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The Lifelong Effects of Childhood Trauma

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A Literature Review Presented

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Table of Contents

Abstract.....3

Introduction.....4

Review of the Literature.....6

 ACEs and Physical Health.....6

 ACEs and Mental Health.....10

 ACEs and Intellectual Health.....14

 ACEs and Occupational Health.....18

Future Research.....21

Conclusion.....23

References.....25

Abstract

Adverse childhood experiences (ACEs) continue in a cycle, as evidence in research literature. Those who have experienced ACEs are likely to continue the cycle with their own children. As a result, children with ACEs are an increasing reality for educators who often see the immediate and short-term effects of trauma. What is not commonly understood among educators are the significant lifelong health effects of ACEs. This literature review examines the life-long effects of ACEs on physical, mental, intellectual, and occupational health. The effects include a shorter life expectancy and a lower quality of life.

Keywords: Adverse childhood experiences (ACEs), physical health, mental health, intellectual health, and occupational health

The Lifelong Effects of Trauma

Educators witness firsthand the significant effects adverse childhood experiences (ACEs) have on students (Brunzell et al., 2016). ACEs have negative effects on academic performance, physical health, mental, health, and social development (Brunzell et al., 2016; Kerker et al., 2015). What educators do not often see are the long-term effects that ACEs have on physical, mental, emotional, intellectual, and occupational health (Anda et al., 2004; Anda et al, 2008; Roos et al., 2016; Bryant et. al., 2020; Dube et al, 2001; Su et al., 2015).

The problem is that ACEs have significant effects on an individual not only across their lifespan but often through the entire ACE cycle (Guinn et al., 2014). The Centers for Disease Control (CDC) conducted a study across 25 states and found that around 61% of participating adults had experienced at least one ACE (Centers for Disease Control, 2019). The same study showed that one in six adults had experienced at least four types of ACEs before the age of 18 (Centers for Disease Control, 2019). Many of these adults will continue the cycle with their own children, making childhood trauma an ongoing and potentially growing problem (Guinn et al., 2014).

The purpose of this literature review is to discuss the lifelong effects that ACEs have on physical, mental, intellectual, and occupational health. Understanding these effects will grant adults who work in education a deeper understanding of the children and families with whom they work (Guinn et al., 2014). Once professionals have a thorough understanding of trauma and the cycle of trauma, effective supports can be implemented.

This literature review will examine the effects of ACEs by looking at peer-reviewed research articles on ACE and childhood trauma research, specifically on the topics of long-term physical, mental, emotional, intellectual, and occupational health effects. Research for this

literature review was collected from three databases: Science Direct, the United States Library of Medicine National Institutes of Health, and Google Scholar. Articles collected were published between 1995-2021.

Review of the Literature

ACEs and Physical Health

Researchers have found that ACEs have significant lifelong physical effects. Kaiser Permanente and the Centers for Disease Control (CDC) have conducted significant research on the lifelong effects of ACEs on many areas of health, including physical health. Researchers have examined whether ACEs increase the likelihood of smoking, COPD, lung cancer, legal prescription drug use, substance abuse disorders (SUDs), insufficient sleep, chronic childhood health problems, childhood obesity, chronic adult health problems, premature death, and brain injury.

Anda et al. (1999) conducted a study through Kaiser Permanente to determine if there is a relationship between ACEs and smoking in adolescents and adulthood. This study was significant because “[f]ew studies have assessed the association between childhood abuse and smoking among adults or adolescents” (Anda et al., 1999). This study uncovered a strong relationship between smoking and ACEs (Anda et al., 1999). Individuals with five or more ACE categories had a higher risk of the following smoking behaviors: initiation, ever smoking, current smoking, or heavy smoking (Anda et al., 1999).

