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**The relationship between physical and mental health,
and the effect of early trauma and discrimination.**

Autor/a: Ana María Vucic Sánchez
Director/a: Ignacio Echegoyen Blanco

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1. Introduction

John Steinbeck (1962) once said that “a sad soul can kill you quicker, far quicker, than a germ.” While it may be true that we have advanced substantially in the field of mental health, and that we take better care of that sad soul now than we did in the first half of the twentieth century, there is still much disregard around this topic in the medical field. Today in age, we tend to refer to the soul as the mind, but it gets sad just the same. There is a tendency to shy away from the complex origins that cause us to be sad and the many mental illnesses with which we cohabit. Moreover, there is much neglect around the tight-knit relationship that poor mental states have with all the germs, or physical illnesses, we are more accustomed to treating.

The concept of health is a complex one that, due to its intangible nature, can be difficult to define. According to the Constitution of the World Health Organization (2002), “Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.” This definition marks how simply the absence of illness, will not ensure well-being. A term that could be described in simple terms as “judging life positively and feeling good” (Center for Disease and Control [CDC], 2018). By these modern theories of what constitutes health and well-being, it is evident that the concept of health has developed to be viewed in a more holistic fashion, and addressed in a way that better aligns with the biopsychosocial model.

This model, originally proposed by George Engel in 1977, refers to “methodological assumptions that causes and/or cures of specific conditions at specific stages, including matters of adjustment and quality of life, will generally – across a wide range of conditions – include biological, psychological and social factors, and interactions between them” (Bolton, 2022). It is very important that we understand our health as multifactorial. By continuing to explore these factors in an integrated fashion we should aim to avoid interpreting them as being independent of one another. Comprehending the complex relationships between our biological, psychological, and social factors, and how they interact with each other, will be paramount to treating and preventing all sorts of diseases that make our lives more difficult.

For example, we know today that poor mental health puts people at risk of having more problems with their physical health. Particularly with cardiometabolic diseases, there is a 1.4 to 2 fold increased chance for people with mental illness to suffer from

diabetes, obesity, and cardiovascular disease (Firth et al., 2019). This relationship is a two-way street. While mental illness can contribute to the development of chronic disease, these chronic diseases can also have effects on the emotional state of patients and be a factor in the development of mental health disorders: there are indications that there is a bi-directional relationship between the two (Chen et al., 2016).

This phenomenon could be one of the factors playing a part in the shortened lifespan of those with severe mental illness (SMI). This category refers to people suffering from diseases like major depressive disorder, schizophrenia, and bipolar disorder. People with SMI have a reduced life expectancy of 10-15 years compared to people who are not mentally-ill (Melamed et al., 2020). To better prevent these serious and persistent illnesses, comprehending their etiology is fundamental.

In analyzing mental and physical health, each day we are learning to better appreciate how our early experiences will later take a toll on both. The original Adverse Child Experiences (ACE) Study (Felitti et al., 1998) had a groundbreaking impact on the understanding of risk factors for disease and physical and mental health. There are three types of ACEs: abuse, neglect, and household dysfunction. The first includes physical, emotional, and sexual abuse. The second includes physical and emotional neglect. Finally, under household dysfunction we find mental illness, incarcerated relative, mother treated violently, substance abuse, and divorce. There are other factors that have not received as much attention but are starting to be addressed as ACEs as well: peer violence (bullying), sibling violence, and witnesses interpersonal violence (Hughes et al., 2017, as cited in Riedl et al., 2020).

This study showed the medical field just how important our early childhood experiences are, particularly traumatic ones. People who have been exposed to abuse and/or household dysfunction as children have a higher chance of suffering from disease in adulthood. For example, there's an increased risk for those who have faced four or more ACEs to develop cancer, heart disease, and diabetes (Boullier & Blair, 2018).

ACEs can happen in any household, although there are certain risk factors that increase their likelihood. Children who live in poverty, are black, and have special health care needs, are more likely to experience ACEs (Crouch et al., 2019), and with these identities comes the hard reality of a discriminatory society. Discrimination and ACEs unfortunately work very well together. People tend to suffer more from psychological

distress when they are affected by ACEs and discrimination, compared to those who have not experienced discrimination and have little or no ACEs. ACEs can also amplify how discrimination correlates with anxiety and depression (Helminen et al., 2022).

Moreover, these traumatic experiences have a significant impact on the mental health of these individuals in their adult lives, such as mental illness and health risk behaviors. These health risk behaviors can also give us clues to better understand what intermediary elements can play a role in the physical health problems to which this population is more vulnerable. There is a graded relationship between having experienced different categories of ACEs and health risk behaviors (Felitti et al., 1998). These include alcoholism, drug abuse, smoking, physical inactivity, severe obesity, 50 or more sexual partners, depression, and suicide attempts.

