Before and After COVID-19: An Examination of Social Indicators of Mental Health in Early Childhood Education Teachers

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Abstract

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The current study aimed to identify individual- and environmental-level social indicators of mental health for Washington State early childhood education (ECE) teachers before and at the onset of the COVID-19 pandemic. Using survey data collected in Fall 2019 and April 2020 from the Washington State ECE Workforce Survey Study (N = 1156), I examined whether ECE teachers' socio-demographic, professional, and work environment characteristics were predictive of ECE teachers' depression scores before the pandemic in Fall 2019. In addition, I also examined whether COVID-19 stressors were predictive of change in depression scores in ECE teachers at the onset of the pandemic, after controlling for pre-pandemic depression levels and other individual- and work environment-level characteristics. When looking at social indicators of mental health before the pandemic, regression model results showed that ECE teachers' age, self-identification as Latinx, weekly work hours, teachers' students' age group, job demands, and

job support were each uniquely predictive of depression scores. Specifically, weekly work hours, working with infants and toddlers, and job demands were predictive of increased depression, and teachers' age, self-identification as Latinx, and job support were predictive of decreased depression. In the second regression model, results showed a significant mean increase in depression scores from Fall 2019 to onset of the pandemic in April 2020, indicating a change from mild to more pervasive symptoms of depression in ECE teachers. Further, the model results revealed that ECE teachers' pre-COVID depression scores, age, self-identification as Asian, and other minority racial groups, such as Native American, Middle Eastern, Pacific Islander, and biracial, and job demands, and income worry were predictive of change in depression scores, with income worry being one of the strongest predictors. Specifically, job demands before COVID and income worry were predictive of more change in depression scores (indicating more depression symptoms), and pre-COVID depression scores, self-identification as Asian, Native American, Middle Eastern, Pacific Islander, and biracial were predictive of less change in depression scores, indicating a little less increase in depression scores compared to teachers with higher depression scores before the pandemic and White teachers. Implications of these findings on the ECE teacher workforce, as well as recommendations for policy and practice, are discussed.

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DEDICATION

To my family, friends, and everyone who has walked with me in this Ph.D. journey.

To all early childhood teachers, you are loved and valued more than you know.

Chapter 1. Introduction

Teaching is an undeniably rewarding yet highly demanding job. Particularly for early childhood education (ECE) teachers, teaching can be physically and emotionally demanding given the responsibilities involved when working with young children and families (Kwon et al., 2022). In addition, ECE teachers are more prone to have poor working conditions compared to educators in the K-12 system given the differences in credentialing requirements and a significant and worrisome pay gap (McLean et al., 2021). These stressors, which can be considered social indicators of health, can have negative implications on ECE teachers' well-being, including their mental health (Gagnon et al., 2019; Hindman & Bustamante, 2019; Roberts et al., 2019; Rodriguez et al., 2020; Schaack et al., 2020; Singh et al., 2017). Furthermore, the COVID-19 pandemic has added more challenges for the ECE workforce since many ECE programs saw their enrollment rates drop considerably, especially at the onset of the pandemic, which resulted in many teachers losing their jobs and an increase in safety and cleaning costs to keep ECE programs running (Delap et al., 2020; McLean et al., 2021; U.S. Chamber of Commerce Foundation, 2020). Given this context, it is important to look at the implications that this pandemic has had on ECE teachers' mental health, especially at the onset of the pandemic when much more uncertainty was present in society compared to before the start of the pandemic. Furthermore, it is crucial to identify factors that seem to buffer or exacerbate ECE teachers' mental health so preventative measures and systems of support can be developed and provided to the ECE workforce.

Supporting ECE teachers' mental health is of utmost importance since poor mental health in ECE teachers has been documented to have a negative influence on the retention of the ECE workforce. For instance, poor mental health has been associated with poor work satisfaction and

low professional commitment (Grant et al., 2019; Schaack et al., 2020). Furthermore, poor mental health in ECE teachers also has implications on the quality of teacher-child interactions and instruction (Hubel et al, 2020; Kwon et al., 2019, Silver & Zinsser, 2020). Therefore, it is crucial to support ECE teachers' mental health so we can retain a healthy ECE workforce and promote quality instruction and care.

This study uses a comparative analysis of individual-level and environmental-level social indicators of mental health in ECE teachers in Washington state before and at the onset of the COVID-19 pandemic. The social indicators of mental health explored in this study will include socio-demographic characteristics, professional characteristics, work environment characteristics, and specific COVID-19 stressors. Specifically, this study aims to examine whether socio-demographic, professional characteristics, and work environment characteristics predict ECE teachers' depressive symptoms before the onset of the pandemic and whether these predictors change at the onset of the pandemic while taking into account specific COVID-19 stressors, such as income worry, parent program unenrollment, and change in work demands. The results of this study will help shed light on potential interventions, programs, and/or policy recommendations for supporting ECE teachers' mental health and their overall well-being, especially during times of great uncertainty and stress.

1. 1. Definition of Key Terms

Before diving into the literature of ECE teachers' mental health and its implications, it is important to define some key terms that will be used throughout this paper: ECE teachers, mental health, and social indicators of mental health.

1.1.1. Defining ECE Teachers

The ECE workforce is a diverse group of professionals that include directors, childcare owners, family support staff, teachers, assistant teachers, etc. Furthermore, compared to the K-12 system, there is a wide diversity of educational credentials among ECE professionals, particularly for teachers (Holm-Tobin et al., 2020). For instance, we can find preschool teachers with a certified teaching credential and home-care providers with a high school diploma, only (McLean et al., 2021). This inconsistency is mostly due to the lack of consensus on credential requirements for ECE professionals across states (Holm-Tobin et al., 2020). For instance, not a single state requires home-care providers to have a bachelor's degree, whereas 24 states do require lead preschool teachers to have this minimum educational qualification (McLean et al., 2021). Yet, home-care providers still support the development and learning of young children in the same way that credentialed preschool teachers do.

Given the different responsibilities and challenges and even compensation differences, that ECE professionals have, such as administrators vs. teachers or teachers vs. teacher assistants (Cramer & Cappella, 2019; Linnan et al., 2017; McLean et al., 2021), this study will focus on ECE teachers, only. In this study, ECE teacher is defined as an individual who works as a "lead teacher" or "teacher", who is the main person in charge of providing care and educational support for children between the ages of 0-5, and who works in either center-based or home-based programs.

1.1.2. Defining Mental Health

Mental health usually refers to an individual's psychological, emotional, and social well-being (CDC, 2021). Mental health can impact how we relate to others, how we manage stress, and our overall everyday functioning. When poor mental health is present, this can result in

difficulty with staying on task, expressing emotions, and making healthy decisions (CDC, 2021). Mental health problems can be caused by biological or genetic factors, life experiences, and family history of mental health problems (U.S. Department of Health & Human Services, 2022). Some common mental health conditions impacting adults in the US include anxiety problems (around 48 million people), major depressive episode (around 21 million people), and post-traumatic stress disorder (around 9 million people; National Alliance of Mental Illness, 2022).

The current study will examine symptoms of depression in ECE teachers, which refer to but are not limited to irritability, feelings of hopelessness or pessimism, fatigue, trouble staying on task, sleeplessness, or oversleeping (National Institute of Mental Health, 2018). However, the research literature review presented in this paper will also include descriptions of studies on other mental health conditions, such as anxiety symptoms, and potential risk factors, such as general stress and emotional exhaustion. Therefore, in this paper, the term “mental health” will refer to a cluster of mental health symptoms and risk factors that have been documented to be present in the ECE teacher population. The term “psychological well-being” will be used at times interchangeably with “mental health”, too.

1.1.3. Defining Social Indicators of Mental Health

The term social indicators of mental health is based on the social determinants of health or SDHO term, which originates and is widely used in the public health field. This term refers to "nonmedical factors” that influence health, including mental health, at the individual and at the community or population level (Braveman et al., 2011, p. 383). Social determinants can range from socio-demographic characteristics to access to resources in the community. Given that this study looks at potential predictors of mental health in ECE teachers before and at the onset of the COVID-19 pandemic, the term “social indicators of mental health” will be used throughout this

paper and they will refer to ECE teachers' socio-demographic characteristics, professional characteristics, work environment characteristics, and COVID-19 stressors. It is also important to note that the term "social indicators of mental health" does not imply a cause-and-effect relationship, but rather an association and possible influence on an individual's mental health.

1.2. ECE Teachers' Mental Health

Depression is one of the most common mental health conditions impacting adults in the US, with 8.4% or 21 million of US adults having experienced a major depressive episode at one point in their lives (National Alliance on Mental Illness, 2022). Furthermore, females tend to be at a higher risk of depression than males (National Institute of Mental Health, 2018). Experiencing symptoms of depression can have implications on an individual's well-being, daily functioning, and ability to contribute to society.

Research has documented that a considerable percentage of ECE teachers in the US report having poor mental health, especially depressive symptoms, which ranges from 20% to 40% of the ECE teacher population (Farewell et al., 2022; Hindman & Bustamante, 2019; Kwon et al., 2022; Linnan et al., 2017; Otten et al., 2019; Whitaker et al., 2013). For instance, using the Baby Faces, 2009 cohort, Hindman and Bustamante (2019) found that at least 35% of ECE teachers reported mild to severe symptoms of depression in the Fall and Spring of the 2008-2009 school year. Specifically, 25% of ECE teachers in the Fall, reported experiencing mild depression, while 7% expressed moderate depression, and 3% expressed severe depression. In the Spring, these numbers changed a bit with 22% of ECE teachers reporting mild depression, 8% reporting moderate depression, and 3% reporting severe depression.

Symptoms of depression at the state level mirror what is found at the national level. For instance, Farewell and colleagues (2022) found that in a sample of Head Start teachers in

Colorado (*N* =137), around 20% of ECE teachers reported at least mild symptoms of depression, as measured by the Patient Health Questionnaire-8 (PHQ-8; Kroenke et al., 2009). In another sample of Head Start teachers in Pennsylvania, 24% of ECE teachers (*N* = 2122) reported clinically significant levels of depression as measured by the Center for Epidemiologic Studies Depression Scale (Radloff, 1977). In a sample of ECE teachers from diverse ECE programs in Oklahoma (N = 262), 23% reported clinical levels of depression as measured by the 10-item version of the CESD (Andersen et al., 1994). Using the 20-item version of the CESD-R (Eaton et al., 2004), Linnan and colleagues (2017) found similar depression ratings with 36% of ECE teachers (N = 205) working in home-based programs in North Carolina reporting mild to severe levels of depression. Otten and colleagues (2019) found similar depression rates with 40% of ECE teachers (*N* = 366) in home-based settings in Austin and Seattle exhibiting clinically significant levels of depression. Last but not least, Roberts and colleagues (2019) found that 1 in 10 ECE teachers in Nebraska reported clinically significant symptoms of this mental health condition.

What is alarming is that the rates of depression found in ECE teachers in the US, at the national and state level, are higher than the rates of depressive symptoms reported by a national workforce sample (8.6%) (Farewell et al., 2022), a non-clinical sample of women in the general population (10.4%), and a sample of women who live in poverty in the US (20%) (Brody et al., 2018). In other words, compared to the general workforce and female population in the US, ECE teachers seem to be experiencing higher rates of depression.

ECE teachers are also likely to report moderate to high personal stress levels (Farewell et al., 2022; Jeon & Ardeleanu, 2020; Otten et al., 2019; Kwon et al., 2022), which are defined as the extent to which individuals see their everyday experiences as stressful (Cohen et al., 1983).

Specifically, Farewell and colleagues (2022) found that ECE teachers in Colorado scored an average of 16.5 points of personal stress, which is considered moderate levels of stress as measured by the Cohen Perceived Stress Scale (PSS; Cohen et al., 1983). Similar to findings on depression symptoms, these personal stress scores were higher than the national workforce sample (mean of 13.7; Cohen et al., 1983). Using the same measure, Otten and colleagues (2019) found that 60% of ECE teachers based in Austin and Seattle had moderate general stress levels and 7% had high general stress levels, which was higher than a national sample of college students (Pierceall & Kiem, 2007). Another study showed similar findings with ECE teachers in Oklahoma reporting an average of moderate stress levels as measured by the PSS (Kwon et al., 2022). However, there are also some studies that have found low general stress levels in ECE teachers. For instance, based on a nationally representative sample of ECE teachers, Jeon and Ardeleanu (2020) found that ECE teachers reported an average of 3.97 points, as measured by the PSS, which is lower than the average stress points reported in the aforementioned studies (Farewell et al., 2022; Otten et al., 2019).

It is also important to note the degree to which work stress levels might influence personal stress levels. For instance, conflict with colleagues or stress caused by job demands can have implications on ECE teachers' individual lives, such as how much time they can spend with family (Tebben et al., 2021). Other mental health symptoms that are important to look at and that are linked to depression and general stress are anxiety symptoms; however, these have been less explored, especially in the context of the US.

Outside the US, similar patterns on ECE teachers' mental health have been found. For instance, in a sample of ECE and primary school teachers in Sao Paulo, Brazil (N = 150), it was found that 23% of teachers reported mild to severe depression symptoms (Ferreira-Costa &

Pedro-Silva, 2019). Furthermore, 25% of teachers reported mild to severe anxiety symptoms, too. And when considering depression and anxiety symptoms together, around 50% of teachers in this sample revealed symptoms that indicated psychological illness- meaning that they had mild, moderate, and severe levels of mental health symptoms that represented harm to their well-being (Ferreira-Costa & Pedro-Silva, 2019). In another study, Schwartz and colleagues (2019) explored a sample of ECE teachers working in under-resourced communities in Ghana, (N = 302), and found that 51% of ECE teachers reported moderate to severe depression levels as measured by the *Goldberg Depression Questionnaire* (Aminpoor et al., 2012). Furthermore, in a sample of ECE teachers in home-based settings in Australia (*N* = 1958), it was found that 42% of ECE teachers in this sample reported high levels of psychological distress (Corr et al., 2015). In this study, psychological distress was measured by the *Kessler 10* (Kessler et al., 2002) and it referred to symptoms of anxiety and depression. Last but not least, in a combined sample of orphanage workers and preschool teachers in Ukraine (*N* = 120), it was found that 54% of the sample met or exceeded the cut off criteria for clinically significant depression (Raskin et al., 2015).

Taken together, a considerable amount of ECE teachers, in and outside the US, seem to be experiencing mild to severe symptoms of depression. When looking at rates of depression at the state or city level, some states and specific cities in the US seem to have a slightly higher percentage of ECE teachers experiencing depressive symptoms (Linnan et al., 2017; Otten et al., 2019). This could be due to differences in resources available to support ECE teachers across these different settings. What is undeniable is that ECE teachers are a vulnerable population given the well-documented and concerning rates of depressive symptoms. In the following sections, the implications of poor ECE teacher mental health on the retention of the ECE

workforce and quality teaching and care will be thoroughly discussed.

1.3. Implications of Poor ECE Teacher Mental Health

There are vast implications of early childhood educators' poor psychological well-being or mental health, particularly on the retention of the ECE workforce and quality teaching and care (Buettner et al., 2016; Ferreira-Costa & Pedro-Silva, 2019; Grant et al., 2019; Hamre & Pianta, 2004; Jeon et al., 2021; Ota et al., 2013; Roberts et al., 2016; Sandilos et al., 2015; Schaack et al., 2020). These implications are described below in detail:

1.3.1. Retention of ECE Workforce.

The retention of the ECE workforce refers to the success in maintaining ECE teachers in the field. Historically speaking, high staff turnover rates have been common in the ECE field (Caven et al., 2021). For instance, based on the 2012 National Survey of Early Care and Education, 13% of ECE teachers left their jobs in 2012 with 25% of centers having turnover rates of 20% or above (Caven et al., 2021). According to the Nebraska Early Childhood Workforce Survey conducted from 2015 through 2016, there was an ECE teacher turnover rate of 26% in licensed childcare programs, and a turnover rate of 15% in state-funded preschool programs (Roberts et al., 2018). In another study conducted on the state of the ECE workforce in Luisiana, it was found that between the 2015-16 and 2018-19 school years, 29% of ECE programs experienced high turnover rates in a single year, which meant that they lost nearly half of their ECE teachers (Doromal et al., 2021). Moreover, 27% of ECE programs in the study experienced high turnover rates for multiple school years (Doromal et al., 2021). Given these chronic ECE teacher turnover rates, a considerable amount of retention programs for ECE teachers were launched, such as Arizona's Professional REWARD$ Program, Minnesota's "R.E.E.T.A.I.N. Bonus Program", and "WAGE$ Delaware" (Hilty & Shaw, 2019). Once the

pandemic started, 166,000 of ECE teachers lost their jobs due to massive program closures (McLean et al., 2021), which exacerbated the issues present in the retention of the ECE workforce.

In addition to context-dependent factors, such as the ones caused by the COVID-19 pandemic, many other factors could play a role in the retention of the ECE workforce, such as but not limited to work satisfaction, education levels, type of ECE program, poor working relationship with peers or supervisors, and alternative employment opportunities. (Doramal et al., 2021; Schwartz et al., 2019; Totenhagen et al., 2016; Wells, 2015). Although less documented, studies have suggested that ECE teachers' mental health can also play a role in the retention of the ECE workforce. For instance, in a sample of ECE teachers in center-based programs across the US, high scores of "psychological load" or depressive symptoms, stress, and emotional exhaustion scores were found to be predictive of lower professional commitment in ECE teachers (Buettner et al., 2016). Specifically, ECE teachers with poorer mental health were more likely to report seeing their current teacher position as a short-term career and being less satisfied with their jobs and/or being in the ECE field (Buettner et al., 2016). In another study, Schaack and colleagues (2020) found that ECE teachers' higher levels of emotional exhaustion from their jobs were predictive of turnover intentions. Similarly, Grant and colleagues found that ECE teachers with higher general stress and emotional exhaustion scores were more likely to report moving or leaving the field compared to ECE teachers with lower general stress and emotional exhaustion scores (Grant et al., 2019).