Another study through Kaiser Permanente and the CDC found a significant relationship between ACEs and COPD (Anda et al., 2008). The study found that “[c]ompared to people with an ACE Score of 0, those with an ACE Score of ≥ 5 had 2.6 times the risk of prevalent COPD, 2.0 times the risk of incident hospitalizations, and 1.6 times the rates of prescriptions” (Anda et al., 2008, p. 1). While Anda et al. (1999) found a connection between ACEs and smoking behaviors, these researchers found that an individual’s smoking history did not significantly impact the findings.

Similarly, the smoking history of the participants partially explained but did not fully explain the relationship Brown et al. (2010) found between ACEs and lung cancer. This study found that participants who had smoked were more likely to have experienced an ACE than respondents who had not smoked (Brown et al., 2010). There was also a strong relationship found between hospitalization as a result of lung cancer and the patients' ACE score as well as between death from lung cancer and the patients' ACE score (Brown et al., 2010). However, the relationship between ACEs and hospitalization/death from lung cancer is not straight-forward:

The increase in risk of lung cancer was only partly due to relationships between ACEs and an intermediate causal factor, smoking. The occurrence of ACE-related lung cancer not attributable to conventional risk factors suggests other mechanisms by which childhood traumatic stressors negatively affect health. (Brown et al., 2010, p. 8)

Neither the 2008 Kaiser study of ACEs and COPD nor the 2010 Kaiser study of ACEs and lung cancer could use the participants' smoking history to fully mediate their findings (Anda et al., 2008; Brown et al., 2010).

Another Kaiser study looked into the relationship between ACEs and lifelong legal prescription drug use and found that individuals with an ACE score of five or more had 40% more prescription drug use. An interesting finding from this study is that “[a]djustment for ACE-related health problems reduced the strength of the associations by more than 60%” (Anda et al., 2008 p. 1). The researchers found that more than 60% of the prescription drug use among the participants was a result of ACE-related health problems (Anda et al., 2008).

A study conducted by Choi et al. (2017) suggests that ACEs also increase the probability of substance use disorders. Choi et al. studied men and women who were fifty years old or older and looked specifically at three substance abuse disorders: “alcohol use disorder, drug (cannabis

sedative, opioid, cocaine, stimulant, hallucinogen, inhalant/solvent, club drug, heroin, and/or other drug) use disorder, and nicotine disorder” (Choi et al., 2017, p. 361). The researchers found an association between ACE score and SUDS that was more significant in men (Choi et al., 2017). While the relationship seemed small in this study, the researchers still believe the findings to be significant (Choi et al., 2017). This study also included research on the effects of ACEs on mental disorders; these findings will be discussed in the Mental Health section of this literature review.

Bryant et al. (2020) also researched the effects of ACEs on substance use disorders (SUDs). This study looked at individuals who were 18+ years old whereas Choi et al. and Marti (2017) looked at individuals who were 50+ years old. The participants in this study were individuals who were receiving behavioral healthcare services at the federal Community Health Center in Connecticut (Bryant et al., 2020). The researchers found a positive relationship between ACEs and SUDs, but there was no clear dose-response relationship found (Bryant et al., 2020).

Chapman et al. (2013) researched the effects of ACEs on insufficient sleep. They found that ACEs have a negative effect on sleep quality. The researchers also found that “[o]dds of frequent insufficient sleep were 2.5 (95% CI, 2.1-3.1) times higher in persons with ≥ 5 ACEs compared to those with no ACEs” (Chapman et al., 2013). In this study, ACEs had a significant relationship with smoking and frequent mental distress but neither fully mediated the relationship between ACEs and poor sleep.

In a nationally representative study (United States), Kerker et al. (2015) discovered ACEs affect childhood health in multiple ways. The participants in the study were children who were part of the welfare system in the United States. The researchers found that “early adverse

childhood experiences may lead to early childhood mental health, chronic medical and social development problems” (Kerker et al., 2015). ACEs increased the risk of childhood chronic medical problems (Kerker et al., 2015). This study also looked into the effects of ACEs on mental health and social development. These findings will be discussed in the mental health section of this literature review.