Outside of specific circumstances that can be categorized as ACEs, poverty levels and discrimination can also be directly linked to the topic of mental health. A study in Australia found that there is a bidirectional relationship between affordable housing outcomes and mental health and physical health (Baker et al., 2013).

This integrative review aims to demonstrate the relationship between traumatic experiences and effects on physical and mental health, while pointing out the ways in which mental and physical health may feed into one another. It is important to also shine light on the context of people's struggles with trauma and disease to be able to paint the whole picture. This study will address the ways in which poverty, discrimination, and violence can exacerbate these symptoms and create more obstacles and boundaries for these communities to be able to experience well-being and improve their economic and social resources. Specific factors will be explored such as wealth, race, sexuality, and gender.

2. Methods

Various databases were used to compile data from a multitude of studies related to the central and minor topics discussed. These included PsycInfo, Psycodoc, and Psychology and Behavioral Science Collection. Key terms and keywords that guided the research were: physical health or physical wellbeing or physical illness or physical health problems, mental health or mental illness or mental disorder or psychiatric illness, adverse childhood experiences, severe mental illness, long term conditions or chronic disease or

chronic conditions or chronic illness, long term effects or long term complication or long term impacts, stress and anxiety, common mental disease or depression or anxiety, psychosomatic or psychosomatic symptoms, effects, stress, stress and health, police or policing, community violence or neighborhood violence, discrimination or prejudice or stereotype or bias or stigma, minority stress, racial discrimination, allostatic load, minority stress theory, pharmacological treatment or pharmacological intervention or pharmacological therapy, HPA axis or hypothalamic-pituitary-adrenal axis, psychoimmunology, health outcomes or health consequences or health, and health effects or health impact or health risk. The information was organized and presented to meet the objectives of the study.

3. Results

3.1 Physical Health Effects on Mental Health

Results. There are specific diseases and conditions which have received more attention regarding their relationship with mental health. The following section will address the effects that physical diseases can have on a person's mental health.

Cancer. There has been extensive research on the mental health of cancer patients, in the field known as psycho-oncology. Many patients with cancer who were psychologically healthy prior to their diagnosis experience emotional distress and even psychiatric diagnoses after starting this process (Roy, 2022). Approximately 30-60% of cancer patients have a psychological disorder and between 29-43% meet the criteria of a psychiatric diagnosis (Anuk et al., 2019). One study that specifically centered on tobacco-related cancers found that 73% of patients have common mental disorders (Barbhuiya, 2020).

This data is alarming, especially given the likelihood of underreporting. It is estimated that less than 10% of cancer patients are referred to mental health professionals to receive help. Of those that are referred to psycho-oncological help, 97.5% receive a psychological diagnosis (Anuk et al., 2019). This data puts into question how the numbers would look if all cancer patients had access to some sort of mental health evaluation and assistance. It is evident that the stressor of a disease such as cancer will cause psychological distress in patients.

Chronic diseases. People with a chronic condition have to live with the negative physical symptoms of the disease for all, or almost all of their life. Along with these hardships, many also suffer from comorbid mental health conditions (Duong & Bradshaw, 2016). In some cases, this can contribute to people thinking about taking their own life. There is a relationship between chronic physical conditions and suicide ideation that can be linked directly or through the mediator of mental disorders such as post-traumatic stress disorder (PTSD) and depression (Vasiliadis et al., 2021).

We can see the effects on youth who at a young age are already diagnosed with a chronic disease. In an extensive study of U.S. youth suffering from chronic physical conditions, the adjusted risk of comorbidity with chronic mental health conditions was 51% greater than those without (Adams et al., 2019). At the age of 10, children already present disproportional rates of mental illness, which continue to be reaffirmed at 13 and 15 years of age (Brady et al., 2020). This is a problem that starts early on and, with the life-long nature of these conditions, will likely persist in these patients' lives.

Infectious diseases. The effects of infectious diseases on people's mental health have been appreciated for a significant time now. In the early 20th century, scientists were linking infectious diseases like typhoid fever, pneumonia, mumps, scarlet fever, and influenza to the apparition of psychotic, manic, and depressive episodes. The recent Covid-19 pandemic also offered evidence of people being left with long-term neuropsychiatric symptoms due to damage from the virus' ability to infect the brain (Perozzo et al., 2021). This showed a direct link between the disease and its ability to affect the mental health of the person, but we also see an indirect psychological distress linked to the intense fear of infection, social isolation, and economic stress that most people were subject to.

This indirect relationship to a deteriorated mental health is common among infectious diseases, as is the case with Tuberculosis (TB). Despite the alarming death toll and prevalence of TB worldwide, there is very limited data on its relationship to mental health. In a hospital in Nigeria, significant differences were observed when comparing the rates of psychiatric disorders in people with pulmonary TB and patients with bone fractures. While 5% of the health control group presented psychiatric disorders, the numbers rose to 15% in the orthopedic group, and 30.2% in the TB group (Aghanwa & Erhabor, 1998). Another more recent qualitative study in Russia examined how TB was affecting infected adolescents. They expressed fear and anxiety over their health outcome,

a more negative evaluation of themselves, strongly linked to feelings of shame and a diminished social network due to rejection by their peers (Zvonareva et al., 2021).