Similar patterns have been found outside the US, too. For instance, in a sample of ECE teachers in home-based programs in Australia (N = 1958), 33% of the sample had considered leaving their jobs in the past month, and around 50% of them were planning to stay in the field

for 5 years or less (Corr et al., 2015). While this study did not measure intentions to leave the field as a predictor of mental health, it was found that 42% of ECE teachers in this sample reported high levels of psychological distress, as described earlier (Corr et al., 2015). In a combined sample of ECE teachers and elementary school teachers in Brazil, it was found that around 50% of teachers reported intentions to stay in their jobs; however, teachers who presented anxiety and depression symptoms were more likely to report lower job satisfaction (Ferreira-Costa & Pedro-Silva, 2019), which is similar to findings observed in ECE teachers in Korea (Lee et al., 2016). In a sample of ECE teachers in Ghana working in under-resourced communities (N = 302), researchers found that anxiety and depressive symptoms were predictive of high rates of ECE teachers' school absenteeism (Peele & Wolf, 2021), which could likely lead ECE teachers to quit from their jobs or, in a worst-case scenario, be fired from their jobs. And last but not least, in Canada, Wagner and colleagues (2013) found that ECE teachers with higher levels of work satisfaction were more likely to report lower levels of general personal stress.

While it is important to consider that there are other variables in play that could influence ECE teachers' intentions to leave their jobs, such as education levels and low pay, it has been suggested that psychological well-being is likely a factor that mediates the relationship between these variables and ECE teachers' intentions to stay in the field (Schaack et al., 2020). Therefore, the implications of ECE teachers' poor mental health on the retention of the ECE workforce cannot be ignored. As the COVID-19 pandemic has added more stressors to ECE teachers due to program closures, staffing issues, and an increase in safety measures to keep programs running (McLean et al., 2021), ECE teachers' mental health symptoms might have been exacerbated, especially at the onset of the pandemic. Therefore, it is important to explore social indicators of mental health in ECE teachers during this point in time and identify potential systems of support

in place to help build and retain a healthy ECE teacher workforce.

1.3.2. Quality Teaching and Care.

Quality instruction and care refers to teaching practices that include but are not limited to emotional support in the classroom, instructional support, and classroom organization (Pianta et al., 2008). In addition to the retention of the ECE workforce, poor mental health can also have implications on teacher-child interactions and the quality of instruction that ECE teachers deliver, and consequently, on the learning and development of children in their care (Hamre & Pianta, 2004; Jeon et al., 2021; Ota et al., 2013; Roberts et al., 2016; Sandilos et al., 2015). These implications will be discussed thoroughly below.

Studies have found that ECE teachers, in and outside the US, with poor levels of psychological well-being, such as depression symptoms have been predictive of poor emotional support in the classrooms and conflicting relationships with children (Buettner et al., 2016; Hamre & Pianta, 2004; Koles et al., 2013). Specifically, Buettner and colleagues (2016) found that ECE teachers with higher psychological load were more likely to report negative reactions to children in hypothetical situations when children exhibited negative emotions. These negative reactions included punitive measures, such as not allowing the children to play until they stop crying, and minimizing reactions, such as dismissing children's emotions and seeing it as an "over-reaction" (Buettner et al., 2016). In a study conducted by Hamer and Pianta (2004), ECE teachers' depression symptoms were predictive of directive/negative verbal interactions with children. ECE teachers' depressive symptoms were also predictive of overall intrusive/negative caregiving based on ratings from the Observational Record of the Caregiving Environment measure (ORCE) (NICHD Early Child Care Research Network, 1996). Most interestingly, these findings especially applied to ECE teachers working in home-based childcare programs (Hamre

& Pianta, 2004). In a cross-sectional study of ECE teachers in the US and Hungary, higher levels of depressive symptoms were predictive of higher conflict in teacher-child relationships (Kole et al., 2013). In another study, researchers measured the number of Adverse Childhood Experiences (ACEs) in a group of ECE teachers and found that a high number of ACEs was predictive of a poor social-emotional environment in the classroom, which involved ratings of directions and rules, teacher affect, and teacher-child interactions (Hubel et al., 2020). While this latter study did not measure ECE teachers' mental health per se, it is very likely that ECE teachers with a high number of ACEs might have also exhibited depression or other mental health symptoms (Merrick et al., 2017).

Studies have also suggested that ECE teachers who exhibit depressive symptoms are more likely to report working with children with behavioral challenges (Kwon et al., 2019). For example. Kwon and colleagues (2019) analyzed a subset of the sample in the EHS Family and Child Experiences Study (i.e., Baby FACES 2009) and found that ECE teachers' with depressive symptoms were more likely to report working with toddlers with behavior problems. Utilizing a bigger sample from the same Baby FACES 2009 study, Roberts and colleagues (2016) found that depression symptoms were predictive of teacher-reported child problems behaviors, such as aggressiveness and hyperactivity. Moreover, it was found that depression symptoms were also predictive of fewer gains in children's social-emotional skills, such as following teachers' directions (Roberts et al., 2016). Similar findings were observed in the study conducted by Hindman and Bustamante (2019) who used a sample from the Baby FACES 2009 study as well. Last but not least, Jeon and colleagues (2014) found that in a sample of ECE teachers from the Fragile Families and Child Wellbeing Study, ECE teacher depressive symptoms were directly and indirectly associated with teacher-reported child externalizing and internalizing problems.

Given the aforementioned findings, it is difficult to determine whether ECE teachers with depressive symptoms are more likely to work with children with chronic behavioral challenges or not, since data from the Baby FACES, 2009 study, for instance, did not control for child behavioral challenges before children entered ECE programs (Hindman & Bustamante, 2019; Roberts et al., 2016). However, given the association between ECE teachers' mental health and the quality of teacher-child interactions and emotional support (Buettner et al., 2016; Hammer & Pianta, 2004; Hubel et al., 2020), it is possible that ECE teachers whose mental health has been compromised might find it difficult to provide the appropriate social-emotional support needed in the classroom to manage children's behaviors, which could exacerbate already existing child behavioral issues. This is particularly concerning since ECE teachers who do not have the support they need to manage children's difficult behaviors, such as access to early childhood mental health consultants might end up requesting children to be removed from their programs (Silver & Zinsser, 2020), which exacerbates the equity issues observed in preschool expulsions (Gilliam et al., 2016).

ECE teachers' mental health can also have implications on other indicators of quality teaching and care, such as instructional support and classroom organization (Jennings, 2015; Sandilos et al., 2015). Specifically, in a sample of ECE preschool teachers (Sandilos et al., 2015), depressive symptoms were predictive of lower ratings in classroom organization and instructional support as measured by the Classroom Assessment Scoring System, Pre-K (CLASS, Pre-K; Pianta et al., 2008). That is, based on the CLASS, ECE teachers with depressive symptoms tend to have lower ratings on the use of creativity and reasoning to promote understanding of concepts taught in the classroom, quality of feedback they give to children, and language modeling (instructional support; Pianta et al., 2008; Sandilos et al., 2015). This also

means that ECE teachers with depressive symptoms tend to have lower ratings on their ability to use time and routines effectively to increase productivity in the classroom, setting clear expectations, knowing how to redirect children's attention, and using a diverse and engaging set of activities in the classroom to promote learning (classroom organization; Pianta et al., 2008; Sandilos et al., 2015). Similar findings were observed in a mindfulness intervention study conducts on ECE preschool teachers (Jennings, 2015) with depression being negative associated with ratings in emotional support, classroom organization, and instructional support. These findings are concerning since it means that depressive symptoms in ECE teachers will likely have an impact on children's academic achievement, too. For instance, using data from the Baby FACES study 2014 cohort, Jeon and colleagues (2021) found that depressive symptoms in ECE teachers in Head Start centers were directly associated with lower gains in preschool children's math performance. Based on these findings, it is not surprising that ECE teachers' depressive symptoms have also been found to be predictive of lower child engagement in ECE programs (Ota et al., 2013).

Other implications of poor ECE teacher mental health on quality teaching and care include teacher self-efficacy skills, which refers to teachers' belief in their ability to do their jobs well (Kim & Kim, 2010). For instance, Jeon and colleagues (2018) found that in a nationally representative sample of ECE teachers in the US, higher levels of job competence or teacher self-efficacy were predictive of lower symptoms of depression. Similarly, in a sample of ECE teachers in South Korea, depression severity was predictive of lower levels of teacher self-efficacy (Kim & Kim, 2010), which suggests a relationship between ECE teachers' depressive symptoms and self-efficacy. Furthermore, poor ECE teachers' mental health can also have implications on attendance to professional development trainings (Schwartz et al., 2019). For

instance, ECE teachers in Ghana who reported moderate to severe depression symptoms were less likely to participate in professional development trainings (Schwartz et al., 2019), which is likely going to impact the quality of teaching and care that ECE teachers provide in their programs.

Taken together, the implications of poor ECE teachers' mental health on the retention of the ECE workforce and quality of teaching and care are vast and concerning. Not only it is important to consider how we can retain ECE teachers' in the field, but also how we can promote quality teaching and care given that poor ECE teachers' mental health has been associated with a wide range of negative outcomes, from lack of positive emotional support in the classroom to lower teacher self-efficacy skills (Buettner et al., 2016; Kim & Kim, 2010) Therefore, it is pivotal to continue efforts to identify contextual characteristics that influence ECE teachers' mental health to develop systems of support for the ECE teacher workforce. In chapter 3, social indicators of ECE teachers' mental health based on individual characteristics and environmental factors, such as work environment characteristics and COVID-19 stressors will be discussed thoroughly.

Chapter 2. Conceptual Framework

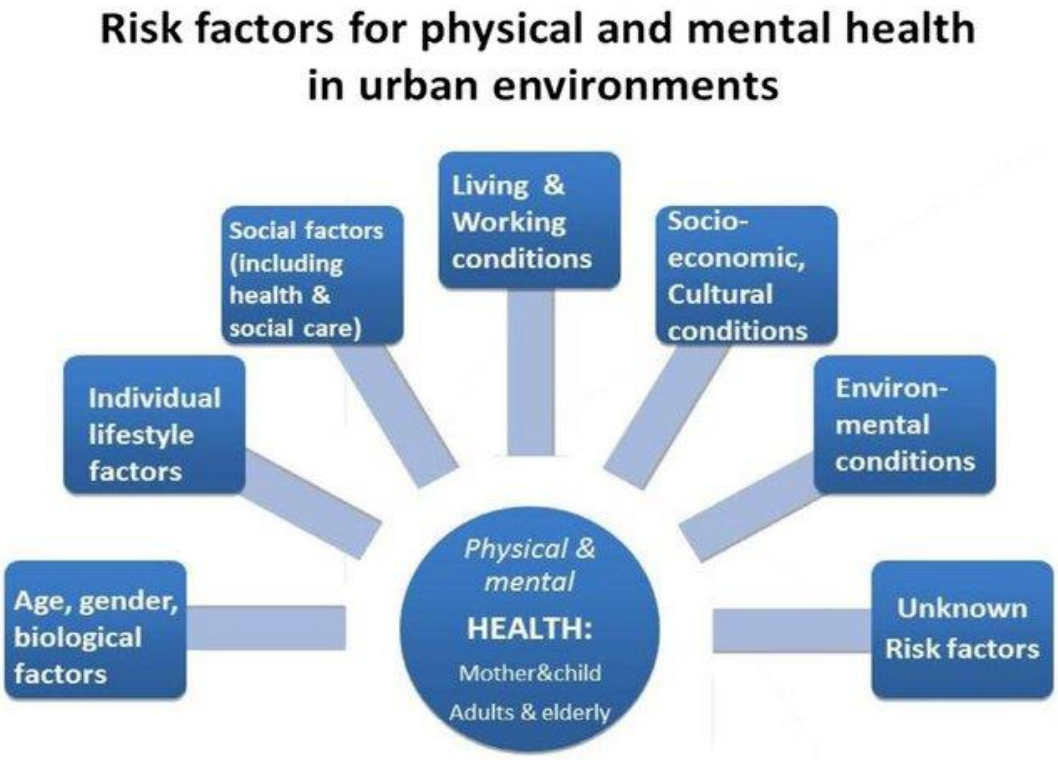
While mental health problems can be caused or influenced by genetic and biological factors, the environment and conditions that individuals are born into, live, and work can also play a significant, if not more important role on individuals' well-being. These factors are usually referred to as "social determinants of health" or SDHO (U.S. Department of Health and Human Services, n.d.).

While the current study explores various potential social determinants of mental health, this framework by itself is not enough to help us identify and understand the specific

environmental, particularly work environment characteristics of ECE teachers, and especially how individual-level and environmental-level social determinants of mental health can interact with each other at one point in time or over time. For instance, the figure (Figure 2.1) below is a typical visual representation of SDHO, which lacks a representation of the potential interactions and interdependence between individual-level and environmental-level social determinants of mental health.

Figure 2.1

Risk Factors for Physical and Mental Health in Urban Environments (Mumm et al., 2017).



Therefore, to have a more holistic understanding of ECE teachers' mental health, this study will draw from a few theoretical frameworks: Bronfenbrenner's Bioecological Model of Human Development (Bronfenbrenner & Morris, 2006), Social Determinants of Mental Health

(Alegria et al., 2018), and "Whole Teacher Well-Being" (Kwon et al., 2022). Furthermore, in order to avoid a causal inference, the term "social indicators of mental health" will be used in this study to describe potential individual and environmental-level influences of mental health. The social determinants of mental health (Alegria et al., 2018) framework will be used to understand the various potential individual and environmental-level social characteristics that could influence ECE teachers' mental health. The "Whole Teacher Well-Being" framework will be used to identify specific work environment characteristics that might impact ECE teachers' mental health (Kwon et al., 2022). Lastly, the Bronfenbrenner's Bioecological Model of Human Development will be used to organize and gain a deeper understanding of the potential interactions between individual-level and environmental-level social indicators of mental health.

Bronfenbrenner's Bioecological Model of Human Development (Bronfenbrenner & Morris, 2006) is a widely well-known framework used for understanding human development and the interdependence of individual and environmental-level characteristics. In other words, Bronfenbrenner proposes that individuals are in constant interaction with their environment from the moment they are born, so their developmental outcomes and lived experiences are often the result of these constant interactions that took place at one point in time or at different points over time. Individuals are not isolated from their environment and mental health problems, similar to developmental outcomes, are likely also the result of different factors present in an individuals' environment that are interacting with individual-level characteristics.

As it is well-known, Bronfenbrenner proposes that individuals are nested in different ecologies that make up the larger environment that the individual is in. These ecological subsystems are: individual, microsystem, mesosystem, exosystem, macrosystem, and chronosystem (Bronfenbrenner & Morris, 2006). For the purposes of this study, the individual,

microsystem, mesosystem, and chronosystem level will be examined thoroughly in relation to ECE teachers' mental health.

At the individual level, fixed and malleable characteristics, such as age, gender, race/ethnicity, SES, attitudes, knowledge, and skills are reflective of an individual and how he/she views or interacts with the environment (Bronfenbrenner & Morris, 2006). Research has documented that socio-demographic characteristics, such as gender, race/ethnicity, SES, and education levels are considered individual-level social indicators or "determinants" of health (Singh et al., 2017). For example, being a person of color or from a low-income background can influence that individual's lived experiences, such as exposure to trauma and discrimination, and access to health care resources (Singh et al., 2017). These lived experiences can in turn have implications on an individual's mental health (Alegria et al., 2018). Specifically, research has documented a link between ECE teachers' socio-demographic characteristics, such as age, educational levels, and SES and their mental health, in and outside the US (Ferreira-Costa & Pedro-Silva, 2019; Hindman & Bustamante; 2019; Linnan et al., 2017; Otten et al., 2019; Roberts et al., 2019; Schaack et al., 2020); therefore, it is important to consider these characteristics as potential individual-level social-level indicators of mental health.

Although not typically included in the research literature on social determinants of mental health, attitudes, knowledge, and skills are also individual-level characteristics that could impact a person's lived experiences and how she/he interacts with the world (Bronfenbrenner & Morris, 2006). For example, someone who views his job as a meaningful way to contribute to society might be more likely to view his work as more positive and handle challenging situations at work in a different way (Kuvaas et al., 2017). Given that this study is focused on ECE teachers, their professional characteristics, such as their years of work experience in the ECE field and their

motivation to work as ECE teachers will be examined as potential individual-level indicators of mental health. The link between ECE teachers' professional characteristics and their mental health is also supported by studies that have found a relationship between ECE teachers' mental health and these individual-level characteristics (Jeon et al., 2018; Jeon et al., 2019; Peele & Wolfe, 2021; Schaack et al., 2020)

The next ecosystem of focus in this study is the microsystem, which represents the immediate environment of the individual, such as neighborhoods, schools, workplaces, etc. (Bronfenbrenner & Morris, 2006). Given that research has documented the poor work environments that ECE teachers have and their potential implications on their mental health (Finánczet al., 2020; Linnan et al., 2017; Roberts et al., 2019), the variables of focus in ECE teachers' microsystem will be their work environments. While work environment characteristics are also social indicators of mental health (Alegria et al., 2018), the "Whole Teacher Well-Being" conceptual model (Kwon et al., 2021; See Figure 2.2) will be used to dive more deeply into the work environment characteristics of ECE teachers as it highlights its influence on ECE teachers' well-being.