ACEs not only have effects on childhood health but have lifelong health effects as well. Bellis et al. (2015) modified a survey originally used by Kaiser Permanente to measure the relationship between ACEs and chronic disease as well as premature death. This nation-wide, nationally representative study was conducted in England. The research showed that individuals with four or more ACEs had an increased risk for developing chronic diseases. Along with the increased risk of chronic diseases comes the risk of premature mortality related to disease. This study found that individuals with four or more ACEs had a 1.97 times higher rate of premature mortality than individuals with fewer ACEs. Bellis et al. (2015) also state in their article that ACEs have an effect on obesity.

Kyler et al. (2021) researched the effects of ACEs on childhood obesity; their findings support the statement made by Bellis et al. (2015). The researchers in this study found that “children with obesity are more likely to report ACEs overall and have more ACEs compared to other children” (Kyler et al., 2021, p. 1). Childhood obesity negatively affects the physical health of the individual acutely and/or chronically (Kyler et al., 2021).

Guinn et al. (2014) found a correlation between ACEs and acquired brain injury (ABI) as well as ACEs and traumatic brain injury (TBI). Acquired brain injury is the result of a health problem such as a tumor or stroke. TBI is the result of an event such as a motor vehicle accident or a sports injury. Breiding et al. found correlations between ACEs and both of these conditions:

Compared with respondents with zero ACEs, the odds of reporting ABI by individuals with three or more ACEs increased by 255%, while individuals with four or more ACEs had an odds increase by 351%. In addition, associations between TBI and ACE score showed similar effects; compared with respondents with zero ACEs, the odds of reporting a TBI by individuals with three or more ACEs increased by 416%, while individuals with four or more ACEs had an odds increase by 339%. (p. 5)

Brain injuries can have serious effects that are immediately noticeable or that don't manifest until later in life. There is also the potential for lifelong disability with severe brain injuries (Guinn et al., 2014).

The research articles listed in this section all respond to the same question: what are the physical effects of adverse childhood experiences? These studies suggest that ACEs increase an individual's risk of smoking, COPD, lung cancer, legal prescription drug use, substance abuse disorders (SUDs), insufficient sleep, chronic childhood health problems, childhood obesity, chronic adult health problems, premature death, and brain injury.

ACEs and Mental Health

Many researchers have studied the effects of ACEs on mental health. These studies looked at the effects of ACEs on the development of SUDs, social development, social connectedness, hospitalized self-harm, suicide attempts, psychosis symptoms, and psychotic experiences.

As stated in the physical health section, Choi et al. (2017) conducted research on the effects of ACEs later in life on substance abuse disorders (SUDs) and mental disorders. This study looked at three specific mental disorders: lifelong major depressive disorder, any form of anxiety disorder, and post-traumatic stress disorder (PTSD) (Choi et al., 2017). The researchers

found that “in total, nine ACEs (i.e., all except parental divorce) were significantly associated with one or more lifetime mental disorders among both genders, whereas parental divorce was associated with men's MDD only” (Choi et al., 2017).

Kerker et al. (2015) were also mentioned in the physical health section of this literature review for their research on the effects of ACEs on childhood chronic disease. The same study focused on the effects of ACEs on childhood mental health and social development. The researchers analyzed the data from the 2008-2009 National Survey of Child and Adolescent Well-Being (NSCAW) II, specifically looking at children in the welfare system (Kerker et al., 2015). The researchers used the Child Behavior Checklist (CBCL) to determine the relationship between ACEs and mental health. The Vineland Socialization Scale was used to determine the relationship between ACEs and social development. The data showed that 98.1% of the participants had experienced at least one ACE during their lifetime, the average ACE score being 3.6 (Kerker et al., 2015). The researchers did find a relationship between the child's ACE score and both the CBCL and Vineland Socialization scores.