HIV is another infectious disease that, despite the incredible advances in its prevention and treatment, continues to affect many people's lives in very significant ways. The relationship between HIV and psychiatric disorders seems to be bidirectional, and very much affected by stigma and discrimination (Cohen et al., 2021). Screening for the psychiatric morbidity of HIV positive people in Kenya, 71.4% of the patients at the clinic had mental health disorders. Among these, 32.2% had major depressive disorder, 18.4% had PTSD, 17.6% had dysthymia, 17.6% had obsessive-compulsive disorder, 16.3% had low-risk suicidality, and 11.4% had mania (Ng'ang'a et al., 2018). Other investigations in Sub-Saharan Africa, the region of the world with the greatest number of people living with HIV, have continued to register the high frequency of stigma and common mental illness, especially depression, in this population (MacLean & Wetherall, 2021; Motumma et al., 2019).

While there are always intermediary mechanisms facilitating the deterioration of a person's mental health when they are living with a physical illness, with infectious diseases there seems to be more awareness of what those elements might be.

Causal mechanisms and moderator variables. Convalescent individuals experience stigma that is extremely harmful, and this is one of the explanations for the deterioration of the mental health of physically ill people. In the case of TB, HIV, and epilepsy, the stigma these patients live with is associated with mental health disorders, especially anxiety and depression (Kane et al., 2019). Later on, we will discuss the role of discrimination and stigma on a person's health more in depth.

The limiting effects that many physical diseases have on the body can lead to physical inactivity and sedentarism—other important factors that facilitate the relationship with poor mental health outcomes. We know that exercise has direct benefits for preventing or minimizing mental illnesses like depression or depressive symptoms (Kohut, 2019), and for many ill people exercise is very difficult or simply not a reality. For chronic disease, in the study mentioned earlier by Adams et al. (2019), 13.5% of the relationship was found to be mediated by activity limitations. Additionally, metacognitive beliefs are associated with depression and anxiety among a vast number of physical illnesses (Capobianco et al., 2020). Household income has been identified as a moderator

between chronic health conditions and SMI (Duong & Bradshaw, 2016), a topic that will also be discussed further on.

Organismal homeostasis, and especially central nervous system homeostasis, can be influenced by many factors including genetics, physiology, psychological wellbeing, and lifestyle circumstances. Disruption of these factors, combined with activation of immunological/inflammatory responses, can contribute to the development of neuropsychiatric disorders (Perozzo et al, 2021). While the activation of immunological/inflammatory responses can be beneficial in fighting detrimental infections, long-term or exaggerated inflammatory responses can lead to a continued elevation of inflammatory cytokines, chemokines, and neurotransmitters. This has led to the definition of the “cytokine hypothesis of depression,” where neuromodulators and other proinflammatory cytokines are essential components of the neuroendocrine, neurochemical, and behavioral features of depressive disorders (Schiepers et al, 2005). Also, it was reported that several inflammatory diseases (e.g., rheumatoid arthritis) are associated with depression, and that inflammatory cytokines can promote depressive symptoms and hyperactivity in the hypothalamic-pituitary-adrenal (HPA) axis (Schiepers et al, 2005; Flux & Lowry, 2023). Commensal gut bacteria can also regulate production of inflammatory cytokines and consequently influence inflammatory processes in the gut and the whole body (Flux & Lowry, 2023). Furthermore, the neuro-immune affective framework that targets regions of the prefrontal cortex and emotion regulation is affected by the endocrine and immune systems (Lopez et al, 2018). Together, all these studies indicate that the immune system plays an important role in the function of neuronal circuits and therefore also in psychological health.

3.2 Mental Health Effects on Physical Health

Results. Mental health conditions have effects on the body and our physical health as well. When looking at 16 mental illnesses, most had a link to 10 subsequent chronic physical diseases that was statistically significant. These relationships ranged between having an odds ratio¹ (OR) of 1.2 and 3.6 (Scott et al., 2016). Along with reviewing evidence for these relationships, it is important to understand what mechanisms might be acting as intermediary factors in creating these effects.

¹ Odds ratio (OR) is a measure of the frequency of occurrence of an outcome relative to the frequency of it not occurring (George et al., 2020).

Severe mental illness. The strain that different mental illnesses can exert on a person's health can vary. SMI can take a particularly heavy toll. One study on cancer survival outcomes comparing patients with and without psychiatric disorders found significant differences for those diagnosed with depression (hazard ratio² [HR] = 1.16) schizophrenia (HR = 1.62), or bipolar disorder (HR = 1.35). In contrast, patients diagnosed with anxiety did not have significant differences (HR = 1.07) in their cancer survival outcome when compared to the control group (Benny et al., 2022). These findings are further confirmed by significantly lower survival rates of women with breast cancer who have SMI, particularly non-affective psychosis (Ahlgrén-Rimpiläinen et al., 2020).

