to provide access to quality health care to every person on this planet. My goals are very clear and important to me because I want to take advantage of all the opportunities my parents never had. It is, therefore, my duty to outwork the person I was yesterday and to push myself because I have already begun the process of grooming myself for leadership. My roles of responsibility in school have prepared me for leadership, and my humanitarian work has kept me humble. I know why I am here and it is a good feeling. Every step I have taken in my young life is a solid path towards my dedication and promise to make a difference in the world. My name is Mercell Enayat and I am going to be–as Mahatma Gandhi once so wisely advised–the change I wish to see in this world.

Visuals

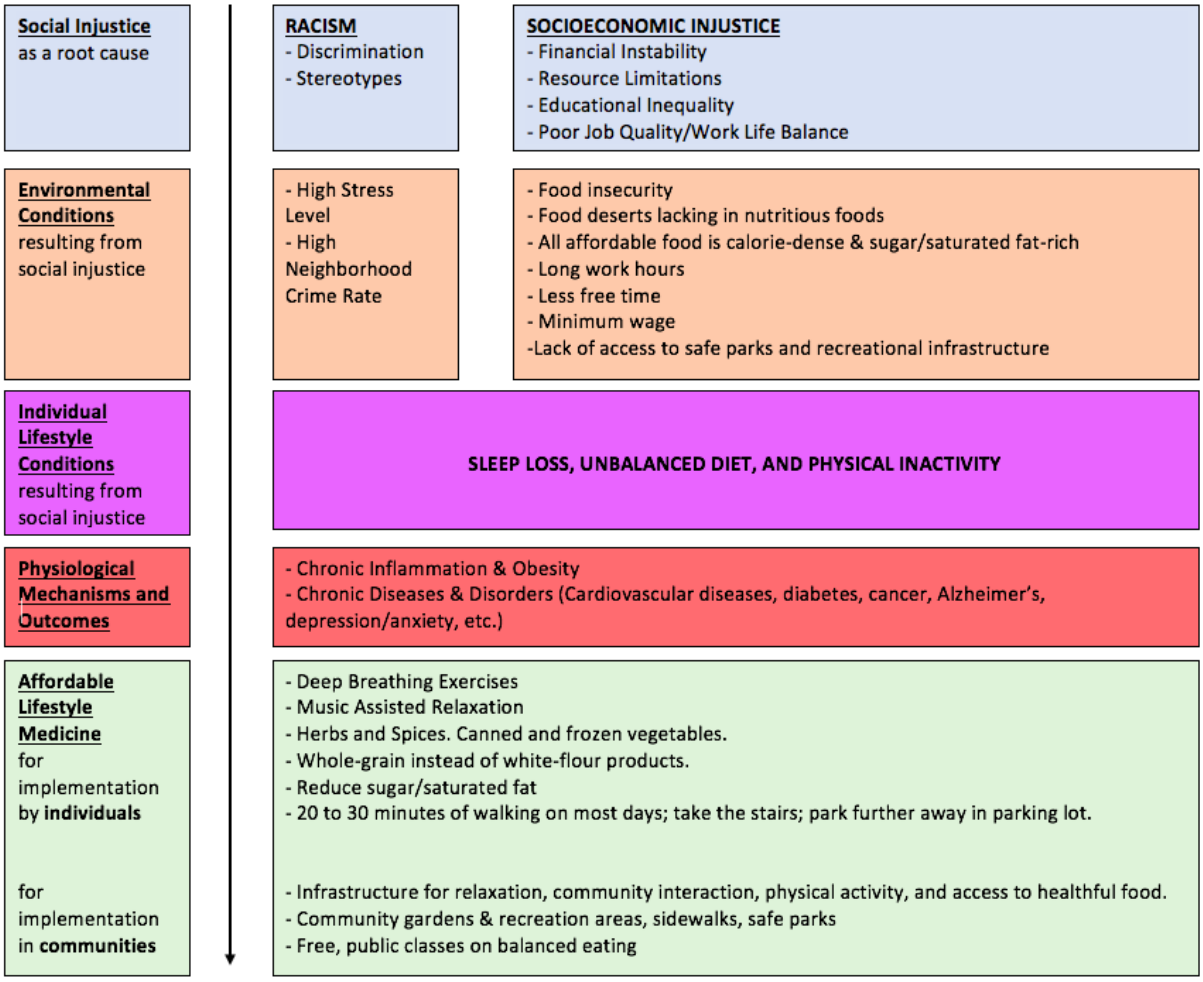

Figure 1: Summary of interactions between the impact of the environment on lifestyle and resulting impacts on health outcomes.