For every additional reported ACE there was a 32% increased odds of having a problem score on the CBCL (Odds Ratio (OR)=1.32, 95% Confidence Interval (CI): 1.14, 1.53), and a 21% increased odds of having a chronic medical condition (OR=1.21, 95% CI: 1.05, 1.40). Among children 36–71 months, for every additional reported ACE there was a 77% increased odds of a low Vineland Socialization score (OR=1.77, 95% CI: 1.12, 2.78). (p. 1)

The data shows that the higher the child's ACE score, the more likely it is for them to have a problematic Vineland Socialization score and a problematic Child Behavior Checklist score.

Kwong (2014) conducted a nationwide (United States) study to determine the effect that ACEs have on the social connectedness of the individual. The data analyzed in this study was from the 2011/2012 National Survey of Children's Health (NSCH), a nationally representative study conducted by the Centers for Disease Control (Kwong, 2014). The research focused on three specific social behaviors: family connectedness (bonding), social/community connectedness (bridging), and instructional connectedness (linking) (Kwong, 2014). The data showed that ACEs had a negative effect on bonding: the higher the ACE score, the less likely the child was to engage in bonding (Kwong, 2014). However, ACEs had a positive effect on linking; the higher the ACE score, the more likely the child was to engage in linking (Kwong, 2014). The results for ACEs effect on bridging were inconclusive.

Sousa et al. (2011) conducted a study on the effects ACEs have on the on parent-child attachment and antisocial behavior in adolescence. This study focused on two specific ACEs; child abuse and exposure to domestic violence. A significant correlation was found between either of these experiences and low attachment levels. The researchers concluded that “preventing child abuse and domestic violence exposure and improving family attachments in adolescence may independently lessen the risk of antisocial behavior during adolescence” (Sousa et al., 2011)

Cleare et al. (2018) conducted a study to determine if ACEs had an effect on hospital-treated self-harm. This study was conducted in Glasgow, Scotland at the Queen Elizabeth University Hospital and the Glasgow Royal Infirmary. The study focused on the following ACEs: “verbal or physical abuse, sexual abuse, and physical and emotional neglect as well as the individual's exposure to maternal abuse, parental separation, and/or a household member's substance abuse, mental illness, or incarceration” (Cleare et al. 2018). The researchers

interviewed patients who were hospitalized as a result of self-harm and found that patients who had a history of self-harm had higher ACE scores than patients who were hospitalized for a first-time incident (Cleare et al., 2018). The data showed a clear relationship between ACE score and hospital-treated self-harm.

Dube et al. (2001) conducted a similar study to determine whether there was a relationship between suicide attempts across the lifespan and ACEs. Kaiser Permanente, the Centers for Disease Control, and Emory University sponsored this study at the Kaiser Permanente's Health Appraisal Center in San Diego. The researchers decided to focus on eight ACEs: emotional abuse, physical abuse, sexual abuse, battered mother, household substance abuse, mental illness in the household, parental separation or divorce, and incarcerated household members (Dube et al., 2001). The data collected showed “that each of the 8 adverse childhood experiences increased the risk of ever attempting suicide from 2- to 5-fold” (Dube et al., 2001).

Heins et al. (2011) conducted a study to determine if there was a relationship between ACEs and psychosis. This study compared healthy comparison subjects, siblings of someone with a psychotic disorder, and subjects with a psychotic disorder (Heins et al., 2011). The patient group data suggests that ACEs are significantly associated with positive psychotic symptoms (Heins et al., 2011). The sibling group data suggests that ACEs are not associated with positive or negative psychotic symptoms (Heins et al., 2011, p. 1289). The healthy comparison subject group data suggests that there is a significant association between ACEs and psychotic symptoms (Heins et al., 2011, p. 1289). This study adds evidence to the notion that childhood trauma is specifically associated with the development of positive psychotic symptoms. It is important to note that comorbid psychiatric illness and family psychiatric history were not

analyzed in this study (Heins et al., 2011, 2011). Whereas the data shows that ACEs are associated with developing psychotic symptoms, this study is not a generalizable study. This study had a small sample size consisting of 272 patients with psychosis, 258 siblings of patients with psychosis, and 227 healthy comparison subjects.