We also see these detrimental effects in other physical conditions. People with schizophrenia are more likely to suffer from physical illnesses and have a significantly reduced life expectancy that is 10-25 years lower than the rest of the population (Crump et al., 2013). The cause is currently unknown, but this increased risk is not due to genetic liability as some had considered (Kendall et al., 2020). This information leaves a lot of questions around what stressors schizophrenia and other SMI have on the body and why they have such substantial impacts on the person's physical health.

Personality disorders. There are ten different personality disorders (PD). Each is characterized by its own particular set of traits and behaviors that constitute a very well-established pattern that dictates how the individual acts in most or all environments. These disorders are marked by how the way they live their life and interact with others deviates from what is culturally expected or acceptable. Their maladaptive patterns of behavior are affected in at least two of the following: cognition, affectivity, impulse control, and interpersonal functioning.

There are clear indications that there is a link between PD and having physical health problems (Dixon-Gordon et al., 2018; Dokucu & Cloninger, 2019). Any severe PD will be associated with more physical, mental, and social disorders. Poor health was reported by more individuals with PD (41.3%) than those without PD (15%), along with a greater percentage of people having more than three illnesses, both when excluding depression (19.9% vs 8.9%) and including depression (22.9% vs 9.9%) (Fok et al., 2014).

² The hazard ratio (HR) measures the different rates at which an event occurs in two groups that differ in a relevant factor (George et al., 2020).

The physical illnesses that are more prevalent in people with PD include asthma, other respiratory problems, arthritis/rheumatism, back problems, and migraines. PD are also associated with chronic disease, obesity, sleep disturbances, and pain conditions (Dixon-Gordon et al., 2018).

Stress. Stress tends to come up more often as an intermediary factor between psychosocial adversities and the final consequences that show up as physical and mental symptoms. Therefore, aside from this section, we will explore stress further when we discuss the effects of social factors and discrimination on people's health.

Stress has been demonstrated to influence the onset and maintenance of several physical and psychiatric conditions (Slavich & Auerbach, 2018). Somatic conditions include diabetes, asthma, chronic pain, arthritis, metabolic syndrome, inflammatory bowel syndrome, and cardiovascular disease. For example, with diabetes, stress affects the glycemic control (HbA1c) and mortality of those patients. For people who are diabetic, stress related to their work ($\beta = 0.65$, 95%) and to their perception of how stress may affect their physical health ($\beta = 0.60$, 95%) increases HbA1c levels (Walker et al., 2019). In the case of asthma, we can also identify an increased health risk. The accumulation of stress on adolescents will decrease their asthmatic control, decrease their perceived quality of life, and increase their visits to the emergency room (Miadich et al., 2020).

In older populations, stress can particularly affect the self-perception of health. Days with higher self-perceived stress are correlated with worse self-perceived health and self-perceived aging (Whitehead & Blaxton, 2020). There are many factors that can affect stress levels. Material hardship is one of the many variables that will increase perceived levels of stress, and in turn this stress can be linked to more mental and physical health problems (Woo et al., 2021). Due to the importance of the stressors themselves, it is important we analyze all of their impacts on our health.

Causal mechanisms and moderator variables. Many patients with mental illness are prescribed psychiatric medication that can have secondary negative effects on patients' physical health such as weight gain, total cholesterol, fasting glucose, and HbA1c levels (Croatto et al., 2022). Life stress can modify the regulation of the hypothalamic-pituitary-adrenal (HPA) axis, which is associated with poor physical and mental health outcomes (Young et al., 2021).

The lifestyle that is often observed in people with depression and SMI, specifically related to inactivity and diet, can predispose people to developing diabetes or worsen the progression of the condition (Holt, 2019). Variables mediating the relationship between PD and poor health include concurrent mental illnesses like depression, lack of adherence to the treatment of chronic illnesses, emotional dysregulation, higher rates of polypharmacy that has its own set of health risks, biological vulnerabilities like metabolic syndrome or BMI, deteriorated relationships with their healthcare services, and personality factors that influence their perception of health (Dixon-Gordon et al., 2018; Fok et al., 2014).

3.3 Effects of Trauma and Adverse Childhood Experiences on Health

Results. When addressing trauma, we will tend to focus on ACEs due to the extensive research around this topic. Because of the attention this criterion has received globally, we must also note the cultural differences that may play into their varied frequencies. A metaanalysis conducted in 2017 by Hughes et al., in an attempt to bring together the results of many studies conducted worldwide, was confronted with the fact that there was some variety within the factors that were being analyzed as ACEs. Depending on the study, they found that between 12-67% of people have experienced no ACEs, whereas 1-38% of participants have a prevalence of four or more ACEs.