The "Whole Teacher Well-Being" conceptual model was created by Kwon and colleagues (2021) and it was developed in accordance with the Job Demands and Resources (JD-R) framework (Bakker & Demerouti, 2007). According to the "Whole Teacher Well-Being", ECE teachers' "whole well-being" is comprised of three dimensions: physical well-being, psychological well-being, and professional well-being (Kwon et al., 2021). A crucial element of the "Whole Teacher Well-Being" conceptual model is how work environment and workplace support conditions, such as work climate, compensation, job demands, etc., support ECE teachers' "whole well-being", including their psychological well-being or mental health (Kwon

et al., 2021). According to Kwon and colleagues (2022), ECE teachers face unique demands and challenges at work compared to K-12 teachers because they work with younger children, their credentialing requirements differ across states, their pay is much lower than K-12 teachers, and some do not even receive health insurance benefits at work. Therefore, exploring work-environment characteristics of ECE teachers is fundamental to understand their well-being, including their mental health (Kwon et al., 2022). In this study, several ECE work-environment and workplace support characteristics will be explored, such as compensation and benefits, job demands, job control, and work psychological rewards as they have been linked to ECE teachers' mental health (Hindman & Bustamante, 2019; Jeon et al., 2018; Peele & Wolfe, 2021; Raskin et al., 2015; Roberts et al., 2019; Schaack et al., 2020; Wagner et al., 2013).

Figure 2.2

Whole Teacher Well-Being Conceptual Model (Kwon et al., 2021)

The last subsystem explored in this model is the chronosystem, which refers to time and historical influences (Bronfenbrenner & Morris, 2006). Historical events, such as the COVID-19

pandemic can not only impact an individual's well-being, but also create major shifts in an individual's microsystem, exosystem, and macrosystem. For instance, The COVID-19 pandemic has impacted the lives of many people, which has resulted in millions of lives lost, hundreds of individuals hospitalized, and major changes in work routines and how individuals interact with each other. ECE teachers, considered essential workers, have also been significantly impacted by the COVID-19 pandemic. For instance, many ECE programs closed at the onset of the pandemic leaving thousands of ECE teachers without jobs (McLean et al., 2021). For the ECE programs that remained open, ECE teachers faced many challenges, such as staffing issues, increased costs to follow health and safety guidelines, and concerns about contracting COVID-19 from children, families, and co-workers (Delap et al., 2020; Kim et al., 2022; Quinn et al., 2022). Therefore, the changes and stressors brought by the COVID-19 pandemic on ECE teachers' lives and experiences are undeniable and are likely another major social indicator of mental health.

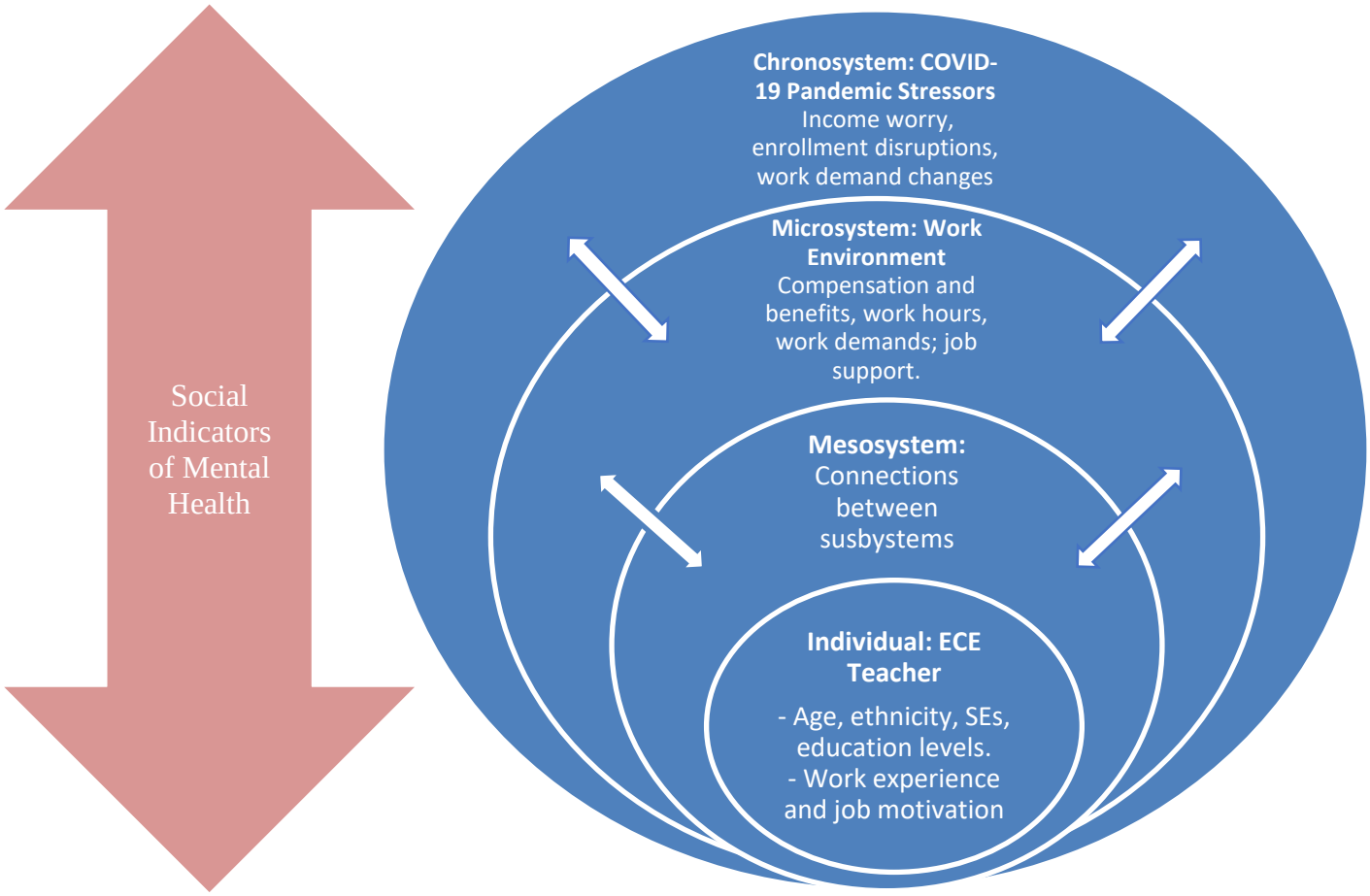
In this study, the implications of COVID-19 on ECE teachers' financial security (individual-level) and work environment characteristics (microsystem) and their potential relationship with ECE teachers' mental health will be explored. Specifically, ECE teachers' levels of concern about their income, child enrollment disruption, and changes in their usual work responsibilities or demands once the pandemic started will be examined in relation to their mental health.

Last but not least, the mesosystem in the Bioecological Model (Bronfenbrenner & Morris, 2006) refers to the potential interactions between an individual's subsystems and ecologies, such as how individual-level characteristics interact with environmental-level characteristics. In human development, developmental outcomes and experiences lived are often the result of different factors in these different subsystems that interact with each other at one or at different

points in time (Bronfenbrenner & Morris, 2006). In this study, the interactions between two subsystems will be thoroughly explored, such as the interaction between the pandemic and ECE teachers' work environment characteristics and their implications on ECE teachers' mental health. Other possible interactions and relationships between individual-level and environmental-level social indicators of mental health will also be discussed thorough the literature review. A visual representation of the conceptual framework used in this study is below.

Figure 2.3

Conceptual Model of ECE Teachers' Mental Health



Chapter 3. Literature Review

While there has been plenty of research done on the implications of poor ECE teachers' mental health on the retention of the ECE workforce, but especially on quality teaching and care (Buettner et al., 2016; Ferreira-Costa & Pedro-Silva, 2019; Grant et al., 2019; Hamre & Pianta, 2004; Jeon et al., 2021; Ota et al., 2013; Roberts et al., 2016; Sandilos et al., 2015; Schaack et al., 2020), research on predictors of ECE teachers' mental health is still relatively new and ongoing. Therefore, this study will base its literature review on individual-level and environmental-level social indicators of ECE teachers' mental health on several sources, such as peer-reviewed research journals, policy reports, and working papers, particularly from the past 20 years. Studies conducted outside the US will be described as well to understand similarities and differences in the individual characteristics, working conditions, and challenges that ECE teachers across different contexts face, before and after the pandemic, and how they are linked to their mental health. Moreover, where reasonable, studies conducted in the K-12 teacher population and their mental health will be discussed to gain a broader understanding of social indicators of teachers' mental health. However, it is important to note that the work environment, demands, and overall experiences of the K-12 teacher population are distinctively different from the ECE teacher population (McLean et al., 2021); therefore, these comparisons will be limited and should be taken with caution.

Using the Bronfenbrenner's Ecological Model of Human Development (Bronfenbrenner & Morris, 2006), the current literature review will be organized as follows: (a) Individual-level social indicators: Socio-demographic characteristics and professional characteristics, and (b) Environmental-level social indicators: work environment characteristics (microsystem), and (c) COVID-19 stressors (chronosystem/microsystem). The interactions between these different

constructs or subsystems (mesosytem) will be explored and discussed throughout the literature review.

3.1. Individual-Level Social Indicators of Mental Health in ECE Teachers

3.1.1. *Socio-Demographic Characteristics*

When looking at mental health, it is important to examine how individual characteristics, such as socio-demographic factors may impact one's own well-being, including mental health (Alegria et al., 2018). Socio-demographic characteristics, which are also considered important social indicators of health include but are not limited to age, ethnicity, educational levels, SES, native language, employment status, disability status, immigration status, among others (Singh et al., 2017). Given the scope of this study, the current paper will focus on the following socio-demographic characteristics: Age, ethnicity, education levels, and SES or economic hardships. Even though gender is another important social indicator of mental health, given the fact that the majority of ECE teachers in and outside the US are female (Corr et al., 2015; McLean et al., 2021; Peele & Wolfe, 2021), and the sample in the current study are predominantly female, this factor will not be explored in the current literature review.

Age. A few studies have documented ECE teachers' age as a potential social indicator of mental health (Hamre & Pianta, 2004; Roberts et al., 2019). The age range of the ECE teacher workforce in the US is very wide. For instance, based on the Baby FACES 2014 cohort, ECE teachers' ages in Head Start programs ranged from 25 and 60 years of age (Harding et al., 2019). Similarly, based on the National Survey of Early Care and Education, 2019, the age range of ECE teachers in home-based program ranged from 18-65, with 67% of them falling between the 30-60 age range (NSECE, 2021). The average age of ECE teachers according to various studies seem to be in the 40s. For instance, the average age of ECE teachers in the Baby FACES 2014

cohort was 43.5 years of age (Harding et al., 2019). This is consistent with the statistics found on a nationally representative sample of ECE teachers in the US with the average age for ECE teachers being 44.6 years old (Jeon et al., 2018), a nationally representative sample of ECE teachers in home-based programs with an average of 49 years of age (Park et al., 2022).

There are very few studies that have looked at the relationship between ECE teachers' age and their mental health. Out of these studies, it has been found that younger ECE teachers are more likely to exhibit depressive symptoms compared to older ECE teachers (Hamre & Pianta, 2004; Roberts et al., 2019). In addition, using a nationally representative sample of ECE teachers, Jeon and colleagues (2018) found that older ECE teachers tended to report lower general stress levels as measured by the Perceived Stress Scale (PSS; Cohen et al., 1983).

These results might be explained by the limited work experience of young ECE teachers compared to ECE teachers who have been in the profession for a significant amount of time. For instance, it has been documented that ECE teachers with more years of work experience, and hence older in age, tend to have higher self-efficacy skills and developmentally appropriate attitudes when working with children (Harding et al., 2019; Kim & Kim, 2010). Furthermore, ECE teachers who are younger in age tend to report lower hourly wages, which is likely due to less work experience (Otten et al., 2019). The implications of work experience on ECE teachers' mental health are further discussed under the "work environment and ECE teachers' mental health" section; however, age is an important socio-demographic factor that should be considered as likely having a relationship with ECE teachers' mental health.

Ethnicity. According to the Center for the Study of Child Care Employment, 40% of the ECE workforce is composed of women of color (Austin et al., 2019). When looking at Head Start centers, for instance, 44% of ECE teachers in Head Start centers were White, 26% were

Black, 24% were Hispanic, and 5% were of "other" race/ethnicity (Baby FACES 2014 cohort; Harding et al., 2019).

Being from a minority background has been associated with many disparities in the ECE field. For instance, it has been found that Black ECE teachers who work with preschoolers earn $1.71 less per hour compared to their White peers and that Black ECE teachers who work with infants and toddlers earn a $0.77 less per hour compared to their White peers (Austin et al., 2019). African American and Hispanic ECE staff are also more likely to be working in lower-paid positions, such as teacher aides or assistant teachers (Austin et al., 2019). White ECE teachers are also more likely to have a bachelor's degree or higher compared to ECE teachers of color (Kwon et al., 2022), which suggests that education likely influences the pay gap observed between these two groups. These disparities may have several implications including on ECE teachers' quality of care and teaching (Buettner et al., 2016), but also their mental health.

Unfortunately, there are very few studies that have explored the relationship between ECE teachers' ethnicity or minority status and their mental health. Furthermore, the results from these studies have been mixed. For instance, based on the Baby FACES 2009 cohort, Hindman and Bustamante (2019) found that Latinx ECE teachers were more likely to report depressive symptoms compared to ECE teachers from an African American or other ethnicity backgrounds. Other studies, however, have not found a significant relationship between minority status, especially being Black or Hispanic, and their mental health (Harding et al., 2019; Jeon et al., 2018). Given the statistics on the disparities that minority ECE teachers face, it is crucial to consider ethnicity as a potential individual-level social indicator of ECE teachers' mental health.

Education Levels. As described in the first chapter, ECE teachers' levels of education vary widely across states given the inconsistent credentialing requirements for center-based and

home-based childcare programs (Holm Tobin et al., 2020). Even among Head Start programs, credentialing requirements are inconsistent for ECE teachers working with infants and toddlers compared to preschool children (Head Start, 2022). For instance, ECE teachers working with infants and toddlers are required to have a minimum of a CDA credential; however, ECE teachers working with preschoolers are required to have at least an associate's degree (AA) or a bachelor's degree (Head Start, 2022). Currently, only 32 out of the 50 states require some level of higher education training for center-based ECE teachers, such as a CDA or an AA (McLean et al., 2021). On the other hand, only 10 out of the 50 states require some higher education training for ECE teachers in home-based programs (McLean et al., 2021).

Despite these inconsistent credentialing requirements, there have been some positive changes in the past few years in the percentages of ECE teachers' with higher education. For instance, based on the Head Start Family and Child Experiences Survey (FACES), Aikens and colleagues (2016) examined changes in educational levels in ECE teachers in Head Start programs from the 2006, 2009, and 2014 cohort, respectively, and found that the percentage of classrooms with ECE teachers with a bachelor's degree or higher increased from 40% in 2006 to 70% in 2014. Also, the percentage of ECE teachers with an associate's degree or less decreased from 60% in 2006 to 31% in 2014. It is important to note that these positive changes were promoted by Congress for ECE teachers working in Head Start programs, specifically (NAEYC, 2019). Based on a nationally representative sample of ECE teachers in center-based and home-based programs, Jeon and colleagues (2018) found that 67% of ECE teachers had a bachelor's degree, 13% had an associate's degree, and 20% had less than an associate's degree. These statistics mirror what was found by Aikens and colleagues (2016) in ECE Head Start teachers. However, these statistics might look different for ECE teachers working in home-based

programs given that the credentialing requirements are different for them (McLean et al., 2021). For instance, based on the National Survey of Early Care and Education (NSECE, 2021), only 18% of ECE teachers in home-based programs had a bachelor's degree or higher. This suggests that while there has been an increase in the number of ECE teachers with a bachelor's degree (Aikens et al., 2016), especially for ECE teachers in center-based programs, there is still improvement to be made in aligning credentialing requirements across states for ECE teachers in center-based and home-based programs as well as other ECE professionals, such as assistant teachers (McLean et al., 2021).

When looking at educational levels of ECE teachers outside the US, the statistics are not very encouraging. For instance, based on a nationally representative sample of ECE teachers in Ghana, only 21% reported having a bachelor's degree or higher (Peele & Wolf, 2021). Similar results were found with smaller samples of ECE teachers in other countries: 8% in Australia (ECE teachers in home-based programs), 12% in China, 21% in Hungary, and 26% in Ukraine (Corr et al., 2015; Finánc z et al., 2020; Li & Li, 2020; Raskin et al., 2015). These statistics show that outside the US, ECE teachers' levels of education are even lower, which is likely given to the lack of or little attention that governments place on this workforce population (Neuman & Powers, 2021).

The association between ECE teachers' levels of education and their mental health have been mixed. For instance, Schaack and colleagues (2020) found that in a sample of ECE teachers in Colorado, having a postsecondary degree was predictive of ECE teachers' emotional exhaustion from their jobs, meaning that ECE teachers were less likely to feel emotionally worn out or drained. In a combined sample of ECE teachers and elementary school teachers in Brazil, it was found that teachers with lower levels of education were more likely to report mild to

severe anxiety and depressive symptoms (Ferreira-Costa & Pedro-Silva, 2019). However, other studies have not found a relationship between educational levels and indicators of ECE teachers' mental health (Harding et al., 2019; Hindman & Bustamante, 2019; Jeon et al., 2018; Roberts et al., 2019). On the other hand, and while not examined in this study, the amount of ECE training hours teachers receive has been suggested to buffer depressive symptoms and general stress levels (Gerber et al., 2007; Ota et al., 2013). More research is needed to unpack the relationship between ECE teachers' education levels and their mental health.