Kelleher (2018) also researched the effects of childhood trauma on psychotic symptoms. Similar to the Heins et al. (2011) study this study focused on a smaller number of participants: 211 adolescent participants. Each participant and the parents of each participant were interviewed using the Schedule for Affective Disorders and Schizophrenia for School-Aged Children, Present and Lifetime Versions (K-SADS). The data showed that ACEs might increase the individual's risk for developing psychotic experiences. However, since the sample size was small, no generalizable conclusions can be made (Kelleher et al., 2018).

All of these studies sought to determine the effects of ACEs on mental health. The articles suggest that ACEs increase the likelihood of experiencing significant negative effects on mental health such as development of SUDs, impaired social development, impaired social connectedness, hospitalized self-harm, suicide attempts, psychosis symptoms, and psychotic experiences. This section suggests that there are significant lifelong mental health effects of ACEs.

ACEs and Intellectual Health

For decades, researchers have studied the effects of ACEs on intellectual health. These studies have focused on whether ACEs increase the risk of developing ADHD, and low IQ executive functioning, poor cognition, poor emotional awareness, low impulse control, physical brain structure, and poor educational performance.

Brown et al. (2014) studied the relationship between ACEs and attention deficit hyperactivity disorder (ADHD). The researchers looked at the data from the 2011-2012 National Survey of Children's Health which focused on 76,227 children ages four to seventeen (Brown et al., 2014). The data showed a strong relationship between ACEs and ADHD. These researchers found that "children with ADHD had a higher prevalence of each ACE compared with children without ADHD" (Brown et al., 2014 p. 1).

Van Os et al. (2017) conducted a nationally representative study (Netherlands) focused on the effects of childhood trauma on intelligence quotient (IQ). The participants were divided into three groups: patients with psychotic disorders, siblings of patients with psychotic disorders and healthy comparison subjects (Van Os et al., 2017). Participants were tested three times over the course of three years. The researchers found that there was a negative impact on IQ for siblings of patients with psychotic disorders and healthy comparison subjects (Van Os et al., 2017). However, there was not a significant effect on IQ for the participants with psychotic disorders. One theory that the researchers had was that there might be larger factors effecting cognition for the individuals with psychotic disorders (Van Os et al., 2017).

A study conducted in China by Ji & Wang (2018) looked at the relationship between ACEs and executive functioning in college students. The researchers looked at inhibition ability, cognitive flexibility and working memory in the 700 college participants. To gather data, the researchers used the ACEs questionnaire, the Adolescent Life Events Scale (Adolescent Self-rating Life Events Checklist ASLEC), and an executive functions program (Ji and Wang, 2018). They found a strong correlation between ACEs and poor inhibition ability, cognitive flexibility, and working memory (Ji & Wang, 2018). A limitation of this study is that it cannot be generalized to groups of people other than college students.

Another study that looked at the effect ACEs have on cognitive function was conducted by Ciciolla et al. (2021). The researchers looked at participants' ACE scores and tested their working, immediate, and delayed memory. What they found was that “[h]igher ACEs, especially deprivation-type, were prospectively linked to poorer cognition (Ciciolla et al., 2021, p. 1). This study's findings that ACEs are related to poor cognitive function later in life support the findings of Ji & Wang (2018).

Another study conducted by Addante et al. (2019) looked at the effect of ACEs on cognition in relation to obesity. The participants in this study were 95 adults who were all classified as obese, 68% of which reported having experienced at least one ACE (Addante et al., 2019). The data showed a strong correlation between ACEs and cognition:

Persons with more ACEs performed worse on cognitive tasks of executive control and episodic memory than did those with fewer ACEs, controlling for obesity severity. Given that these cognitive processes play important roles in self-regulation, ACEs may be important to obesity development, progression, and weight loss interventions. (p. 54)

This study's findings align with the findings of Ciciolla et al. (2021), and Ji & Wang (2018).