A common feature in all these studies was the way they correlated with health problems and health risk behaviors. Persons with four or more ACEs had a four times higher chance of having mental distress or a mental disorder. Among physical illnesses, respiratory diseases had the most significant correlation to having experienced four or more ACEs with an OR of 3.05. The other diseases that were reviewed were liver and digestive disease with an OR of 3.05, cancer with an OR of 2.31, cardiovascular disease with an OR of 2.07, and diabetes with an OR of 1.52. Even stronger than these relationships were those linked to health risk behaviors such as heavy alcohol use (OR = 2.20), smoking (OR = 2.82), having multiple sexual partners (OR = 3.64), early sexual initiation (OR = 3.72), teenage pregnancy (OR = 4.20), illicit drug use (OR = 5.62), problematic alcohol use (OR = 5.84), sexually transmitted infections (OR = 5.92), violence victimization (OR = 7.51), violence perpetration (OR = 8.10), problematic drug use (OR = 10.22), and finally, suicide attempt (OR = 30.14). These health risk behaviors

can give us a lot of information around possible mediators between the adverse experiences from a person's childhood and their health outcomes in their adult life.

These results have been confirmed in later studies, as is the case with a study done specifically with hospital patients. They found a positive correlation between having experienced more ACEs and a higher number of physical disorders ($r = 0.16$, $p < .001$), depression ($r = 0.32$, $p < .001$), anxiety ($r = 0.30$, $p < .001$), somatization ($r = 0.18$, $p < .001$) and experiences of domestic violence ($r = 0.42$, $p < .001$). Polyvictimized patients, those who had experienced four or more ACEs, again saw the most drastic increase compared to those without ACEs. The odds ratios within physical disorders: chronic pain (OR = 3.8), urogenital disorders (OR = 2.8), gastrointestinal and musculoskeletal disorders (both OR = 2.30). Among mental health disorders, polyvictimized patients had an 8.9 times higher chance of having depression and 6.4 times higher odds of having anxiety. These patients also were 10.4 times more likely to have experienced domestic violence in their adult lives (Riedl et al., 2020).

While this study focused predominantly on the negative effects of poor health in one personal area on another, we can appreciate that the opposite could also be true. Though ACEs increase the chance of having anxiety or depression in adolescents, positive childhood experiences can moderate the impact of those ACEs on their mental health (Qu et al., 2022).

Expanding the lens to trauma in general, not just adverse situations before the age of 18, the effect on the person's health is maintained. A traumatic event is when someone personally experiences or is witness to the threat of a person's life or integrity. People who have experienced trauma are more likely to have problems with their cardiovascular, reproductive, gastrointestinal, brain, immunological, musculoskeletal, and neuroendocrine health. The symptoms they experience also make them more vulnerable to developing other medical conditions (Kumari & Mukhopadhyay, 2020).

Causal mechanisms and moderator variables. As with stress, trauma also has an important effect on the HPA axis by chronically activating it, along with the sympathetic nervous system. This has significant implications like increasing allostatic load and altering the natural levels of cortisol and norepinephrine (Kumari & Mukhopadhyay, 2020). The idea of allostatic load is used to explain how even small changes may combine to negatively impact health. Biological, psychological, behavioral,

and attentional changes associated with PTSD are the proposed mechanisms through which it may affect physical health (Schnurr, 2022). Early life stresses transform into biological signals that are concurrently or successively incorporated into the cardiovascular and metabolic systems, along with the brain (Mariani et al., 2021). This biological embedding also causes changes in the immune, endocrine, and nervous systems, affecting in turn the allostatic load as well.

The moment in which an individual experiences a traumatic event might be important. Studies have indicated the possibility of there being particularly sensitive periods in a child's brain development, that can be associated with psychological disorders like major depression, though it is too early in the findings to draw final conclusions (Riedl et al., 2020). Others have identified the role of executive functions as mediating factors between ACEs and mental health outcomes and health-risk behaviors (Danese & McEwen, 2012)

Emotional intelligence was found to play an intermediary role between child maltreatment and posterior depression and anxiety (Zhao et al., 2020). Bullying victimization can be very traumatic for children, and the quality of the relationship that the child has with their father was found to mediate the psychosomatic symptoms they could potentially develop (Hong et al., 2021). In line with a previous topic, mental health disorders influence the association between childhood trauma and chronic physical disorders (Noteboom et al., 2021). With such a circular concept, these different variables can sometimes, act as cause, effect, or pathways between other variables.

3.4 Social Factors Influencing Health and ACEs

Results. In contrast to a more medical approach, the biopsychosocial model also aims to attend the more social, societal, or external factors affecting an individual. These stressors can include economic pressures like poverty, social pressures like discrimination, violent environments, and many more.