While the research literature on this topic has been mixed and limited, it has been documented that education levels may have implications on ECE teachers' increased knowledge of child development and classroom quality indicators, such as emotional behavioral support and instructional support (Aikens et al., 2016; Early et al., 2007; Goble et al., 2015; Harding et al., 2019; Kwon et al., 2022; Lake et al., 2015). Therefore, educational levels may be a buffer for teacher stress and poor mental health as they may serve as a mechanism to increase teachers' knowledge and ability to do their jobs; thus, it should be explored as a potential social indicator of ECE teachers' mental health.

SES/Economic Hardships. Another important socio-demographic characteristic to keep in mind is socio-economic status (SES) and economic hardships. Research has documented that a significant amount of ECE teachers in the US experience economic instability (Linnan et al., 2017; Otten et al., 2019; Whitebook et al., 2018). Specifically, in a sample of ECE administrators and teachers in home-based programs in North Carolina, 54% reported having a household income of $25,000 or lower (Linnan et al., 2017); however, ECE teachers were more likely to report job insecurity compared to ECE administrators (Linnan et al., 2017). Furthermore, in a study conducted on childcare workers in two large urban cities in the US (Otten et al., 2019),

42% of ECE teachers experienced food insecurity compared to 11.8% of individuals at the national level. Furthermore, 23% of ECE teachers in this study reported receiving at least one form of food public assistance program. This is consistent with the data reported by the *Early Childhood Workforce Index* (Whitebook et al., 2018), which has documented that ECE teachers tend to use public income support programs, such as the Children's Health Insurance Program (CHIP), or the Supplemental Nutrition Assistance Program (SNAP). Moreover, Roberts and colleagues (2019) found that a considerable amount of ECE teachers also reported having multiple jobs. This is likely due to the low wages that ECE teachers have, which forces teachers to seek for additional means to make ends meet. More information on ECE teachers' compensation and benefits are discussed under the "Work Environment Characteristics" section.

Similar SES characteristics have been found in ECE teachers outside the US. Specifically, in studies conducted in Australia, Brazil, China, and Ukraine, the majority of ECE teachers reported having household incomes that were considered minimum wages (Corr et al., 2015; Ferreira-Costa & Pedro-Silva, 2019; Li & Li, 2020; Raskin et al., 2015). Furthermore, in a sample of ECE teachers in home-based programs in Australia, 23% reported working overnights or during the weekends (Corr et al., 2015). Similarly, 20% of ECE teachers in Ghana and 26% of ECE preschool teachers in Ukraine reported having a second job (Raskin et al., 2015; Schwartz et al., 2019).

Based on these findings, it is undeniable that ECE teachers in and outside the US tend to report going through economic hardships. This is concerning since experiencing economic instability can take a toll on ECE teachers' mental health as these add stress and worry to their lives. For instance, in a sample of ECE teachers in North Carolina, lower income ECE teachers ($20,000 or below) were more likely to report higher depression symptoms compared to ECE

teachers with higher pay (Linnan et al., 2017). Furthermore, ECE teachers with lower income also reported being more likely to be smokers and consuming high-sugar beverages, which could have implications on their physical health, too (Linnan et al., 2017). Direct associations between ECE teachers' job compensation and their mental health have also been found in other studies (Roberts et al., 2019; Schaack et al., 2020). Moreover, ECE teachers with multiple jobs were more likely to report symptoms of depression as well (Roberts et al., 2019). Last but not least, being uncertain about one's own financial situation or feelings of job insecurity have been suggested to be predictive of depressive symptoms and psychological distress in ECE teachers, especially outside the US (Corr et al., 2015; Finánczet al., 2020; Wagner et al., 2013).

These findings highlight the importance of economic stability on ECE teachers' mental health. Given the history of poor compensation for ECE teachers, especially for childcare workers or teachers working in home-based programs (McLean et al., 2021), it is likely that ECE teachers are more likely to experience economic hardships; therefore, SES should be considered a social indicator of mental health. Further exploration on the relationship between ECE teachers' work compensation and their psychological well-being is discussed under the "work environment characteristics" section. Implications of the COVID-19 pandemic on ECE teachers' SES is also discussed under the "COVID-19 Stressors" section.

3.1.2. Professional Characteristics

ECE teachers' professional characteristics can be defined as attitudes, beliefs, and skills that ECE teachers bring to their work environment. For example, years of work experience, self-efficacy skills, job motivation, beliefs on children and teaching practices, beliefs on family engagement, etc. (Finánczet al., 2020; Hu et al., 2019; Jeon et al., 2018; Jeon et al., 2019; Kim & Kim, 2010; Rodriguez et al., 2020). Considerable research has focused on certain ECE

teachers' professional characteristics and their mental health, such as self-efficacy skills (Hu et al., 2019; Kim & Kim, 2010), but less research has focused on other professional characteristics, such as job motivation. For the purposes of this study, job motivation and work experience will be explored thoroughly in relation to ECE teachers' mental health.

Work Experience. Work experience simply refers to the number of years that ECE teachers have worked in that position. The average number of years of work experience in the ECE field varies by study and by ECE program. However, based on a national sample of ECE teachers and samples of ECE teachers from specific states in the US, and across center-based and home-based programs, the average years of work experience seem to range between 10 and 16 years (Grant et al., 2019; Jeon et al., 2018; Kwon et al., 2022; Otten et al., Schaack et al., 2020).

There are very limited studies that have explored the relationship between ECE teachers' work experience and their mental health. For instance, Jeon and colleagues (2018) found that based on a national representative sample of ECE teachers, more years of work experience were predictive of lower depression scores. Schaack and colleagues (2020) found that ECE teachers with 10 or more years of work experience were less likely to report intentions to leave their jobs, which was measured as an indicator of job burnout or professional well-being. Similar findings have been observed in the K-12 teacher population, too, especially in relation to occupational stress (Antoniou et al., 2013).

The differences in the relationship between years of work experience and well-being outcomes, including mental health, might be explained by ECE teachers' higher work satisfaction (Park et al., 2022), higher work commitment (Grant et al., 2019), and higher self-efficacy skills (Kim & Kim, 2010). For instance, Park and colleagues (2022) found that ECE teachers in home-based care settings with more years of work experience were more likely to

have positive feelings in relation to work, including work satisfaction. Also, as ECE teachers have more years of work experience, they might feel more comfortable with teaching and juggling the demands of working with young children (Kim & Kim, 2010), which could make them more inclined to stay in their jobs. More experienced ECE teachers might tend to have more developmentally appropriate attitudes when working with children (Harding et al., 2019), which could have implications on their intentions to stay in the field. Last but not least, ECE teachers with more years of work experience tend to earn more than novice ECE teachers (Otten et al., 2019), which could influence their decision to stay in the field as well. Nevertheless, more research on the relationship between ECE teachers' work experience and mental health outcomes is needed to support this hypothesis.

Job Motivation. Job motivation refers to the reason an individual feels inclined to choose a career or job. In the research literature, job motivation is usually seen through the lens of intrinsic vs. extrinsic motivation (Pinder, 2011). Intrinsic motivation has been defined as an individual's desire to complete a task due to internal satisfaction, such as a sense of fulfillment or belonging (Kuvaas et al., 2017). Extrinsic motivation has been defined as an individual's desire to complete a task due to external reasons, such as obtaining a reward or avoiding negative consequences (Kuvaas et al., 2017).

Given that teaching is a profession of service, it is well-known that most teachers, ECE and K-12 teachers, choose this profession due to intrinsic reasons and its social utility value (Corr et al., 2015; Grant et al., 2019; Kılınç et al., 2012; Massari, 2014; NSECE, 2021; Tekin, 2016). In and outside the US, ECE teachers who are intrinsically motivated usually see teaching as a personal calling or spiritual mission (Buell et al., 2002), a way to support children's learning and development (Zhang et al., 2019), and as an opportunity to nurture meaningful relationships

(Malm, 2020). ECE teachers also choose to enter this field as a way to address social inequities, such as supporting economically disadvantaged children's school readiness and decrease academic achievement disparities seen in later grades (Suryani, 2021). Moreover, ECE teachers, especially male teachers, might also join the ECE workforce as a way to challenge stereotypes (Reich-Shapiro et al., 2021). For instance, in qualitative study conducted with ECE male teachers (Reich-Shapiro et al., 2021), it was reported that while ECE male teachers chose this profession to support children's development, they also saw their decision to join the field as a means to diversify the workforce, bring in new perspectives on teaching and learning, and challenge gender stereotypes. It is important to note that there are also extrinsic reasons for ECE teachers to choose this profession. For ECE teachers who are home child-care providers, particularly, working from home and the ability to choose their own schedule is a major reason for choosing to enter this field (Corr et al., 2015; NSECE, 2021).

The implications of having intrinsic motivation compared to extrinsic motivation are important for children's learning and the ECE workforce. For instance, studies have found that ECE teachers who are more intrinsically motivated are more likely to: stay in the field (Grant et al., 2019; Torquati et al., 2007; Zhang et al., 2019), have more child-centered beliefs and endorse developmentally appropriate teaching practices (Jeon et al., 2019), pursue professional development (Wagner & French, 2010; Visković & Višnjić Jevtić, 2018), and provide high quality teaching and care (Forry et al., 2013).

The relationship between job motivation and ECE teachers' mental health has not been widely explored. Although there are some studies that suggest that depression and anxiety symptoms are predictive of lower job motivation (Jeon et al., 2019; Peele & Wolf, 2021), it is still unclear what the role of job motivation is in predicting mental health outcomes for ECE

teachers. Given the crucial implications that intrinsic motivation in ECE teachers has on children's learning and development and the ECE workforce, it is imperative to examine the relationship between ECE teachers' job motivation and their mental health as another potential influence on ECE teachers' mental health.

3.2. Environmental-Level Social Indicators of Mental Health

3.2.1. *Work Environment Characteristics*

Based on the extensive research literature, several studies have suggested that poor working conditions and the high demands of working with young children and families may have a negative influence on ECE teachers' mental health as well as their professional and physical well-being (Gagnon et al., 2018; Kwon et al., 2022; Roberts et al., 2019). ECE teachers' working environments, such as employment compensation and benefits, and work demand characteristics, such as work hours and the challenges of working with children and families will be discussed thoroughly below.

Employment Compensation and Benefits. It has been well documented that ECE teachers are among the lowest-paid professions in the US, especially childcare workers (McLean et al., 2021; Otten et al., 2019). For instance, the Early Childhood Workforce Index stated that, in 2019, the median hourly compensation was $11.64 for ECE teachers working in home-based with infants and toddlers (or childcare workers), $14.67 for ECE preschool teachers across center-based or home-based programs, and $26.95 for ECE preschool teachers working in schools (McLean et al., 2021). According to the Massachusetts Institute of Technology (MIT) Living Wage Calculator, these wages are not considered "livable" wages- meaning that they are not enough to afford basic necessities (Glasmeier, 2020). More concerning is that these hourly wages are considerably lower than the average hourly wage by teachers in kindergarten, which is

$32.80, and elementary school teachers, which is $34.43 (McLean et al., 2021). These findings highlight the pay inequities present between ECE teachers and teachers in the K-12 system.

In addition to low hourly wages, a considerable amount of ECE teachers do not have access to basic benefits, such as health insurance. For example, in a sample of ECE teachers in Austin and Seattle, it was found that 10% of ECE teachers in home-based programs did not have health insurance (Otten et al., 2019). Out of the number of ECE teachers who had health insurance, only 57% of them had health insurance through their employers (Otten et al., 2019), and that only 69% of ECE sites offered health insurance to their employees. Moreover, only 54% of ECE sites offered paid parental or family leave (Otten et al., 2019). Similarly, in a sample of ECE teachers in Oklahoma, it was found that 31% did not have health insurance, 61% had paid sick days, and only 58% of them worked in ECE programs that offered retirement plans (Kwon et al., 2020). Moreover, Caven and colleagues (2021) found that private-pay ECE programs or home-based programs are less likely to offer benefits (52%) compared to other ECE programs (87%). Interestingly, higher-wage ECE teachers were more likely to work in ECE programs that offered health insurance and other benefits (Kwon et al., 2020; Otten et al., 2019).

Working in jobs that offer poor hourly wages and little to no benefits can cause economic hardships and stress, which in turn can have implications on an individual's well-being, especially on their mental health (Kiely et al., 2015). For instance, studies have documented that ECE teachers with lower wages were more likely to report depressive symptoms compared to their better-paid counterparts (Linnan et al., 2017; Otten et al., 2019). Similarly, ECE teachers with poor work benefits, such as not having health insurance or paid sick leave were more likely to report negative mental health outcomes including greater emotional exhaustion from their jobs (Roberts et al., 2019; Schaack et al., 2020). Outside the US, similar findings have been observed.

For instance, in a combined sample of orphanage workers and preschool teachers in Ukraine, it was found that the percent of vacation days taken were predictive of less depressive symptoms in ECE teachers (Raskin et al., 2015).

This COVID-19 pandemic has added even more economic stress to ECE teachers given that during the first eight months of the pandemic, thousands of ECE programs had to close resulting in many lay-offs for ECE staff (McLean et al., 2020). Therefore, it is imperative to understand whether poor financial compensation exacerbated ECE teachers' mental health status at the onset of the pandemic. More information about the implications of this pandemic on ECE teachers' financial security will be discussed under the "COVID-19 Stressors" section.

Job Demands. Job demands refer to the responsibilities that ECE teachers have when working with young children, which include but are not limited to child behavioral management, staffing support, engaging with families, attending work meetings and professional development trainings, etc. For the purposes of this study, weekly work hours and the demands of working with children and families will be discussed thoroughly in this section.

Staffing and Work Hours. Research has documented that ECE teachers experience a significant amount of job demands in their programs. For instance, in a sample of ECE teachers in Colorado (N = 137), 62% reported having too much work on their plates compared to 35% of the national workforce sample (Farewell et al., 2022). In a sample of newly hired ECE Head Start teachers, teachers reported having high levels of perceived workload compared to assistant teachers (Wells, 2015). Furthermore, ECE teachers' workload can be exacerbated by staffing issues, ECE program type, and children's age. Specifically, 82% of ECE teachers in Colorado reported concerns about not having enough staff in their programs to get the work done compared to 61% of the national workforce sample (Farewell et al., 2022). Deham and

colleagues (2017) found that ECE teachers who worked in home-based programs were more likely to experience more work demands. And in a sample of ECE teachers in Oklahoma (Kwon et al., 2022), ECE teachers who worked with infants and toddlers and who did not have a bachelor's degree were less likely to report having additional staff on site for work support. Given the workload and staffing difficulties that ECE teachers experience, it is likely that they also tend to work overtime. For instance, in a sample of ECE teachers in home-based programs in North-Carolina, teachers reported working long hours, especially lower-wage workers (Linnan et al., 2017).

Outside the US, similar findings have been observed with ECE teachers feeling that there is limited or "never enough time" for them to do their jobs, especially providing individualized support for children (Moriarty et al., 2001, p.37). Similar to findings on ECE teachers in the US, most ECE teachers abroad reported working overtime. For instance, 18% of ECE teachers in Ghana over 50 hours a week (Schwartz et al., 2019). ECE teachers in China also reported working over 40 hours a week (Li & Li, 2020). In Australia, ECE teachers in home-based settings reported working an average of 45 hours a week, but most alarmingly, 32% reported working unwell in the last four weeks (Corr et al., 2015).

Taken together, in and outside the US, ECE teachers tend to work more than 40 hours a week, which is likely due to the high demands and staffing needs in ECE programs. Moreover, this pandemic has likely exacerbated the number of hours ECE teachers need to work, especially at the beginning of the pandemic, given that a significant percentage of ECE teachers were laid off due to program closures or staffing downsizing (Delap et al., 2020; McLean et al., 2021).

Staffing demands and excessive work hours can, understandably, have implications on ECE teachers' psychological well-being, such as exhibiting depressive symptoms and high levels

of general stress, as it was found in a sample of ECE teachers in Oklahoma (Kwon et al., 2021). In Canada, similar findings were found for ECE teachers who were working full time, although it is not clear whether this group of ECE teachers also worked overtime (Wagner et al., 2013). Although some studies have not found an association between work hours and ECE teachers' mental health (Li & Li, 2020), there is still limited research on the predictive relationship of work hours on ECE teachers' mental health; therefore, it is still crucial to consider this work environment factor as a potential social indicator of mental health in ECE teachers.

Working with Young Children. The demands of working and interacting with young children can also be emotionally and physically demanding since young children depend a lot on their caregivers to meet their basic needs. Working with young children involve different responsibilities, such as but not limited to supporting children's language, academic, social-emotional, and physical skills, and keeping them clean, fed, and safe. In fact, studies have documented a relationship between the demands of working with young children and ECE teachers' mental health and have even found differences between child age groups (infants and toddlers vs preschoolers).

Specifically, Kwon and colleagues (2020) found that in a sample of ECE teachers in Oklahoma, teachers who worked with preschool children were more likely to report depressive symptoms compared to ECE teachers who worked with infants and toddlers. These results might be due to differences in behavioral support needs. For instance, working with infants and toddlers can be physically demanding since ECE teachers need to change diapers constantly, assist with potty training, carry babies in their arms frequently, etc. While these physical demands might not have implications on ECE teachers' mental health per se, they might have implications on ECE teachers' physical health and overall well-being (Kwon et al., 2022).