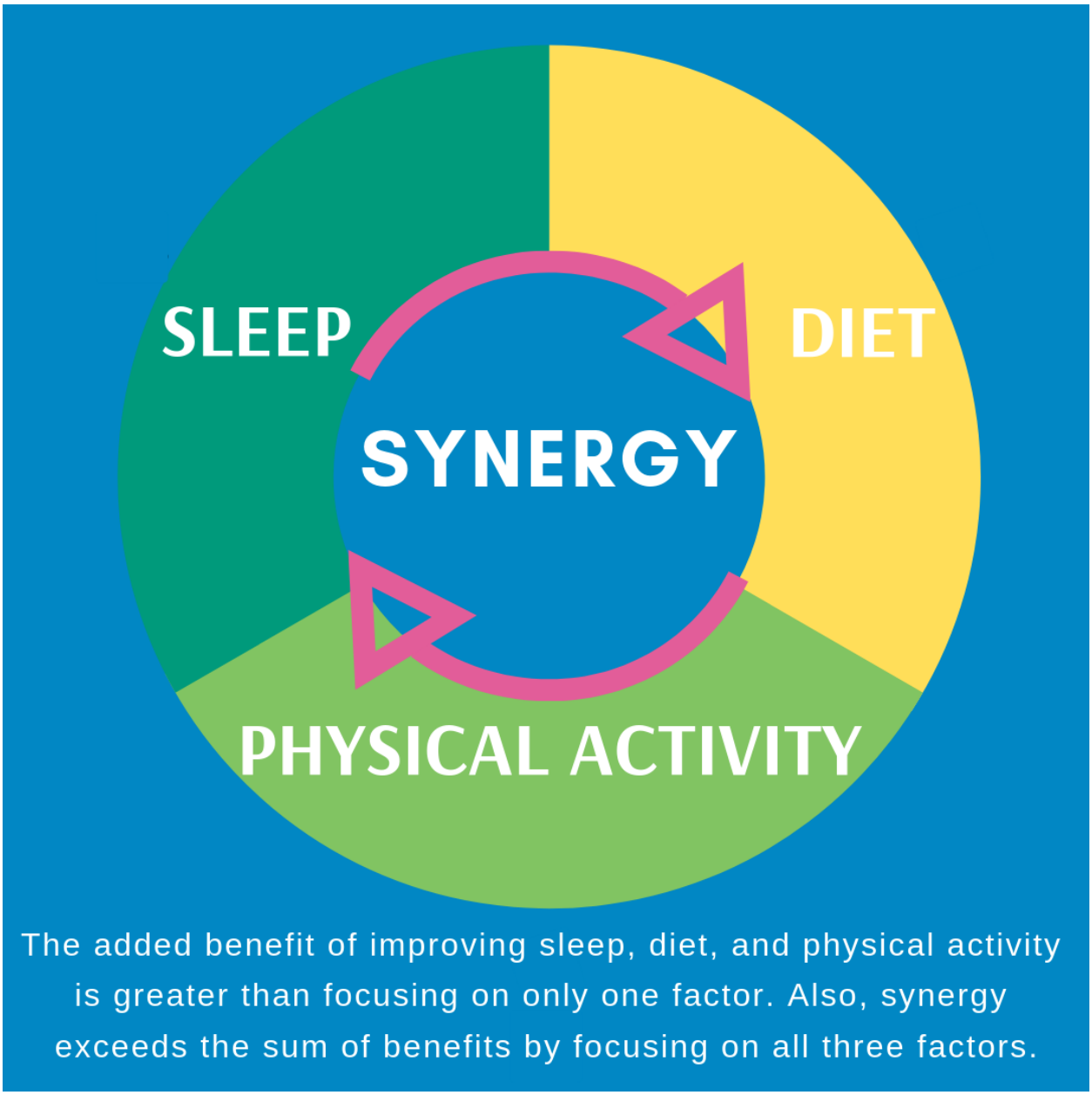

Figure 2: Summary of the synergy interactions between sleep, diet, exercise.

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