Socioeconomic conditions. The socioeconomic realities of families will have an important effect on their health risks and outcomes. Financial hardship significantly increases the chance that someone has experienced an ACE in their life. It has been demonstrated that 47% of children in households living above the poverty line have not experienced any ACEs. That number drops for children who come from households below the poverty line, where 12% have not been exposed to any ACEs. As a whole, there

was also a link between more exposure to ACEs and worse access to public transportation, housing, and breastfeeding counselling (Blair et al., 2019).

Financial debt is one of the forms that will take a monumental toll on a person's health. When explored, people who have debt have a significantly worse self-rated health, higher levels of perceived stress, along with more depressive symptoms and anxiety (Sweet, 2020). Most of these individuals had to pass on medical care or skip housing bills at some point due to their financial debt.

Looking at hospital workers specifically, a profession whose wages many times do not reflect the importance of their job, material hardship was clearly correlated to worse mental health. But there were additional variables that were found to have significant relationships that widen our scope on this issue. These included hourly pay, education, ethnicity or race, and age with mental health, perceived stress, and food insecurity (Woo et al., 2021).

Poverty or income levels may also be seen as a moderator between different health outcomes, such as between chronic diseases and probable SMI, indicating that these relationships become significant or exponentiated in the presence of financial insecurity. In the case of asthma, only low-income households are significantly correlated to probable SMI. Whereas for diabetes, middle-income households have a significant relationship with probable SMI (Duong & Bradshaw, 2016). Economic hardship is a stressor in and of itself that affects peoples' health, but it can also add additional pressure to other existing relationships, like the ones we have previously discussed.

Discrimination. The impact of the treatment, acceptance, and integration we receive by our communities can extend further than we may expect. When these aspects are absent or done so negatively, we find situations of discrimination that can consequently be associated with a deteriorated physical and mental health (Leger et al., 2022). Over extended periods of time, the significant relationship between lifetime discrimination with negative health outcomes is very apparent.

There are many personal characteristics for establishing discrimination. One of those forms is ageism, which on a yearly basis accounts for 17.04 million cases of the eight most expensive health conditions (Levy et al., 2020). People who have been victims of child trafficking also face discrimination that negatively affects their physical and mental health outcomes. Due to the stigmatization that this group faces, they receive more

barriers to health care and are not properly attended, leaving them with significant differences in their health quality compared to the rest of the population (Wallace et al., 2022). These are two examples of discrimination that people face, but the majority of studies focus on other very common forms of discrimination like racism, xenophobia, homophobia, and transphobia.

People who are gender and sexual minorities are at risk of experiencing negative health outcomes such as immune dysregulation, problems sleeping, and psychological distress that are due to the stress caused by personal and structural discrimination and stigma (Christian et al., 2021). Together with the minority stress and discrimination, there is a constant need for physical vigilance because of the safety threats. This has detrimental long-term effects on peoples' psychological, emotional, and immunological health (Diamond & Alley, 2022). A study in Chile focused on transgender people describes how discrimination and stigma affect their mental health, leading to problems with their self-image, anxious and depressive symptoms, alcohol and other substance abuse, suicidal ideation or suicide attempts, and self-harm (Delgado et al., 2019). Even within the overarching trans community, stress affects nonbinary people differently due to the binary structures of our society and culture (Matsuno et al., 2022), though this population's experience has yet to be further studied.

The treatment that people face for being immigrants in a country will also have a detrimental impact on their health. Aside from xenophobia, a migratory process entails many more hardships such as isolation, stigma, racism, instability, being separated from family, fear of deportation, and a lack of resources. Disparities in mental health among Latinx immigrants can be linked to the stressful and inequitable contexts of discrimination and historical loss (Handal et al., 2022). Focusing on immigrant Mexican women, it is clear that through discrimination, they are more likely to experience acculturative stress, psychological distress, depressive and anxious symptoms, and role limitation (Mendoza Griego, 2022). These effects on the mental health of immigrants have also been quantified in the United Kingdom following Brexit. The areas inhabited by more "leave" voters correlated with higher rates of discrimination, which was associated with increased symptoms of generalized anxiety disorder (Frost, 2020). So much so, that it increased the chance of having clinically significant symptoms (OR = 3.01). This study illustrates the importance of how structural stigma has an important impact on the mental health of marginalized communities.

Much xenophobic discrimination is closely intertwined with racist attitudes, which also pose threats to peoples' health. The strongest evidence in this field of research indicates a significant impact of racial discrimination on a person's mental health and psychological well-being, along with health risk behaviors such as eating patterns, trouble sleeping, and consuming substances such as alcohol, drugs, and tobacco. Data also points to a relationship between racism and hormonal dysregulation, inflammatory markers, and allostatic load (Bailey et al., 2017). The medical attention people receive can be impacted by discrimination. As such, there are significant disparities in women's health according to race and ethnicity, with growing evidence pointing to discrimination as an underlying cause (Akinade et al., 2022). For African Americans, racism plays a role in the documented health disparities, such as a lower life expectancy and higher risk of mortality from Covid-19, as the CDC identified (Reid & Earnshaw, 2022). Racism is associated with increased anxiety symptoms and poor sleep for Black adults, both with personal experiences of everyday racism and vicarious experiences of major discrimination (Manning et al., 2022; Moody et al., 2022). Other ethnic minorities report parallel experiences with the effects on their mental health, such as with Chinese American university students where stress related stressors and racial discrimination are positively associated with anxiety symptoms (Haft et al., 2022).