On the other hand, ECE teachers who work with preschoolers might need to address children's challenging behaviors more often as preschool children are able to express themselves more and move around more freely compared to infants and toddlers. This might explain why studies have documented a relationship between dealing with children's challenging behaviors, especially in preschool children, and ECE teachers' mental health, such as emotional exhaustion, stress, and depression levels (Gagnon et al., 2019; Hindman & Bustamante, 2019; Jeon et al., 2014; Kwon et al., 2019; Roberts et al., 2019; Schaack et al., 2020). Specifically, studies suggest that ECE teachers who work with preschoolers tend to engage frequently in emotional suppression in the classroom to model behavior and maintain a positive classroom climate (Rodriguez et al., 2020; Shewark et al., 2018). However, this hyper-regulation of emotions may come at a cost since it can leave early childhood educators feeling "drained" in and outside of the classroom and with higher stress levels (Jeon & Ardeleanu, 2020; Rodriguez et al., 2020; Shewark et al., 2018).

Dealing with children's challenging behaviors can also be especially stressful because ECE teachers might be the recipients of children's aggressive behaviors in addition that it could be challenging to communicate this to families (Hoffman et al., 2019). Therefore, it is not surprising that Zinsser and colleagues (2016) found that when preschool teachers received more behavioral support for children, such as access to mental health consultants, trainings, etc., they were less likely to exhibit depressive symptoms compared to preschool teachers with less child behavioral support.

Although not explored in this study, other demands to keep in mind when working with children include class size and working with children who are dual language learners and children with special needs. Results from studies looking at this set of predictors in relation to

ECE teachers' mental health have been mixed (Harding et al., 2019; Hindman & Bustamante, 2019), so more research is needed to untangle the relationship between these variables and ECE teachers' mental health; however, this study will focus on expanding the research literature on the demands of working with children and ECE teachers' mental health.

Working with Families. Working with families is another aspect of ECE teachers' work that is demanding and, therefore, could have implications on ECE teachers' mental health, too (Faulkner et al., 2016; Roberts et al., 2019). Some challenges found when working with families include but are not limited to how to effectively communicate with families, how to involve and partner with families to support their children's learning and development, aligning behavioral and overall developmental expectations at home and school, etc. (Barnes et al., 2015; Sisson et al., 2017). Furthermore, as mentioned earlier, when dealing with children's challenging behaviors, ECE teachers tend to worry about how to best communicate these issues with families, as some families might understandably become defensive about the topic (Hoffman et al., 2019).

The demands of working with families, especially if ECE teachers have received little training on how to form partnerships with families, can take a toll on their mental health. For instance, in a sample of ECE teachers in a Midwestern state, it was found that the demands of working with families, such as parents placing blame on teachers or lack of parents' clear communication were predictive of depressive symptoms in this sample of teachers (Roberts et al., 2019). On the other hand, when a positive and supportive partnership is present between ECE teachers and families, this could result in positive outcomes for ECE teachers' mental health (Jeon & Ardeleanu, 2020). Specifically, using a sample of ECE preschool teachers across the US, Jeon and Ardeleanu (2020) found that ECE teachers who reported having more support from

families, such as having families who supported and understood the demands of their jobs as teachers were more likely to report lower general stress levels. Even more interesting, ECE teachers who reported having more support from families were more likely to engage in healthier emotional regulation strategies, such as a reappraisal emotion regulation, which in turn also predicted lower general stress levels (Jeon & Ardeleanu, 2020). Therefore, working with families can have implications not only on ECE teachers' mental health but also other aspects of their everyday work, such as emotion regulation strategies.

Some studies have also documented that poor ECE teacher mental health can be predictive of poor family engagement or teacher-parent partnerships. Specifically, Jeon and colleagues (2021) found that ECE Head Start teachers with higher levels of depressive symptoms were more likely to report having negative family-teacher relationships- meaning that they had lower levels of collaboration, communication, responsiveness, family engagement knowledge, and more negative beliefs towards families. Researchers suggested that ECE teachers struggling with depressive symptoms may find it difficult to form supportive and collaborative relationships with families (Jeon et al., 2021); however, this study did not measure depression over a long period of time, so it is also possible, as other studies have shown, that poor teacher-parent relationships can also impact ECE teachers' mental health (Jeon & Ardeleanu, 2020; Roberts et al., 2019). At the same time, it is important to note that there are other studies that have not found a significant relationship between support from families and ECE teachers' depression or general stress levels (Jeon et al., 2018).

Although not explored in this study, there are many other demands or challenges that ECE teachers face that could influence their mental health as well, such as the amount of administrative tasks ECE teachers have to take care of (Moriarty et al., 2001; Ylitapio-Mantyla et

al., 2012), and working with families who are going through difficulties, such as homelessness, illness, etc., as these families usually have a hard time meeting their children's basic needs (Corr et al., 2015; Faulkner et al., 2016).

Taken together, the demands of working as an ECE teacher are vast and can, undoubtedly, have implications on their mental health (Moriarty et al., 2001). Particularly, working overtime and working with children and families, especially if there are tensions and negative interactions present, can be stressful and might have a negative influence on ECE teachers' psychological well-being (Jeon & Ardeleanu, 2020; Kwon et al., 2021; Roberts et al., 2019). Given the positive influence of keeping a healthy work environment on ECE teachers' mental health and teacher-child interactions (Corr et al., 2015; Deham et al., 2017), it is important to continue exploring this variable as a potential social indicator of mental health in ECE teachers.

Job Support. Job support for ECE teachers can refer to multiple constructs, such as but not limited to decision-making power, acknowledgment from others for their work,, resources, and positive relationships with co-workers. For the purposes of this study, ECE teacher's job support will focus on job control and psychological rewards as these were the variables measured in this study. Each of these constructs will be discussed thoroughly below.

Job Control. Job control can be defined as the amount of agency that teachers have on their daily work activities, such as curriculum choice or timing of breaks. Research has found that ECE teachers, especially in home-based programs, tend to have lower job control compared to other ECE professionals, such as administrators (Linnan et al., 2017). Specifically, ECE teachers in home-based settings reported having lower authority on what happens in their jobs compared to administrators (Linnan et al., 2017).

Very few studies have examined the relationship between job control and mental health in the ECE teacher population, and the results have been mixed. For instance, Hindman and Bustamante (2019) found that ECE Head Start teachers were less likely to report symptoms of depression when there was curriculum support and more agency in curriculum choice. In the same vein, Schaack and colleagues (2020) found that ECE teachers in Colorado with higher job control- meaning higher levels of decision-making on curriculum, structure of day, and organizational decisions- reported lower levels of emotional exhaustion from their jobs in comparison to ECE teachers with lower job control. On the other hand, in a sample of ECE teachers in Nebraska, Roberts and colleagues (2019) did not find an association between perceived job control and depression symptoms, although this association was marginally significant.

Outside the US, mixed results have been observed, too. Specifically, in a sample of ECE teachers in Canada (Wagner et al., 2013), higher levels of perceived job control were associated with lower levels of general stress. However, in a study with ECE teachers in Ukraine, researchers did not find a significant association between perceived job control and depression symptoms (Raskin et al., 2015).

While there is very limited research on the relationship between job control and ECE teachers' mental health, especially on depression symptoms, it is still important to continue to untangle the relationship between these two variables. Furthermore, job control has been linked to other important aspects, such as positive teacher-child interactions (Deham et al., 2017), and ECE teachers' work engagement and job satisfaction (Lee et al., 2019).

Psychological Rewards. Psychological rewards can be defined as "perceived positive feelings that come from doing the job, such as intimacy, happiness, joy, respect, worthiness, and

self-efficacy" (Lee et al., 2019, p. 83). In other words, this construct may refer to ECE teachers' feelings of fulfillment derived from their own work and acknowledgement from others, such as families.

It has been documented that many ECE teachers feel that their work is not valued by society, including the families that they work with (Faulkner et al., 2016; Sisson et al., 2017). For instance, based on qualitative studies on ECE teachers in home-based programs, ECE teachers reported feeling that many people in society, including families, viewed them as "babysitters" and not professionals with training on early childhood development and learning (Faulkner et al., 2016; Sisson et al., 2017). Similar views were reported by ECE teachers outside the US, such as not feeling respected or valued by families and their broader communities (Schwartz et al., 2019). This lack acknowledgement on the work and crucial role that ECE teachers play in children's lives can have implications on ECE teachers' psychological well-being (Raskin et al., 2015; Roberts et al., 2019).

While there are limited studies that have examined the relationship between psychological rewards and ECE teachers' mental health, some patterns have been observed. For instance, in a sample of ECE teachers in Nebraska, Robert and colleagues (2019) found that higher levels of perceived psychological rewards were associated with less depression symptoms. Similar findings have been found outside the US with ECE teachers in Ukraine with higher psychological rewards, or higher levels of job fulfillment, reporting less symptoms of depression (Raskin et al., 2015). However, more research is needed to strengthen the validity of these findings and understand the relationship between these two variables.

While seeing the value in one's own work and acknowledgement from families can be vital to increase ECE teachers' levels of fulfillment and psychological well-being (Raskin et al.,

2015; Roberts et al., 2019), psychological rewards could also have implications on quality teaching and care (Deham et al., 2017). Specifically, it has been observed that ECE teachers who reported more psychological rewards were more likely to engage in positive emotion socialization practices, such as wondering with children about what could be influencing their strong emotions (Deham et al., 2017). And similar to job control, psychological rewards have also been found to be predictive of work engagement (Lee et al., 2019), which has implications on the retention of a healthy ECE workforce.

Taken together, work environment characteristics, such as employment compensation and benefits, job demands and job support play a crucial role on ECE teachers' mental health (Gagnon et al., 2019; Jeon & Ardeleanu, 2020; Kwon et al., 2020; Linnan et al., 2017; Raskin et al., 2015; Roberts et al., 2019; Schaack et al., 2020). While working as an ECE teacher represents having considerable job demands, it is equally important for ECE teachers to feel supported and fulfilled in their jobs as well as receive fair compensation and benefits because an unbalanced demands-to-rewards ratio may have implications on their mental health (Corr et al., 2015). Given that the pandemic has added more challenges to the ECE field (Delap et al., 2020; McLean et al., 2021; U.S. Chamber of Commerce Foundation, 2020), it is crucial to explore the potential influence of work environment characteristics on ECE teachers' mental health during times of great uncertainty and collective stress and trauma in order to determine systems of support for the ECE workforce. Further implications of the COVID-19 pandemic on ECE teachers' work environment and well-being are described below.

3.2.2. *COVID-19 Stressors*

The COVID-19 pandemic is a historical event that has impacted and continues to impact the lives of many people across different communities and contexts. Lockdowns and enforced quarantines started back in March of 2020, even though the virus had already been spreading well before then. These lockdowns impacted the working and living conditions of many people around the word, including workers in the ECE field (Delap et al., 2020; Quinn et al., 2022). Furthermore, the COVID-19 pandemic can also be considered a social indicator of health because of its implications on individual's psychological well-being (Panchal et al., 2021). Therefore, the effects of the COVID-19 pandemic on ECE teachers' working conditions and mental health will be discussed thoroughly below.

According to the Early Childhood Workforce Index (McLean et al., 2021), 166,000 jobs in the childcare industry were lost during the first 8 months of the pandemic. For the ECE centers that remained open, ECE teachers had to face many challenges, such as but not limited to shortages in staff, enrollment disruptions, increased costs to follow health and safety procedures to keep programs running (e.g. use of masks, hand sanitizers, and other cleaning tools), and concerns about contracting COVID-19 from children, families, and co-workers (Delap et al., 2020; Kim et al., 2022; Quinn et al., 2022).

Given these massive program closures and deep uncertainty about their jobs, many ECE teachers reported high levels of financial insecurity during the first year of the pandemic (Kim et al., 2022; Quinn et al., 2022; Swigonski et al., 2021). For instance, many ECE teachers reported more concerns about making ends meet compared to before the pandemic (Quinn et al., 2022; Swigonski et al., 2021). These financial concerns were exacerbated by ECE program type, too. Specifically, it has been found that ECE home-based programs were less likely to be able to

financially support their staff compared to center-based programs at the beginning of the pandemic (Kim et al., 2022).

While research on the impact of COVID-19 on ECE teachers' mental health continues to be made, there are a few studies that have looked at this topic already. For instance, based on a sample of ECE teachers in Indiana, there was an observed increase in personal stress levels before and after the beginning of the pandemic (Swigonski et al., 2021). Specifically, 32.8% of ECE teachers reported moderate personal stress and 4% of them reported severe levels of personal stress before the pandemic compared to 46% and 17.5% after the pandemic started (Swigonski et al., 2021). In a sample of ECE teachers in Luisiana (Markowitz et al., 2020), 38% of ECE teachers reported clinically significant levels of depression compared to 22% of ECE teachers before the pandemic. Furthermore, laid-off ECE teachers were more likely to report symptoms of depression compared to non-laid off ECE teachers (Markowitz et al., 2020). Outside the US, similar findings have been observed. For instance, 85.9% of ECE teachers in Australia reported that the COVID-19 pandemic had had a strong negative or slight negative impact on their well-being (Eadie et al., 2021). In Spain, ECE teachers reported moderate to severe symptoms of depression (19.5%), anxiety (37%), and general stress (34.4%) during the first year of the pandemic (Santamaría et al., 2021).

Taken together, the COVID-19 pandemic created many more challenges and stressors for ECE teachers, especially at the beginning of the pandemic, which has likely had implications on their mental health (Markowitz et al., 2020; Quinn et al., 2022; Swigonski et al., 2021). In this study, specific stressors created by the pandemic, such as income worry, child unenrollment, and staff capacity will be examined in relation to ECE teachers’ self-reported symptoms of depression before and at the onset of the COVID-19 pandemic.

It is also important to note that while studies have documented worse mental health outcomes for ECE teachers since the pandemic started, there are limited studies that have looked at potential social indicators or predictors of ECE teachers' mental health, especially depressive symptoms, during this time. To the authors' knowledge, only one study has looked at the potential predictive relationship of individual-level and environmental levels social indicators of mental health on ECE teachers during the COVID-19 pandemic (Quinn et al., 2022). However, this study looked at general stress levels, not depressive symptoms, and did not consider important individual-level characteristics, such as minority status, education levels, and job motivation, as well as other important work-environment characteristics, such as work benefits (Quinn et al., 2022). Furthermore, this study did not use a comparative model analysis to estimate the changes in mental health outcomes and the predictive power of social indicators of mental health before and after the pandemic. A recent study conducted by Martin and colleagues (2022) looked at the probability of depression symptoms in elementary school teachers at the start of the pandemic but did not look at the predictive relationship of COVID-19 stressors, such as income worry. The current study aims to contribute to the new and growing research literature on social indicators of mental health in ECE teachers before and after the COVID-19 pandemic.

3.3. Purpose of the Study

The purpose of this study is to explore social indicators of mental health in ECE teachers before and at the onset of the COVID-19 pandemic. The social indicators of mental health that were measured before the pandemic include: socio-demographic, professional, and work environment characteristics (individual and environmental level). The social indicators that were measured at the onset of the pandemic were COVID-19 stressors, such as income worry, parent program unenrollment, and perceived change in work demands. The current study seeks to

answer the following research questions:

RQ1. What are ECE teachers' depression scores before and at the onset of the COVID-19 pandemic?

RQ2. What is the unique effect of individual characteristics and work environment characteristics on ECE teachers' depression scores before the COVID-19 pandemic?

RQ3. What is the unique effect of COVID-19 stressors on ECE teachers' change in depression scores after the onset of the COVID-19 pandemic, while considering individual characteristics, work environment characteristics measured before the pandemic?

Chapter 4. Methods

4.1. Source of Data

The current data from this study was collected as part of the Washington ECE Workforce Survey study led by Cultivate Learning at the University of Washington. More details about this study will be discussed under the "Procedure" section.

4.2. Participants

The participants in this study included a representative sample of ECE teachers in Washington state. Participants were recruited from 33 different counties from 9 different state regions. 79% of the participants identified themselves as Lead Teacher /Lead Instructor and 21% of them identified as Teacher/Instructor. 46% of the participants worked in federally funded ECE programs, such as Head Start centers and Early Head Start centers, and 54% of the participants worked in privately funded or mixed-funded programs, such as private child care centers, private schools, and Educational Service Units. 96% of the sample identified as female, 2% identified as male, and 0.8% identified as other, and 1.2% preferred not to answer. The ages of participants ranged from 18 to 73, with an average age of 38 years old. With respect to

educational levels, 28% of participants had a high school diploma or less, 13% had a CDA or another certificate, 21% had an Associate Degree, 28% had a bachelor's degree, 8% had post-graduate studies, such as a master's program, and 2% of answers were missing. 36% of participants worked with infants and toddlers, 64% of participants worked with preschoolers. Lastly, 62% of the sample identified themselves as White, 12% as Latinx, 11% as Biracial or Multiracial, 7% as Asian, 4% as Black or African American, 3% as other (American Indian, Middle Eastern, or Hawaiian/Pacific Islander), and 1.9% of answers were missing. Lastly, participants in this sample had an average of 13 years of work experience in the ECE field.

4.3. Procedure

The sampling frame from this survey was selected from the state's workforce registry database and official system of record for early learning professionals. ECE providers in this database included lead teachers, childcare providers, aid teaching staff, administrators, and after-school staff. Two types of surveys were administered: a 65-question survey, which was disseminated between December of 2019 and March of 2020, and a 9-question follow-up survey, which was disseminated in May of 2020. The follow-up survey was administered to the ECE providers who had completed the first survey, only.

A total of 4,400 ECE lead teachers and assistant teachers, as indicated in the state's workforce registry database, completed the first survey, which represented a 19.9% response rate. However, given that some participants might no longer be working in the same position, only participants who identified themselves as "lead teachers" or "teachers" in the survey were included in the study. Out of the 4,400 participants, 1927 identified themselves as ECE teachers (either lead teachers or teachers). Next, an inclusion criteria was used to select ECE teachers in the final sample. This inclusion criteria included: (a) participants identified themselves as either

"lead teacher" or "teacher", (b) participants worked with children between the ages of 0 and 5, (c) participants worked at an early learning and education program (no after-school programs), and (d) participants had depression scores before the pandemic. The final sample size consisted of 1156 ECE teachers.