Kyler et al. (2019) found that children who are obese are more likely to report having experienced ACEs compared to children who are not obese. Kyler et al. (2019) and Addante (2019) et al. have similar findings that obesity and ACEs are connected. Addante et al. (2019) digs a little deeper to suggest that the connection between ACEs and obesity can be partially mediated by the relationship between ACEs and executive control and episodic memory (Addante et al., 2019).

Another study by Luby et al. (2017) focused on the effects of ACEs on the brain itself. In this study the researchers looked at neuroimaging of children with and without ACEs to determine the effect of ACEs on brain structure, emotional development, and lifelong health outcomes (Luby et al., 2017). The study found that “early ACEs predicted the volume of the [inferior frontal gyrus IFG], a structure known to be associated with impulse control, emotion processing, and regulation, 46-49 and IFG volume in turn predicted emotion awareness (Luby et al., 2017, p. 1173). The (IFG) is involved in impulse control and emotional regulation (Luby et al., 2017). This study's findings that ACEs affect brain structure which in turn affects impulse control and emotional regulation are consistent with the findings of Brown et al. (2014), Ji and Wang (2018), Ciciolla et al. (2021), Addante et al. (2019), and Kyler et al. (2019) all who found that ACEs have negative effects on cognition.

Stempel et al. (2017) conducted a study to determine the potential effects that ACEs have on school attendance. The study utilized the 2011-2012 National Survey of Children's Health (NSCH) which included data from parents/caregivers of 58,765 children ages 0-17. The researchers looked at individual ACEs as well as total ACE score in relation to chronic absenteeism (Stempel et al., 2017). The one individual ACE had a significant relationship with chronic absenteeism was neighborhood violence (Stempel et al., 2017). Total ACE score also had a significant effect, even an ACE score of one was associated more with chronic absenteeism than an ACE score of zero (Stempel et al., 2017).

Whereas Stempel et al. (2017) studied ACEs and school attendance, Hardcastle et al. (2018) researched the relationship between ACEs and educational success. This study also looked into the relationship between ACEs and employment success; the employment results will be discussed in the Occupational Health section of this literature review. This study took

place in England and Wales and included 2,881 participants. The educational success of participants was measured by looking at the educational qualifications they had earned; none, secondary, college or higher. The data showed a dose-response relationship between the individual ACE score and poor educational success. Participants who had “a history of childhood adversity (≥ 4 ACEs) more than doubles the risk of having no qualifications” (Hardcastle et al., 2018, p. 112). In response to these results, the researchers stated that “[e]ducation goals cannot be met when children live in fear. Chronic stress can negatively impact cognition, school connectedness and school attendance, all of which may mediate the relationship between ACEs and (non)attainment” (Hardcastle et al., 2018, p. 112).

The research articles listed in this section all work to determine the effects that ACEs have on intellectual health. These studies suggest that ACEs impact the individual’s risk of developing ADHD, and negatively affects one’s IQ, executive functioning, cognition, emotional awareness, impulse control, physical brain structure, and educational performance. Each article reviewed suggests that ACEs have lifelong effects on intellectual health.

ACEs and Occupational Health

Many researchers have studied the effects of ACEs on occupational health. They have studied whether ACEs increase the likelihood of poor job performance, low-income level, adult incarceration, and criminal justice involvement for individuals who are homeless and have been diagnosed with mental illness, and lifetime homelessness.