Many people are subject to these and many other forms of discrimination. The risk of death increases with the number of stigmatized social identities that a person identifies with or belongs to (Manning et al., 2022). The ways in which communities treat their members personally and structurally has very significant impacts on their quality of life and health.

Police and community violence. The CDC considers the misuse of force by law enforcement a public health issue due to the magnitude of deaths and injury that the police is responsible for in the United States (CDC, 2010, as cited in Adekale, 2021). The actual physical injury from excessive force, or when police kill civilians, represents the direct detrimental effects that law enforcement's misuse of violence has on health. However, negative effects can also be caused indirectly. These indirect effects tend to be more visible on peoples' mental health, and one study found a multitude of specific examples. People who have experienced a police intrusion are more likely to be experiencing PTSD symptoms, and the intensity of the symptoms increases with the aggressivity of that intrusion. For Black adults there is a relationship with psychosis when having been

exposed to police abuse, and anxiety is significantly related to the frequency and intrusiveness of police stops among men. There can also be strong effects from witnessing police violence, not only experiencing it firsthand. People who have experienced or witnessed law enforcement abuse report negative effects on their mental and physiological health. The news can also take a significant toll because the way in which media covers these topics can provoke pain, stress, and diminished feelings of self-worth for community members (Simckes et al., 2021).

As seen with other types of external pressures, the perception of police misuse of force is related to higher levels of stress in the community. Certain subgroups are more vulnerable to this stress like Black people, women, and people who are unemployed. On the other hand, it is important to note the positive implications that more community cohesion and feelings of safety in the neighborhood can have, as it is associated with better health for its members and lower levels of stress (Stansfield, 2022).

This concept of feeling safe in one's community is important because it can have serious implications for a person's health. Neighborhood violence is associated with negative health outcomes (Semenza & Stansfield, 2021). One specific example would be for asthma. High crime in a community has been identified as a trigger for toxic stress that increases the amount of asthma diagnoses in youth (Merrill et al., 2021). The violence that people are exposed to on a more systemic level, like their community and the state, greatly affects their health outcomes.

Causal mechanisms and moderator variables. Many of the moderating factors discussed in the previous section on trauma and ACEs could be applied to situations of exclusion, discrimination, and violence, as these experiences can be very traumatic for those who live them. For example, interpersonal racism has been associated with allostatic load, hormonal dysregulation, and inflammatory markers, all biomarkers of wellbeing and disease (Bailey et al., 2017). In the case of policing, epigenetic changes such as the functioning of the HPA axis, our stress response system, might be partially responsible for deteriorated health, and allostatic load has been identified as a significant contributor to the elevated mortality levels among Black adults (Simckes et al., 2021). Stress is a key moderating factor for health outcomes, particularly in the case of discrimination and wage insecurity (Christian et al., 2021; Frost, 2020; Leger et al., 2022; Woo et al., 2021). It is referred to as minority stress, and throughout this paper we have discussed the effects that stress will have on our health and wellbeing.

The autonomic nervous system (ANS) might play a significant role as well. In the case of the Chinese American college students, respiratory sinus arrhythmia reactivity, the measure they used to represent the reactivity of the ANS, moderated the association between discrimination and anxiety symptoms (Haft et al., 2022). Other factors are quite dependent on or linked to the environment and resources of a person.

Transportation is a key factor in the relationship between poverty and ACE incidence. In the case of “3 or more ACEs,” 21% of the income-based inequality could be eliminated if everyone had access to transportation (Blair et al., 2019). In the case of asthma, geographic location is very important because inequalities in health outcomes and life opportunities are perpetuated by neighborhoods as a mechanism for environmental injustice (Harris, 2019). However, for discrimination, lifetime or prior usage of mental health resources moderated or eliminated its relationship with anxiety symptoms (Manning et al., 2022; Moody et al., 2022). And as discussed earlier, discrimination within healthcare services themselves are an underlying cause that explains health disparities (Akinade et al., 2022; Wallace et al., 2022).

4. Conclusions

It is increasingly evident that multiple aspects of any person’s circumstances and environment need to be properly understood, addressed, and cared for in order to ensure the individual’s health. Our physical health strongly affects our state of mind, and our mental health has important effects on our body as well. Adversities, violence, and stressors that people are exposed to on a personal, community, and systemic level will all affect our physical and mental health. Even when certain external variables are primarily associated with the body or the mind, we know that body and mind are profoundly interconnected by a two-way street with heavy flowing traffic. When one falls ill, the chances increase that the other will do so as well. It is impossible and counterproductive to view our health as any less than a complete and integrated picture of our physical, mental, and social components. It is important that we continue to research all of these relationships and their effects to strengthen the ways in which we attend to the patients in our offices and care for the people in our world.