It is also important to note that while this survey used a stratified sampling methodology to select the participants, this was not the case for the ECE teacher subsample. That is, all ECE teachers in the state's registry database were contacted (universe sampling); however, due to a very low response rate, the ECE teachers who responded to the survey still do not represent the whole population of ECE teachers in this state. Therefore, the ECE teachers in this study are still treated as a sample rather than as the actual population.

4.4. Measures

Pre-COVID 19 Predictor Variables

Socio-Demographics. Participants' demographic characteristics, such as age, ethnicity, education levels, and the number of federal assistance resources that they received before the pandemic were collected as part of the survey. Gender was not included in the current analysis given that 96% of participants in the current sample were female.

Race/Ethnicity. The information for this variable was based on a multiple-choice question with eight options for self-reported race/ethnicity categories that included: African American (Black), American Indian, Native Hawaiian, Asian, European American, Latinx, Middle-Eastern, and Biracial/Multiracial. Smaller sized minoritized groups were collapsed into a larger category for analysis, with this variable ultimately coded into five dummy coded, as follows: Asian, Black, Latinx, Other, and European American (White), with the last category coded as the reference category.

Education. The education question was a multiple-choice question with 11 options that ranged from "GED" or "HS diploma" to "Masters' degree" or "Additional degree/certificate." The higher education options (Bachelor's degree and Masters' degree or additional degree) were collapsed into a single category as "college or higher," and remaining options were coded as "no college," with the latter being the reference group.

Federal Assistance Resources. This was a multiple-choice question that asked participants, "do you currently have or receive any of the following benefits?". This question had 15 options that included "Medicaid or Medicare", "Food Stamps", "WIC", "TANF", among others. Participants had to choose either "yes" or "no" for each option. The number of "yes" responses were added up for each participant and used as a continuous variable.

Professional Characteristics. In this study, professional characteristics were measured included years of work experience and job motivation.

Work Experience. This was an open-ended question, which included years and months. Answers were added up for each participant and coded as a continuous variable.

Job Motivation. ECE teachers' motivation for working with children was measured via a multiple-choice questionnaire originally used in the 2019 National Survey of Early Care and Education (NSECE, 2020). This questionnaire included 8 statements related to job motivation, such as, "it is a way to help children" and "it is a job with a paycheck." Participants were asked to choose the statement that "best" described their reason for working as educators. The statements listed in the questionnaire used in the NSECE were primarily based on the childcare motivation questionnaire developed by Kontos et al., (1995), which is a Likert-scale questionnaire. An additional statement ("it is my personal calling") was added to the list of options used in the NSECE survey and it was originally developed by Torquati and colleagues

(2007). Participants' responses were coded as either intrinsically motivated or extrinsically motivated, based on career motivation theory (Kuvaas et al., 2017). Participants who answered, "none of these reasons apply" were coded as missing.

Work Environment Characteristics. Work environment characteristics measured in this study include hourly wage, work benefits, work hours, ECE program funding, child age range, and job demands, and job support.

Hourly Wage. Hourly compensation rate was an open-ended question that was coded as a continuous variable. Participants were asked about their wages per hour, week, month, or year. For participants who did not provide an answer for hourly wage, their hourly wage was calculated based on either their weekly/monthly/yearly wage. If only yearly wage was available, this was divided by the amount of work months and then by the number of weekly work hours that participants indicated in the survey.

Work Benefits. This variable was based on a multiple-choice question that asked participants whether they received any benefits from their employer. Participants had to select, "yes" or "no" based on a list of 15 options, which included but were not limited to: health insurance, paid vacation days, retirement benefits, paid family leave, free meals, etc. Given that some work benefits were correlated with other variables in the study (e.g. free meals and hourly wage), only a couple of work benefits were included in the study and that were deemed as "basic" or "essential" work benefits, such as paid vacation and sick days.

Work Hours. This was an opened ended question that asked participants for the number of paid hours they worked during the week. Answers were coded as a continuous variable.

ECE Program Funding. This was based on the multiple-choice question that asked participants about who their employer was. Options included: Educational Service Unit, Public

School District, Parochial/Private School, Early Head Start, Head Start, Public-Childcare/Preschool, Private Childcare/Preschool, and Other. Answers were coded as either "federal funding", "private funding", or "mixed funding". Given that very few participants reported working for ECE programs with mixed funding ($N = 33$), "mixed funding" and "private funding" were combined as one category to compare with public funding as the reference group.

Child Age Group. The child age group taught question was a multiple-choice question that included infants, toddlers, preschoolers, Kindergarten-3rd grade, and fourth grade and higher as options. Only participants who work with infants, toddlers, and preschoolers were included in the analysis per the study inclusion criteria. This variable was coded as a binary variable: infants and toddlers = 1, preschoolers = 0.

Job Support: Job Control and Psychological Rewards. The 20-item version of the Child Care Worker Job Stress Inventory (CCWJSI) was used to measure job stress and it derived from the original 51-item version (Curbow, Spratt, Ungaretti, McDonnell, & Breckler, 2000). The 20-item version was shortened by Walter Gilliam (personal communication, August 2003) for the National Pre-K Study (personal communication, August 2003). The measure includes four subscales: Job Demands, Job-Specific Demands (for center-based ECE teachers, only), Job Resources, and Job Control. Items were rated on a scale ranging from 1 (never) to 5 (most of the time) for Demands and Resources and a scale of 1 (very little) to 5 (very much) for Control. Higher scores in each subscale represent more of each construct. This abbreviated measure demonstrated acceptable internal consistency in a sample of ECE providers in Nebraska (demands $\alpha = 0.66$; resources $\alpha = 0.75$; Roberts et al., 2019). After discussing with experts in the fields of ECE, infant and early childhood mental health (IECMH), and educational policy, and conducting cognitive walkthroughs with ECE, FCC, and out of school time (OST) providers, the

measure was further modified to include one additional question within the Job Control subscale and the Job-Specific Demands subscale, which made this a 22-item inventory. For the purposes of this study, only the job demands subscale was used in its original version. The Job control and job resources subscales were combined to create a composite of Teacher Support given that they measure similar constructs and preliminary analysis showed that they were significantly and positively correlated with each other- therefore, the scores for both subscales were aggregated. The Job-Specific demands subscale was not used given that this data was only applicable for center-based ECE teachers.

Onset of COVID-19 Predictor Variables

COVID-Related Stressors. COVID-19 stressors were a count of stressors at the onset of the pandemic and they included income worry, parent program unenrollment, and change in work demands.

Income Worry. Income worry was measured by a 5-point Likert scale question. The question asked, "How worried are you, if at all, that you will lose income due to a workplace closure or reduced hours because of COVID-19?" Responses included, "very worried", "somewhat worried", "not too worried", "not worried at all" and "don't know." Given that only 4 participants had answered "don't know", these answers were coded as missing and the rest of the answers were coded from 1 to 4, so it could be used as a continuous variable: 4 = very worried, 3 = somewhat worried, 2 = not too worried, 1 = not worried at all.

Parent Program Unenrollment. This variable refers to the number of parents who unenrolled their children at the onset of the pandemic. This was measured with an open-ended question and used as a continuous variable.

***Perceived Change in Work Demands*.** In the survey, participants were asked whether

they had to work in a different capacity other than what they usually did, such as emergency childcare, extended hours, etc. Participants had to answer either “yes” or “no. Answers were dummy coded and participants who replied positively were chosen as the group of interest.

Pre- and Onset-COVID-19: ECE Teachers’ Mental Health (Depression) Outcome Variable

Depression. An abbreviated 12-item version of The Centre for Epidemiological Studies Depression (CES-D) scale was used for this study. The original CES-D self-report scale was developed by the National Institute of Mental Health (Radloff, 1977). The abbreviated version used in this study was put together by using a 10-item version of the CES-D scale (Cole et al., 2004) and adding two more items from the original CES-D questionnaire. These two items were: “my sleep was restless” and “I could not get going.” The short version of the CES-D scale evaluates major domains of depressive symptoms including negative affect (e.g., I felt lonely), positive affect (e.g., I felt I was just as good as other people), somatic symptoms (e.g., my sleep was restless), and interpersonal problems (e.g., people were unfriendly). The 10-item CES-D scale developed by Cole and colleagues (2004) showed an acceptable internal consistency between items ($\alpha = 0.75$). Although this scale is not used for clinical diagnosis, scores of 10 or more may be indicative of depression.

4.5. Analysis Plan

Selection of Variables and Preliminary Data Analysis. The Washington State ECE Workforce Survey measured a wide range of variables and constructs related to ECE teachers’ well-being. Variables in the current study were selected based on whether they were consistent with the study’s conceptual framework and the research literature on individual- and environmental-level social indicators of mental health. For example, the number of children with behavioral challenges in ECE teachers’ classroom, as reported in Time 1 (before the pandemic),

was considered as an environmental-level social indicator of mental health for the current analysis. However, bivariate correlations showed that this variable was correlated at $r = 0.32$, $p < .05$, with the "job demands" subscale from the CCWJSI (Curbow et al., 2000). Since both variables measure similar constructs (e.g., job demands subscale question: "Children have behavior problems that are hard to deal with"), the number of children with behavioral challenges was removed from the final regression analysis to avoid multicollinearity (Tabachnick et al., 2007). Also, while gender can be an important individual-level social indicators of mental health, it was not included in the analysis because 96% of ECE teachers in the sample were female, making it more a constant than a variable. Lastly, preliminary data analysis showed that regions and counties where ECE teachers were recruited from did not account for substantial variance in depression at either time point (ICCs < .01); thus, geographical location was not included in the regression models.

Missing Data. However, the original dataset had large portions of missing data (from 21% to 80% on variables of interest), and even after we applied our inclusion criteria, the percentage of missingness ranged up to 42% on variables of interest. Inspection of the socio-demographic and work environment characteristics of participants with depression data before the COVID-19 pandemic (Fall 2019, Time 1) and at the onset of the COVID-19 pandemic (Spring 2020, Time 2) were similar (see Table 5.1). Bivariate correlations between predictors and missingness on ECE teachers' depression scores did show a few small relationships. Specifically, variables correlated with missing depression scores at Time 1 were minority status ($r = 0.08$, $p < 0.05$) and years of work experience ($r = -0.07$, $p < 0.05$), and variables correlated with missing depression scores at Time 2 included college degree status ($r = -0.06$, $p < 0.05$), income worry ($r = 0.09$, $p < 0.05$), and parent program unenrollment ($r = 0.09$, $p < 0.05$).

Because these variables were planned to be included in our regression models, and because we have no reason to believe that missing depression scores is related to true levels of depression (i.e., that people with increased depression are more or less likely to have missingness), it is reasonable to assume that the missingness is "Missing at Random" (MAR). In other words, MAR assumes that "the probability of (the data) being missing is the same only within groups defined by the observed data" (Van Buuren, 2018). To handle the missingness in both predictors and outcomes, we used multiple imputation, a process by which complete datasets are drawn from a multivariate distribution based on the observed variance-covariance matrix, and then each dataset is analyzed and results across datasets are pooled to form one estimate (Kline, 2015). Specifically, we used *mice* (van Buuren & Groothuis-Oudshoorn, 2011) for imputation and *mitools* for results pooling (Lumley, 2019) within *R*, with 100 imputations for each analysis (Time 1, and Time1-2 change) to ensure both unbiasedness and stable standard errors.

Interaction effects. In preliminary analyses, two-way interaction effects among predictors on both outcomes were examined (e.g. minority status and hourly wage), but we found no evidence of moderation. As such, we only consider main effects in the final models.

Final analysis for RQ1: What are ECE teachers' depression scores before and at the onset of the COVID-19 pandemic? Descriptive statistics, correlations, and data visualizations were tabulated on the available data (pre-imputation) to answer this research question. (Data visualizations were created in *R*.)

Final analysis for RQ2: What is the unique effect of individual characteristics and work environment characteristics on ECE teachers' depression scores before the COVID-19 pandemic? To understand how different individual-level and environmental-level social indicators for mental health might be predictive of depression before and at the onset of the

pandemic, multiple regression analysis was conducted. Multiple linear regression analysis is used when we want to estimate the value of a variable or outcome that is continuous based on the value of two or more other variables (Tabachnick et al., 2007). In this model (Model 1), ECE teachers' depression scores were modeled as the outcome and the predictors included individual-level characteristics, such as socio-demographic and professional characteristics, and (2) work environment characteristics. The general model was as follows.

$$Y_i = b_0 + b_1X_{i1} + b_2X_{i2} + b_3X_{i3} + \ldots + b_{13}X_{i13} + e_i$$

Where:

Y_i = ith score on the dependent variable (Depression at Time 1, Fall 2019)

b_0 = Y intercept (mean value of Y when all Xs = 0)

b_p = Slope for p^{th} predictor (mean change in Y per 1 unit increase in X; for dummy coded variables, the slope is the difference between the category = 1 and the reference category)

X_p = p^{th} predictor

e_i = residual error for the ith individual

Final analysis for RQ3. What is the unique effect of COVID-19 stressors on ECE teachers' change in depression scores after the onset of the COVID-19 pandemic, while considering individual characteristics, work environment characteristics measured before the pandemic? Multiple linear regression analysis was used to answer this research question as well. In this model (Model 2), ECE teachers' change in depression scores from before the pandemic to the onset of the pandemic was modeled as the outcome. In contrast to Model 1, predictors in Model 2 included prior depression (pre-pandemic) along with COVID-19 stressors, such as income worry, parent program unenrollment, and perceived change in work demands at the onset of the pandemic, in addition to the individual and work environment characteristics

measured before the pandemic onset in the Fall of 2019. The general model is the same as the earlier model, except that the outcome was Time 2 – Time 1 change scores.

Variables used in analyses. Lastly, all variables used in this study were coded as follows (see Table 5.2).

Chapter 5. Results

RQ1. What are ECE teachers' depression scores before and at the onset of the COVID-19 pandemic?

Based on the subsample of $N = 670$ early childhood education (ECE) teachers who reported data on the depression outcome at both Time 1 (pre-COVID-19, in Fall 2019) and Time 2 (onset of COVID-19, in Spring 2020), at the start of the pandemic, the sample reported an average score of 7.79 points ($SD = 5.89$) on the short-form CESD (Radloff, 1977). This indicated that, at Time 1, 7% of ECE teachers reported no symptoms of depression (score of 0 points), 64% reported very moderate to mild symptoms of depression (scores between 1 and 9 points), and 29% reported more pervasive symptoms of depression (score of 10 and more points). By the onset of the pandemic, however, these ECE teachers reported an average score of 10.86 points ($SD = 7.12$), a 3.29-point increase ($SD = 7.12$) from before the pandemic. More specifically, at the onset of the pandemic (Time 2), 3% of ECE teachers reported no symptoms of depression, 50% reported mild symptoms of depression, and 47% reported more pervasive symptoms of depression.

Figures 5.1, 5.2, and 5.3 display the distribution of depression scores before the pandemic, at onset of the pandemic, and of change in depression scores between these two time points for this sample of participants with complete outcome variable data.

Descriptive Statistics and Bivariate Correlations among Variables

Bivariate correlations are provided in Table 5.3 for the subsample with complete data on the depression outcome. In the Fall before the pandemic began (Time 1), greater depression was correlated with greater weekly work hours (r = 0.07), working with infants and toddlers (r = 0.10), and average job demand (r = 0.23) (ps < 0.05). In contrast, Time 1 depression was negatively associated with teachers' age (r = -0.31), having a college degree (-0.08), years of work experience (r = -0.21), intrinsic job motivation (r = -0.07), hourly wage (r = -0.10), and job support scores (r = -0.24) (ps < 0.05).

With respect to change in depression between Fall of 2019 and the onset of the pandemic in April 2020, there were only a handful of variables significantly correlated: greater change in depression was related to greater average job support (r = 0.08) and greater income worry (r = 0.18) (ps < 0.05). Less change in depression was related to previously reported depression scores at Time 1 (r = -0.35), identifying as Asian (r = -0.09), and identifying as being from another non-White category, including Native American, Middle Eastern, and biracial (r = -0.11).

RQ2. What is the unique effect of individual characteristics and work environment characteristics on ECE teachers' depression scores before the COVID-19 pandemic?

To answer this question, recall that we used individual- and environmental-level social indicators of mental health to predict ECE teachers' depression prior to the pandemic (Fall of 2019). As shown in Table 5.4, the set of predictors measured in this model accounted for a significant amount of variance in ECE teachers' depression scores, R^2 = 0.17, R^2_{adjusted} = 0.16. The variables that uniquely predicted significantly more depression included the number of weekly work hours (b = 0.38, p = 0.020), teachers of infants and toddlers (b = 0.82, p = 0.018),

and greater job demands (b = 0.81, p = <0.001). Specifically, for every standard deviation increase in weekly work hours, there was a predicted increase of 0.38 points in depression, holding all else constant. Similarly, for every standard deviation increase in job demands, there was a predicted increase of 0.81 points in depression, holding all else constant. Further, teachers who worked with infants and toddlers were predicted to have 0.82 points higher depression compared to teachers who work with preschoolers, holding all else constant.