The study conducted by Hardcastle et al. (2018) was mentioned in the intellectual health section of this literature review. This study also looked at the effect ACEs have on occupational health. The researchers looked at the participants’ occupational status in terms of employment, unemployment or long term sick or disabled (LTSD) (Hardcastle et al., 2018). The researchers

found a significant relationship between ACEs and employment status: “There was a strong positive relationship between childhood ACE count and not being in current employment, either through unemployment or LTSD (Hardcastle et al., 2018, p. 110). The researchers did note that whereas there is a correlation between ACEs and low academic achievement and unemployment, ACEs are not determinant (Hardcastle et al., 2018).

Also related to occupational health, Anda et al. (2004) conducted a study that examined the relationship between ACEs and adult job performance. There were 9,633 participants in this study, all of whom were involved in the Kaiser Foundation Health Plan in San Diego, California. This study focused on three indicators of poor work performance: serious job problems, financial problems and poor attendance. The researcher found a strong, graded relationship between ACEs and the three indicators of poor worker performance (Anda et al., 2004, p. 35).

Another study conducted by Halfon et al. (2017) looked at the potential relationship between ACEs and income inequality. The researchers used data from the 2011-2012 National Survey of Children’s Health (NSCH) which included 95,677 parents of children between the ages of 0-17. Households and their results were divided into four income groups to determine if there is a relationship between ACEs and income level. The data showed that ACEs are prevalent at all income levels and not solely at lower income levels (Halfon et al., 2017). However, the researchers also found that “ACEs are aligned along an income gradient with those at the bottom of the gradient having a higher likelihood of experiencing adversity” (Halfon et al., 2017).

Roos et al. (2016) conducted a study that looked at the relationship between ACEs and adult incarceration. The data was obtained from the 2001-2002 (wave one) and 2004-2005 (wave 2) National Epidemiologic Survey on Alcohol and Related Conditions (NESARC) (Roos et al., 2016). The total sample size for this study was 34,653 individuals. The data showed that

“childhood typologies with maltreatment were specifically associated with adult incarceration even after controlling for sociodemographic and substance use problems” (Roos et al., 2016, p. 591).

A similar study conducted by Edalati et al. (2017) looked at the potential relationship between ACEs and criminal justice involvement specifically for homeless individuals with mental illness. The participants in this study were 2,255 homeless adults with mental illness. What the researchers found was that homeless individuals who had experienced at least one ACE had higher criminal justice involvement than homeless individuals with no ACEs (Edalati et al., 2017). Particular ACEs correlated with higher risk rates of criminal justice involvement:

The greatest effect on criminal justice involvement was seen among participants who reported parental separation and divorce and an incarcerated household member, compared with those who did not have such experiences. Children of incarcerated parents have a higher risk of antisocial behavior than children without that experience... Living in a home where drug use is present has been shown to increase the risk of severe aggression among runaway and homeless youths... (Edalati et al., 2017, p. 1292)

All of the participants were homeless individuals with mental illness; this fact limits the populations to whom the findings apply to. The researchers even mention that the findings may only be applicable to homeless adults with mental illness instead of homeless individuals as a whole group.

Another study by Roos et al. (2013) examined the relationship between ACEs and homelessness associated with poor mental and physical health. The researchers looked at data from the 2001-2002 (first wave) and 2004-2005 (second wave) National Epidemiologic Survey of Alcohol and Related Conditions. When reviewing the data, Roos et al. (2013) looked at Axis 1

and Axis 2 mental health disorders as potential mediators between the hypothesized relationship between ACEs and homelessness. The data showed a strong relationship between each category of ACE and lifetime homelessness. The researchers also found that “[e]ach of these relationships was significantly partially mediated by Axis I and II disorders, but nevertheless remained highly significant” (Roos et al., 2013, p. 280).

Each article reviewed in this section works to define the effects ACEs have on occupational health. These articles suggest that ACEs have significant effects on job performance, income level, adult incarceration, and criminal justice involvement for individuals who are homeless and have been diagnosed with mental illness, and lifetime homelessness. Each article reviewed in this section suggests that ACEs have significant lifelong effects on occupational health.