5. Discussion

The principal complication that I struggled with while investigating this topic illustrates the exact barrier that I aim to shine a light on with this paper. It is impossible to separate the specific variables discussed, as I have attempted to do, while researching and presenting the relevant data that I have found. The reason that the writing is structured by different subsections is to facilitate the information to the readers. Without headings for concrete directional impacts, along with their pertinent scientific exploration and findings, the investigation ran the risk of being a very long and confusing list of how absolutely everything impacts everything else.

Though that format would have been difficult to read, it may have been more true to the dilemma that is being studied. It is clear that with health, humans cannot separate their physical health from their mental health and their social health. All of these variables will have an impact on one another, which is made evident by just trying to research the individual relationships. I found that when trying to focus on a specific heading, it was impossible to type keywords into the search engine and find articles focused exclusively on that one subtopic. For example, with the question on how stress impacts physical health, I found thousands of research leads that could be grouped into almost all of the major headings. This is because stress impacts physical health, but a chronic physical or mental illness might also cause someone to experience stress. Furthermore, a lot of stress is informed by difficult social circumstances like poverty, but stress might impact how well someone does their job and working poorly could cause them to lose their job (causing more stress), etc. These loops could come up endlessly for all of the different dimensions, and though their circularity might pose extra difficulties for research, it only points to how important it is to continue exploring. We might not be able to uncover a magical solution that solves all of the mysteries behind these intricate processes, but we can always improve the current understanding that we have.

There are few notable limitations in this paper. First, due to length constraints, it lacks a section addressing how negative health outcomes could impact a person's economic and social status within a society. To attempt to complete the full picture, it would be helpful to discuss how disease or illness might affect the access to job opportunities, and the possibility of structural discrimination. Second, because of how complex the topic of health is, there are many physical diseases, mental illnesses, and

social factors that were not addressed, and there are a lot more moderating factors that connect all of these variables. Third, ideally, the way the information was presented could always be improved in order to better reflect the circularity between variables that was aimed at being demonstrated. But due to the complexity of these bidirectional and circular relationships, I aired on the side of clarity in fear of how chaotic the other structure would have been to read and understand.

A limitation that confronts the entire field of health, is the dualistic tendency to separate a person into physical health, mental or emotional health, and social health. The research focuses on how one variable affects one other variable, when it is impossible to ignore that these three (very general and overarching) variables are always acting at all times, and not only that, but they are influencing each other. We cannot completely block the confounding effects that make up (arguably) a third of that person we are studying. We must continue to strive for research that is truly integrative on a biological, psychological, and social level. That would allow us to better understand ourselves and better treat ourselves, to know towards what type of health infrastructure we need to move. Right now, our doctor's office, therapist clinic, social services, and community centers tend to be isolated players working individually, when human health is a team sport. While there is communication between these parties, they frequently only start working together when the patients' discomfort or situation reaches quite drastic points. We should strive to improve this communication and promote the custom of interdisciplinary teams with holistic interventions.

The relationship between the health of our mind and that of our body can be traced back to when we were small children, vulnerable to the many adversities our environments can offer. Unmet physical needs and abuse, along with verbal and emotional ones, leave scars, pain, and trauma. These factors can lead to emotional and behavioral patterns that surface in the form of disease and, possibly, premature death. All this can lead to an endless cycle that, unless we intervene with prevention and treatment, will continue to undermine the lives of so many throughout the globe. In this regard, early intervention as a means of prevention is also incredibly important. A child that experiences ACEs will most likely experience better health outcomes if they have access to health professionals such as psychologists and social workers that can help the child process the trauma, and support their environment and the adults in their life with tools and education. Extensive longitudinal studies focusing on ACEs, social and economic

adversities, and health outcomes over the course of peoples' lives could give invaluable information for getting a full understanding of what people need, especially if we focus on the protective variables and those that promote health.

Because people that have suffered from ACEs tend to be impoverished and form part of marginalized groups, it is important to improve the resources and conditions to help these populations. In so doing, we will reduce the self-supporting cycles that lead to the maintenance of mental and associated physical diseases, and in consequence reduce not only the ongoing suffering of the afflicted, but also diminish the toll on the health of the overall society to which these people belong. It would also be quite informative to study how the relationship between ACEs or social adversities changes in different countries or states, depending on whether there is access or not to public healthcare, including mental health services.

The research and attention paid to this topic is beyond significant. It has direct effects on our population's health and well-being, and has the potential to decrease the existing disparities that establish abysmal differences in regard to the guarantees for health and happiness of a person according to their living conditions.

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