The variables that uniquely predicted lower depression prior to the pandemic included teachers' age (b = -1.48, p <0.001), identifying as Latinx (b = -1.03, p = 0.050), and average job support scores (b = -0.95, p <0.001). That is, for every standard deviation increase in teachers' age, there was a predicted 1.48-point decrease in depression, holding all else constant. Similarly, for every standard deviation increase in teachers' job support, there was a predicted decrease of 0.95 points in depression, holding all else constant. Last, teachers self-identified as Latinx were predicted to be 1.03 points lower in depression compared to White teachers. All remaining variables were not uniquely predictive of pre-pandemic depression (ps > 0.05).

RQ3. What is the unique effect of COVID-19 stressors on ECE teachers' change in depression scores after the onset of the COVID-19 pandemic, while considering individual characteristics, work environment characteristics measured before the pandemic?

Recall that this second model predicted change in depression from Time 1 to Time 2 (pre-pandemic, Fall 2019, to onset of the pandemic in Spring 2020), controlling for Time 1 depression as well as the previous individual-level and environmental-level social indicators of mental health; however, in this model, COVID-19 stressors were also added to estimate their contribution to change in depression. Overall, our results (see Table 5.5) show that the set of predictors together explained 18% of the variance in the change scores, R^2 = 0.18, R^2_{adjusted} =

0.16. As it was expected, depression before the pandemic was negatively and significantly predictive of change in depression scores (b = -2.55, p < 0.001), indicating that those with higher depression at Time 1 had relatively less change, and those with lower depression at Time 1 had more change.

The variables that were of greater change in depression were both measured at the onset of the pandemic, and included perceived job demands (b = 0.62, p = 0.027) and income worry (b = 0.66, p = 0.003. For every standard deviation increase in job demands, there was a predicted increase of 0.62 points in depression change, and for every standard deviation increase in income worry, there was a predicted increase 0.66 points in depression change, holding all else constant.

The variables that were significantly uniquely predictive of less change in depression included self-identifying as Asian (b = -2.39, p = 0.012) or identifying as being from another minoritized group (Native American, Middle Eastern, Pacific Islander, and Biracial), b = -1.73, p = 0.015. Specifically, teachers who are Asian were predicted to have 2.39 points less change than White teachers, and teachers from another minoritized background were predicted to have 1.73 points less change than White teachers, all else held constant. No other predictors were uniquely predictive of change in ECE teachers' depression (ps > 0.05).

Chapter 6. Discussion

This study aimed to examine individual-level and environmental-level social indicators of mental health in ECE teachers at two different time points: before the COVID-19 pandemic and at the onset of the pandemic. Our results specifically showed that there was a significant increase or worsening of depression symptoms in ECE teachers at the onset of the pandemic, with the average depression scores at this point in time largely reflecting "more pervasive" symptoms of depression. These results are consistent with recent studies that have found an increase in ECE

teachers' symptoms of depression as well as in other teacher populations, such as elementary school teachers (Markowitz et al., 2020; Martin et al., 2022). The following sections will further detail the relationship between these social indicators and depression scores before the pandemic, as well as in the change in depression from before to the onset of the pandemic.

6.1. ECE Teachers' Depression Scores Before COVID-19

In examining social indicators of mental health before the start of the COVID-19 pandemic, the results of this study suggest that ECE teachers' age, identifying as Latinx, weekly work hours, working with infants and toddlers, job demands, and job support were each uniquely predictive of their depression scores. Specifically, older ECE teachers reported lower symptoms of depression, which is consistent with what has been observed in other studies (Hamre & Pianta, 2004; Roberts et al., 2019). As mentioned earlier, ECE teachers who are older might be more likely to have more years of work experience and, hence, might likely possess higher self-efficacy skills and developmentally appropriate beliefs, which might help them feel less stressed in their day-to-day work with children (Harding et al., 2019; Kim & Kim, 2010). Interestingly, in this sample, ECE teachers who identified as Latinx reported lower symptoms of depression compared to White ECE teachers before the COVID-19 pandemic. Although this was not an expected relationship, it has been documented that the Latinx population tends to have higher levels of family support, or "familismo", which might serve as a buffer for mental health symptoms (Ayón et al., 2010).

In terms of work environment characteristics, more weekly work hours was predictive of higher depression scores before the pandemic. This finding adds to the mixed research literature on work demands, including working long hours on ECE teachers' mental health (Kwon et al., 2021; Li & Li, 2020; Wagner et al., 2013). Given that ECE teachers tend to have a high

workload and work long hours (Farewell et al., 2022; Linnan et al., 2017; Wells, 2015), it is likely that these high demands are taxing on their mental health. Another finding from this study was that ECE teachers who worked with infants and toddlers were more likely to report higher depression symptoms. While the research suggests that working with infants and toddlers is less behaviorally challenging than working with preschool-aged children (Kwon et al., 2020), it is likely that working with infants and toddlers may still involve other stressors, such as feeling more pressure to provide one-on-one support and care since children at this age are less independent than preschool-aged children. Furthermore, it has been documented that ECE teachers who work with infants and toddlers are more likely to be working in home-based programs and with lower pay compared to ECE teachers who work with preschool-aged children (Austin et al., 2019; McLean et al., 2021). Therefore, these financial stressors potentially explain the relationship observed between ECE teachers who work with infants and toddlers and their mental health (Linnan et al., 2017; Roberts et al., 2019; Schaack et al., 2020). The results of this study also suggest that ECE teachers with higher job demands, such as difficulties managing children's challenging behaviors and communicating with families were more likely to report higher depression scores. These results are consistent with what previous studies have found, especially before the pandemic (Hindman & Bustamante, 2019; Jeon et al., 2021; Kwon et al., 2019). On the other hand, when ECE teachers have more job support, such as higher agency in their work environment and a higher sense of fulfillment and acknowledgement from families, they are likely to report lower symptoms of depression, which is also consistent with previous studies (Hindman & Bustamante, 2019; Raskin et al., 2015; Roberts et al., 2019). No other social indicators of mental health, either at the individual or environmental level, were associated with ECE teachers' depression scores before the pandemic.

6.2. ECE Teachers' Change in Depression Scores (Pre-to-Onset of COVID-19)

As described earlier, our results specifically showed that there was a significant increase in ECE teachers' depression scores at the onset of the pandemic, with the average depression scores largely reflecting "more pervasive" symptoms of depression. When examining individual and environmental indicators of change in depression between six months before the pandemic to its onset, results were very different. Specifically, ECE teachers' age, weekly work hours, working with infants and toddlers, and job support experienced before the pandemic were not predictive of change in depression scores. While pre-pandemic (younger) age seemed to serve as a protective factor for depression before the pandemic, this was no longer the case once the pandemic started. Pre-pandemic weekly work hours, teaching the infants and toddlers age group, and job support were also not uniquely predictive of change in depression at the onset of the pandemic. This suggests that change in depression, at the onset of the pandemic, was fairly uniform across varied work hours, job support levels, and age groups taught.

In terms of variables that were uniquely predictive of change in depression scores, we see some interesting findings. At the individual level, teachers who identified as Asian or other minority groups (Native American, Pacific Islander, Middle Eastern, and biracial) were more likely to report less change in depression compared to White teachers. While ECE teachers who identified as Latinx did not report significant changes in depression scores, the results from the study suggest that there was still less change in depression scores, similar to Asian and other minority groups, with the exception of Black ECE teachers. Although it has been documented that minority ECE teachers suffer from many disparities in the field, such as being likely to be less paid and less educated compared to their White counterparts (Austin et al., 2019; Kwon et al., 2022), it is likely that ECE teachers from minority backgrounds might have had other

systems of support at the onset of the COVID-19 that might have buffered to some extent the impact of the pandemic on their mental health. For instance, recent studies have suggested that individuals from minority groups were more likely to report higher levels of social cohesion during the start of COVID-19 compared to their White peers (Thomas et al., 2022). Furthermore, in a sample of elementary school teachers in Louisiana, it was suggested that Black teachers were more likely to report more protective factors at the onset of the COVID-19 pandemic compared to their White peers, such as spending more time with family or friends, building new and supportive relationships, and finding greater meaning in their work (Baker et al., 2021). In addition, it was suggested that teachers with more protective factors found it easier to cope and teach at the beginning of the pandemic compared to ECE teachers with less protective factors (Baker et al., 2021). Therefore, it is possible that the protective factors present in minority groups prevented depression symptoms in this population from increasing to the same extent as it did for White ECE teachers. However, the results of this study should be interpreted with caution as this does not mean that minority groups do not need mental health support. Depression scores significantly increased or worsened for both groups at the onset of the COVID-19 pandemic, but only a little less for the minority groups in this sample compared to their White peers. These results add a new finding to the growing research literature on minority ECE teachers' mental health during the onset of the pandemic.

Importantly, the job demands measured before the start of the pandemic were predictive of more change in depression scores. While the job demands experienced by ECE teachers before the pandemic might have been different than the job demands they experienced at the onset of the pandemic, this result suggests that difficulties interacting with families and managing children's challenging behaviors, as measured by the job demands subscale used in

this study, might have still been prevalent for ECE teachers who reported high levels of these job demands before the pandemic. As research has documented, experiencing difficulties with engaging with families and child behavioral management many have a negative influence on ECE teachers' mental health (Gagnon et al., 2019; Hindman & Bustamante, 2019; Jeon & Ardeleanu, 2020; Roberts et al., 2019). It is also important to note that many ECE teachers experienced enrollment disruptions in their programs at the start of the pandemic (Delap et al., 2020; McLean et al., 2021; U.S. Chamber of Commerce Foundation, 2020); therefore, it is likely that many ECE teachers had to deal with new demands and challenges, such as cleaning their classrooms constantly, keeping children 6 feet away from each other, managing online instruction, etc. (Kim et al., 2022; Quinn et al., 2022), in addition to working with families and managing children's challenging behaviors. Therefore, this finding only partially explains some of the potential demands that ECE teachers were likely to experience at the onset of the COVID-19 pandemic.

When looking at COVID-19 stressors, only income worry was a predictor, and one of the strongest predictors in the model, of more change in ECE teachers' depression scores. That is, ECE teachers who were more concerned about making ends meet were more likely to report an increase in depression scores after the pandemic started (more symptoms compared to depression symptoms reported before the pandemic). These results are consistent with studies that have found that ECE teachers reported higher levels of financial insecurity during the first year of the pandemic (Kim et al., 2022; Quinn et al., 2022; Swigonski et al., 2021). However, no studies have documented the effect of this factor on ECE teachers' mental health. This finding is a novel contribution to the growing research literature on predictors of ECE teachers' mental health during the pandemic and it highlights the crucial role of financial stability on ECE teachers'

psychological well-being, above and beyond parent program enrollment disruptions and changes in work demands.

6.3. Recommendations

The results of this study highlight the vulnerability of the ECE teacher population to COVID-19 stressors and their negative influence on their mental health. Supporting ECE teachers' mental health is paramount to retain a healthy ECE workforce and increase the quality of teaching and care in ECE programs (Grant et al., 2019; Hubel et al, 2020; Kwon et al., 2019). Based on the current study results, the following recommendations to support ECE teachers' mental health are provided:

a. Increase wages for the ECE workforce on an ongoing basis. Increasing wages for ECE teachers is of outmost importance and urgency given that lack of economic stability, as suggested in this study, can have negative implications on ECE teachers' mental health. While many efforts have and are still taking place to provide financial relief to ECE teachers, most of these efforts are temporary in nature, such as bonuses or one-time payments (Center for the Study of Child Care Employment, 2021). Therefore, our recommendation is for states to create long-term solutions that guarantee a pay increase for ECE teachers on an ongoing basis.

Efforts across different states have taken place to increase pay parity between ECE teachers and teachers in the K-12 system (McLean et al., 2021). For instance, New Mexico, New York City, and Washington, D.C., have established guidelines and allocated funds that guarantee increased wages in the long-term, such as increasing the wage floor for ECE teachers across center-based and home-based programs, along with one-time bonuses, such as bilingual certification or program tenure incentives (Austin et al., 2022; Parrott, 2020). Efforts at the state and at the national level should continue to provide ECE teachers with compensation that is

sufficient to meet their basic needs as financial stability has been linked to better mental health outcomes for this teacher population (Jeon et al., 2018; Wagner et al., 2013), and even children's positive social-emotional development (King et al., 2015).

b. Work on a consensus on optimal ECE teacher credentialing requirement. As an effort to incentivize professional development and secure pay parity for the ECE teacher population, especially between ECE teachers in home-based and center-based programs (McLean et al., 2021), states should come to a consensus on the optimal credentialing requirement ECE teachers should have while putting together a plan that makes it feasible for ECE teachers to attain such requirement. Based on the *Power to the Profession* report, it is suggested that ECE teachers could complete a professional training preparation program and pass a national assessment that shows their knowledge and skills in their area of practice (NAEYC, 2019). Regardless of the chosen credentialing requirement, it is pivotal for states to provide financial support and flexible preparation programs for ECE teachers. Online preparation programs can be a very effective means for ECE teachers to obtain higher education given that most of them work full time (Fiechtl & Hager, 2019). Providing scholarships or financial assistance packages is also crucial given that, as already documented, ECE teachers' salaries are barely enough for them to make ends meet (McLean et al., 2021). The state of New Mexico with its recent pass of free college for all its residents has been leveraging this to incentivize ECE teachers to get their higher education (Austin et al., 2022). Other states could also focus efforts to increase access to higher education for all their residents, as vulnerable populations, such as the ECE teacher workforce are the most likely to benefit the most.

Program Level:

a. Provide mental Health resources or programs as part of professional development trainings. Given the high demands of working with children and families and even the added demands that the COVID-19 pandemic has created, ECE teachers should have access to mental health resources that support their mental health and overall well-being, not only in their community but in their workplace as well. Therefore, providing mental health resources to ECE teachers as part of ongoing professional development trainings could be a great way to increase access to this content. Some mental health resources and programs that have shown to be beneficial for ECE teachers include mindfulness programs (Becker et al., 2017; Csaszar et al., 2018; Lomas et al., 2017), resilience-based programs (Lang et al., 2020), and programs that teach proactive and healthy coping skills, such as reappraisal self-regulation, given that they have been linked to positive outcomes in relation to ECE teachers' mental health and teacher-child interactions (Buettner et al., 2016).

b. Implement a comprehensive social-emotional approach. Modeling behavior for children and managing challenging behaviors can be very stressful for ECE teachers and have negative implications on their mental health (Jeon & Ardeleanu, 2020; Rodriguez et al., 2020; Shewark et al., 2018). Therefore, it is important for ECE teachers to not only have training on behavioral management, but also have access to other professionals, such as early childhood mental health counselors, which has also been suggested to be predictive of lower expulsion rates in ECE programs (Silver & Zinsser, 2020). Furthermore, implementing a comprehensive social-emotional curriculum that provides tools for increasing children's social-emotional skills as well as ECE teachers' social-emotional development can be effective in promoting positive teacher-child interactions (Brackett et al., 2012). An example of this type of social-emotional curriculum

is called, RULER, which has been suggested to have positive effects on teacher and child outcomes across different school grades (Brackett et al., 2012).

c. ***Implement a comprehensive family engagement approach.*** Last but not least, equipping ECE teachers with tools for developing reciprocal and positive partnerships with families can also serve as an indirect mechanism to support ECE teachers' mental health. At the same time, family engagement approaches should be comprehensive in nature and focus on providing tools for families as well, so both parties are ready to engage with each other. The *Dual Capacity-Building Framework for Family-School Partnerships* developed by Karen Mapp proposes this approach and highlights the process and organizational conditions that need to be present in a program for teachers and families to engage in an effective and collaborative manner (Mapp & Bergman, 2021).

6.4. Limitations of the Study

This study has many limitations. First, individual-level and work-environment indicators of mental health were measured in Time 1, only (before the pandemic). Future studies should look at how these same indicators might have changed once the pandemic started and whether they are still predictive of ECE teachers' mental health. While some individual-level indicators in this study might have remained the same at the onset of the COVID-19 pandemic (e.g. education levels), work-environment characteristics, especially in relation to job demands, likely changed and hence should also be examined to strengthen the results of the current study.

There are also other individual-level social indicators of ECE teachers' mental health that are crucial to consider. While gender was not examined in this study given that most participants identified as female, research has shown that females tend to be more likely to exhibit depressive symptoms (National Institute of Mental Health, 2018; Santamaria et al., 2021). Furthermore,

male ECE teachers tend to experience different challenges compared to female ECE teachers (Reich-Shapiro et al., 2021). Therefore, future studies should focus on examining the mental health status of ECE male teachers before and after the COVID-19 pandemic and identify unique potential social indicators of mental health. Other important individual-level characteristics to consider, and that are less explored, include ECE teachers' lived experiences, such as Adverse Childhood Experiences (ACES) and trauma (Hubel et al., 2020; Levkovich & Gada, 2020). Research has found high rates of ACES and exposure to trauma, especially in ECE teachers who live in at-risk communities (Hubel et al., 2020; Levkovich & Gada, 2020; Razza et al., 2020). This is concerning since exposure to trauma, inside and outside of the classroom, has implications on educators' psychological well-being, such as developing depression or PTSD symptoms (Razza et al., 2020; Rojas-Flores et al., 2015).

Future studies should also look at other work environment characteristics, such as ECE program type and work climate. It has been well-documented that ECE teachers who work in home-based programs face different challenges than ECE teachers in center-based programs, such as different credentialing requirements, lower pay, and staffing issues (Deham et al., 2017; Linnan et al., 2017; McLean et al., 2021). Furthermore, ECE teachers in home-based programs were less likely to receive funding program support at the onset of the pandemic (Kim et al., 2022). Therefore, future studies should use a comparative analysis on the impact of the COVID-19 pandemic on ECE teachers' mental health by program type and identify additional social indicators or risk factors that might be unique to ECE teachers' program type. Studies should also consider the role of work climate on ECE teachers' mental health. It has been documented that a positive work climate (positive relationship with colleagues and leadership staff) has a positive relationship with ECE teachers' psychological well-being or mental health (Corr et al.,

2015; Jeon et al., 2019). Furthermore, in a study conducted in ECE teachers in Australia, ECE teachers who had higher levels of professional well-being, which included positive collegial relationships were less likely to be at risk of quitting their jobs and experience conflict in teacher-child interactions during the first year of the pandemic (Eadie et al., 2021). Therefore, including measures of work climate in the context of the pandemic is crucial when looking at ECE teachers' mental health as it can help identify further potential resources and systems of support.