Future Research

This literature review focuses on the lifelong effects of ACEs. The articles included in this literature review state several limitations to their research as well as gaps in current research and needs for future research. The most common suggestions for future research are a new way to report/measure ACEs, more detailed research regarding ACEs and possible mediators, and strategies/interventions to improve outcomes for individuals who have experienced ACEs.

Su et al. (2015) referenced self-reported ACEs as a limitation in their blood pressure trajectories study. While self-reporting ACEs creates limitations for studies, there is currently no other way to measure ACEs. Kwong et al. (2014) also expressed the need for future research on the way that ACEs data is reported/collected as a result of their ACEs and social connectedness study. Self-reported ACEs can potentially lead to inconsistent reports and data because it is not standardized and is subjective. Another emphasis for future research Kwong identified was

research on ACEs and social connectedness because their study was not enough to definitively determine the connection.

Reflecting on their study of ACEs and homelessness, Roos et al. (2013) stated that more research is needed to study other potential mediators besides Axis 1 and Axis 2 disorders (Roos et al., 2013). Their conclusion emphasized the importance of further research to understand this link because "homeless individuals with a history of childhood adversities had even worse mental and physical health than other homeless persons" (Roos et al., 2013, p. 280).

Chapman et al. (2013) studied the relationship between ACEs and sleep but stated that further research should be done to account for potential mediating factors such as smoking. Cleare et al. (2018) studied ACEs and self-harm and stated that future research for them may include ACEs into early childhood and adolescence to compare effects. No studies in this literature review divided ACEs into age categories, but rather any event that happened before the individual turned 18 years old.

After summarizing their study on ACEs and MSUDs, Choi et al. (2017) identified that future ACEs research should focus on ACEs and genders. There is a gap in the research that divides participants into genders to study the effects of ACEs. Kyler et al. (2021) studied ACEs and childhood obesity but state that there is still more research needed on the topic. Similarly, Anda et al. (1999) stated the need for further research on ACEs and smoking.

While there is more research that can be done on the lifelong effects of ACEs, there is also more research needed on prevention and interventions to improve the outcomes of individuals who have experienced ACEs. Hardcastle et al. (2018) stated that more research is needed to guide educational policy changes to help improve the success of students with ACEs. Halfon et al. (2017), who studied ACEs and income inequality, stated that more research is

needed to help prevent and combat the effects of ACEs. Guinn et al. (2014) expressed the need for more research on strategies to help children with ACEs as well as to prevent some of the negative effects of ACEs. Kerker et al. (2015) studied the effects that ACEs have on social development and mental and physical health and identified that future research should focus on interventions, specially, to evaluate the effectiveness of current interventions.

Bryant et al. (2020) researched the effect that ACEs have on SUD's, they identified the need for more research on resilience to reduce SUD's despite ACEs history. They also expressed a need for research on how ACEs affect recovery from SUD's. Similarly, Brown et al., (2014) identified that there is more research needed on ADHD treatment with the knowledge of the connection of ACEs and ADHD.

Conclusion

This literature review was conducted to gain a better understanding of ACEs and how they affect lifelong physical, mental, emotional, intellectual and occupational health. Educators have long witnessed the effects that ACEs have on students while they are school-aged (Brunzell et al., 2016). However, educators do not often see the lifelong effects that ACEs have on their students' physical, mental, emotional, intellectual and occupational health.

Collectively, these findings are significant; they demonstrate the importance of all educators being well versed when it comes to trauma as well as trauma-informed practices. Not only will many of their students likely have ACE scores of one or above but many students' parents will as well. ACEs are changing children and their families. Our education system needs to adapt as well to continue to meet the evolving needs of students and families.

Since educators work with children for a fraction of their lives, it is unlikely that one teacher will combat all of the effects of trauma on their own. However, if all educators have a

deep understanding of trauma and implement trauma-informed practices, the team may be able to mitigate some of the physical, mental, intellectual and occupational effects of ACEs.

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