Last but not least, future studies should also examine other aspects of mental health, such as anxiety symptoms and symptoms of trauma. It has been documented that individuals with symptoms of depression are also likely to exhibit symptoms of anxiety (Davies et al., 2019). Moreover, as described earlier, ECE teachers' lived experiences, such as exposure to trauma can also impact their mental health (Razza et al., 2020; Rojas-Flores et al., 2015). For this reason, it is crucial to have a more comprehensive examination of ECE teachers' mental health, so the appropriate resources and systems of support are provided.

Conclusion

The current study reveals contrasting differences in social indicators of mental health on ECE teachers before and at the onset of the COVID-19 pandemic, which highlights the role of changes in the environment on individual outcomes, such as symptoms of depression. Results from this study reiterate the need to support ECE teachers' mental health given that symptoms of depression increased from mild to more pervasive symptoms of depression at the onset of the pandemic. Above all, the results from this study highlight the urgent need to implement systems of support that can help buffer the effects of unexpected changes in the environment, such as COVID-19, on ECE teachers' mental health. Being a highly vulnerable workforce population,

supporting ECE teachers' financial security via fair compensation may likely serve as a protective factor for poor mental health given that it can provide ECE teachers the ease of mind to make ends meet and access the resources they need, especially during times of collective crisis and stress.

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Table 5.1

Participants' Demographics and Work Environment Characteristics at Time 1 and Time 2

Characteristic	Time 1 (Pre-COVID-19) *N* = 1156		Time 2 (COVID-19 Onset) *N* = 670	
	N	*%*	*N*	*%*
Female vs. Other	1112	96%	643	96%
Minority Race/Ethnicity vs. White	421	36%	255	38%
College or higher vs. Other	415	36%	254	38%
Infants and Toddlers vs. Older	418	36%	237	35%
Public Funding vs. Other	527	46%	311	46%

Note. *N* = 1156 and 670 teachers reporting complete data at Time 1 and Time 2, respectively. Infants and Toddlers = Teaching this age group compared to preschoolers; Public Funding = Working in ECE programs that are publicly funded.

Table 5.2

List of Variables and their Coding for Final Analyses

Variable	Coding
Outcomes	
Time 1 Pre-COVID-19 Depression	Modified CESD score (36 points max.)
Change in Depression:	
Time 2 (Onset of COVID-19) – Time 1	Change in CESD score
Pre-COVID-19 Predictors	
(Socio-Demographic Characteristics)	
Age	Years, centered and standardized (*z*)
Asian Status	Asian = 1; White = 0
Black Status	Black = 1; White = 0
Latinx Status	Latinx = 1; White = 0
Other Race Status	Other = 1; White = 0
Educational level	College or more =1; no college = 0
No. federal assistance programs received	Count, centered and standardized (*z*)
Time 1 Depression (Model 2 only)	Continuous score, centered and standardized (*z*)
(Professional Characteristics)	
Years of teaching experience	Years, centered and standardized (*z*)
Job motivation status	Intrinsic motivation = 1, extrinsic = 0
(Work Environment Characteristics)	
Hourly wage	Dollars, centered and standardized (*z*)
Paid vacation days status	Receives paid vacation days = 1, no = 0
Paid sick days status	Receives paid sick days = 1, no = 0
Work hours	Hours per week, centered and standardized (*z*)
ECE program public funding status	Public funding = 1; private/mixed funding = 0
Child age group taught status	Infants or toddlers = 1; preschoolers = 0
Job Demands	Average subscale score, centered and standardized (*z*)
Job Support	Average subscale score, centered and standardized (*z*)
Onset of COVID-19 Predictors (Model 2 only)	
(COVID-19 Stressors)	
Income Worry	Rating scale, centered and standardized (*z*)
Parent program unenrollment	Count, centered and standardized (*z*)
Perceived change in work demands status	Yes = 1, no = 0

Table 5.3

Descriptive Statistics and Zero-Order Correlations (N = 670)

Variable	*N*	*M*	*(SD)*	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.
Outcome																								
1. Time 1 Pre COVID-19 Dep	1156	7.69	(5.89)	--																				
2. Time 2- Time 1: Change Dep	670	3.30	(6.57)	**-.35**	--																			
Sociodemographic Characteristics																								
3. Age	1136	38.36	(12.65)	**-.31**	.02	--																		
4. Asian Status	77	0.07	(0.25)	-.03	-.09	**-.09**	--																	
5. Black Status	44	0.04	(0.19)	-.01	-.06	**-.11**	**.85**	--																
6. Latinx Status	140	0.12	(0.33)	-.04	-.04	**-.14**	**.79**	**.83**	--															
7. Other Race Status	160	0.14	(0.35)	.02	**-.11**	**-.13**	**.79**	**.83**	**.74**	--														
8. Education Level (college = 1)	1122	0.37	(0.48)	**-.08**	-.01	**.06**	.04	-.03	**-.08**	-.05	--													
9. Assistance Programs (count)	1152	0.83	(1.48)	.06	.04	**-.09**	**.07**	**.13**	**.10**	**.08**	**-.21**	--												
Professional Characteristics																								
10. Teaching Experience (years)	1141	12.56	(9.46)	**-.21**	.04	**.71**	**-.15**	**-.12**	**-.15**	**-.11**	.01	**-.09**	--											
11. Job Motivation (intrinsic = 1)	1139	0.86	(0.35)	**-.07**	.04	**.27**	**-.06**	**-.07**	**-.09**	**-.06**	.05	-.05	**.30**	--										
Work Environment Characteristics																								
12. Hourly Wage	1089	18.16	(6.25)	**-.10**	.03	**.23**	-.02	-.05	**-.07**	**-.06**	**.35**	**-.13**	**.27**	**.16**	--									
13. Paid Vacation Days Status	1154	0.77	(0.42)	-.04	.04	**.06**	-.03	-.04	-.06	-.04	**.15**	**-.11**	**.07**	**.13**	**.17**	--								
14. Paid Sick Days Status	1154	0.89	(0.31)	-.02	.02	.03	**-.10**	**-.10**	**-.10**	-.06	**.07**	-.03	.03	**.08**	**.09**	**.29**	--							
15. Work Hours (weekly)	1142	37.31	(7.60)	**.07**	.06	-.01	-.03	-.04	-.02	-.01	-.01	-.02	.02	.04	.03	**.14**	.04	--						
16. Program Funding (public = 1)	1156	0.46	(0.50)	.02	-.02	.05	-.04	.01	-.01	-.01	.02	.02	**.11**	**.08**	**.14**	**.07**	**.13**	.01	--					
17. Child Age (infants/toddlers = 1)	1156	0.36	(0.48)	**.10**	-.01	**-.13**	.00	.00	.00	.04	**-.16**	**.08**	**-.14**	**-.08**	**-.21**	.05	-.04	.04	**-.08**	--				
18. Job Demands (cont.)	1145	2.62	(0.85)	**.23**	.01	**-.11**	**-.17**	**.18**	**-.21**	**-.10**	.01	.03	-.01	.00	-.04	-.03	.02	.01	**.09**	-.04	--			
19. Job Support (cont.)	1155	3.54	(0.62)	**-.24**	**.08**	**.13**	**.12**	**.10**	**.11**	**.08**	-.01	.04	**.10**	**.13**	**.08**	.05	.01	.01	**-.13**	.06	-.34	--		
COVID-19 Stressors																								
20. Income Worry (cont.)	668	3.12	(0.93)	-.02	**.18**	-.04	**.10**	**.11**	**.12**	.04	**-.13**	**.15**	**-.09**	-.07	**-.13**	**-.10**	**-.11**	.00	**-.14**	-.03	-.04	.03	--	
21. Parent Unenrollment (count)	529	10.31	(10.98)	.01	.06	**-.13**	.08	.02	.01	.02	-.04	.02	**-.10**	-.08	**-.21**	.06	-.03	-.03	**-.36**	.07	.03	.03	**.17**	--
22. Work Change Status (yes = 1)	683	0.75	(0.43)	.02	.03	-.07	-.05	-.06	-.07	-.04	.02	.00	.00	-.04	.04	.00	.01	-.02	.02	**-.11**	**.09**	**-.09**	.02	**.09**

Table 5.4

Pooled Imputed Multiple Linear Regression Model Results for Depression at Time 1 (Pre-COVID-19)

Variable	*b*	*(SE)*	*t*	*df*	*P*	sr^2
Outcome						
Time 1 (Pre-COVID-19) Depression	7.57	(0.70)	10.86	1111	<0.001	--
Socio-Demographic Characteristics						
1. Age	-1.48	(0.23)	-6.41	1110	<0.001	0.03
2. Asian Status	-0.07	(0.07)	-0.11	1121	0.916	0.00
3. Black Status	0.75	(0.86)	0.88	1099	0.382	0.00
4. Latinx Status	-1.03	(0.52)	-1.96	1117	0.050	0.00
5. Other Race Status	0.43	(0.48)	0.90	1123	0.370	0.00
6. Education Level (college = 1)	-0.57	(0.38)	-1.52	1080	0.129	0.00
7. No. Federal Assistance Programs Received	0.12	(0.17)	0.73	1128	0.468	0.00
Professional Characteristics						
8. Years of Teaching Experience	-0.13	(0.24)	-0.56	1104	0.573	0.00
9. Job Motivation Status (intrinsic = 1)	0.54	(0.50)	1.08	1068	0.278	0.00
Work Environment Characteristics						
10. Hourly Wage	0.05	(0.19)	0.28	1082	0.781	0.00
11. Paid Vacation Days Status (yes = 1)	-0.32	(0.41)	-0.78	1130	0.434	0.00
12. Paid Sick Days Status (yes = 1)	-0.18	(0.54)	-0.34	1132	0.737	0.00
13. Work Hours (weekly)	0.38	(0.16)	2.32	1110	0.020	0.00
14. ECE Program Funding Status (public = 1)	0.08	(0.33)	0.23	1134	0.821	0.00
15. Child Age Group (IT= 1)	0.82	(0.35)	2.37	1133	0.018	0.00
16. Job Demands (cont.)	0.81	(0.18)	4.41	1080	<0.001	0.02
17. Job Support (cont.)	-0.95	(0.18)	-5.26	1118	<0.001	0.02

Note. N =1,156 ECE teachers represented, across 100 imputed datasets. Cont. = continuous; IT = infants and toddlers. R^2_{total} = 0.17, 95% CI = 0.13 – 0.21

Table 5.5

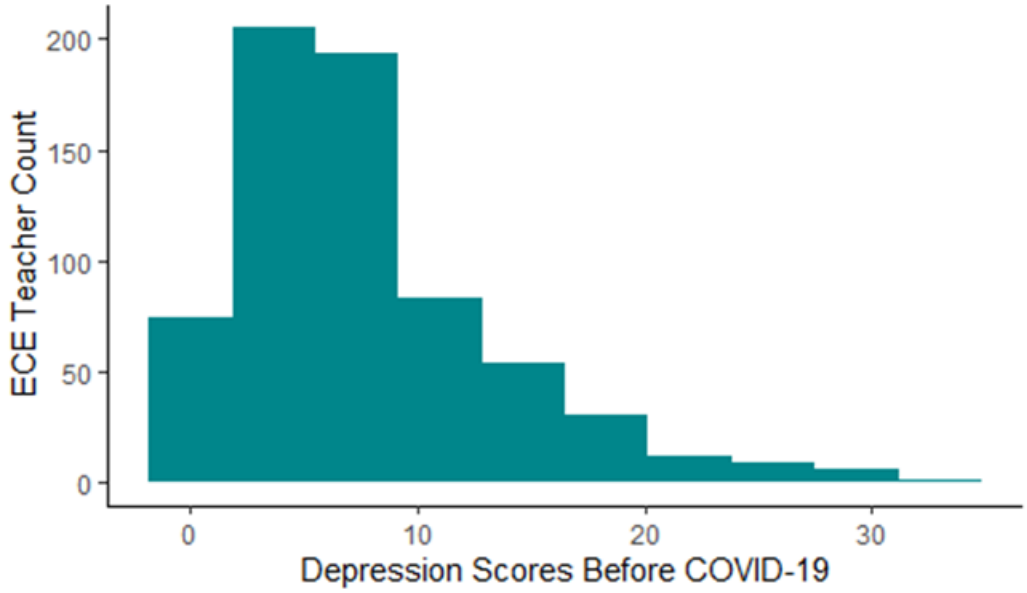
Pooled Imputed Multiple Linear Regression Model Results for Change in Depression by COVID-19 Onset

Variable	*b*	*(SE)*	*t*	*df*	*p*	sr^2
Outcome						
Change in Depression: Time 2- Time 1	2.54	(1.06)	2.40	387	0.016	--
Covariate						
1. Time 1 Pre-COVID-19 Depression	-2.55	(0.26)	-9.95	308	<0.001	0.26
Socio-Demographic Characteristics						
2. Age	-0.61	(0.36)	-1.69	267	0.092	0.01
3. Asian Status	-2.39	(0.95)	-2.51	355	0.012	0.01
4. Black Status	0.73	(1.35)	0.54	229	0.591	0.00
5. Latinx Status	-0.16	(0.74)	-0.21	358	0.835	0.00
6. Other Race Status	-1.73	(0.71)	-2.44	285	0.015	0.02
7. Education Level (college =1)	-0.21	(0.54)	-0.38	313	0.706	0.00
8. No. Federal Assistance Programs Received	0.29	(0.27)	1.05	217	0.295	0.00
Professional Characteristics						
9. Years of Teaching Experience	0.15	(0.35)	0.43	300	0.666	0.00
10. Job Motivation Status (intrinsic =1)	0.27	(0.77)	0.36	245	0.723	0.00
Work Environment Characteristics						
11. Hourly Wage	0.23	(0.28)	0.81	270	0.416	0.00
12. Paid Vacation Days Status	0.32	(0.63)	0.50	271	0.617	0.00
13. Paid Sick Days Status	0.43	(0.79)	0.54	314	0.591	0.00
14. Work Hours (weekly)	0.47	(0.25)	1.87	244	0.063	0.01
15. ECE Program Funding Status (public = 1)	0.18	(0.51)	0.36	347	0.718	0.00
16. Child Age Group (IT =1)	0.35	(0.52)	0.67	306	0.502	0.00
17. Job Demands (cont.)	0.62	(0.28)	2.23	276	0.027	0.01
18. Job Support (cont.)	0.14	(0.28)	0.49	260	0.626	0.00
COVID-19 Stressors						
15. Income Worry (cont.)	0.66	(0.23)	2.94	447	0.003	0.02
16. Parent Program Unenrollment (count)	0.25	(0.26)	0.96	335	0.338	0.00
17. Perceived Change in Work Demands Status (yes = 1)	0.20	(0.48)	0.41	622	0.680	0.00

Note. N =1,156 ECE teachers represented, across 100 imputed datasets. Cont. = continuous; IT = infants and toddlers. R^2_{total} = 0.18, 95% CI = 0.12 – 0.22

Figure 5.1

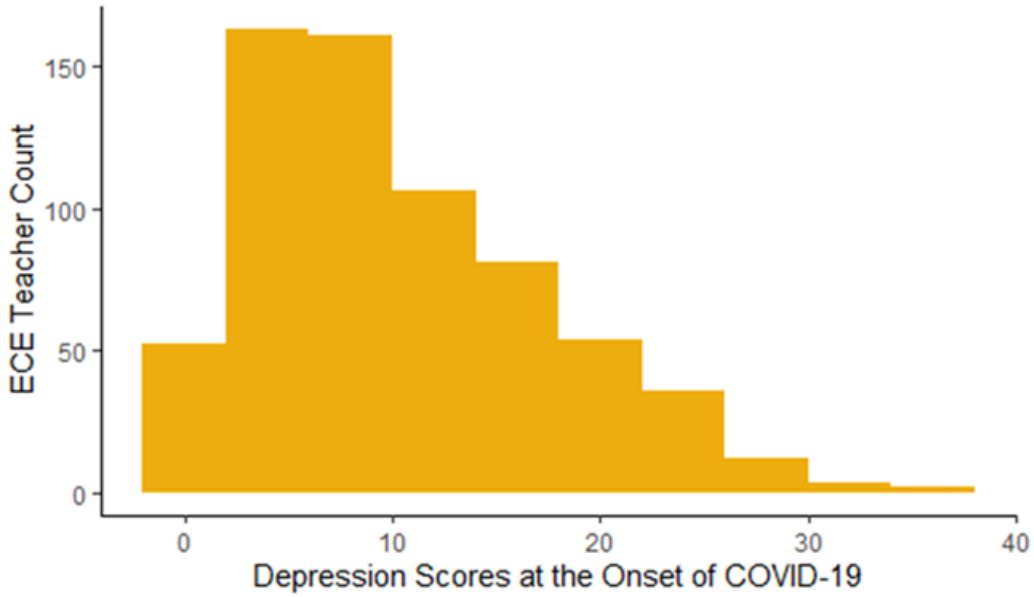
Distribution of Depression Scores in ECE Teachers Before the COVID-19 Pandemic



Note. N = 670 participants with depression scores at both Time 1 and Time 2.

Figure 5.2

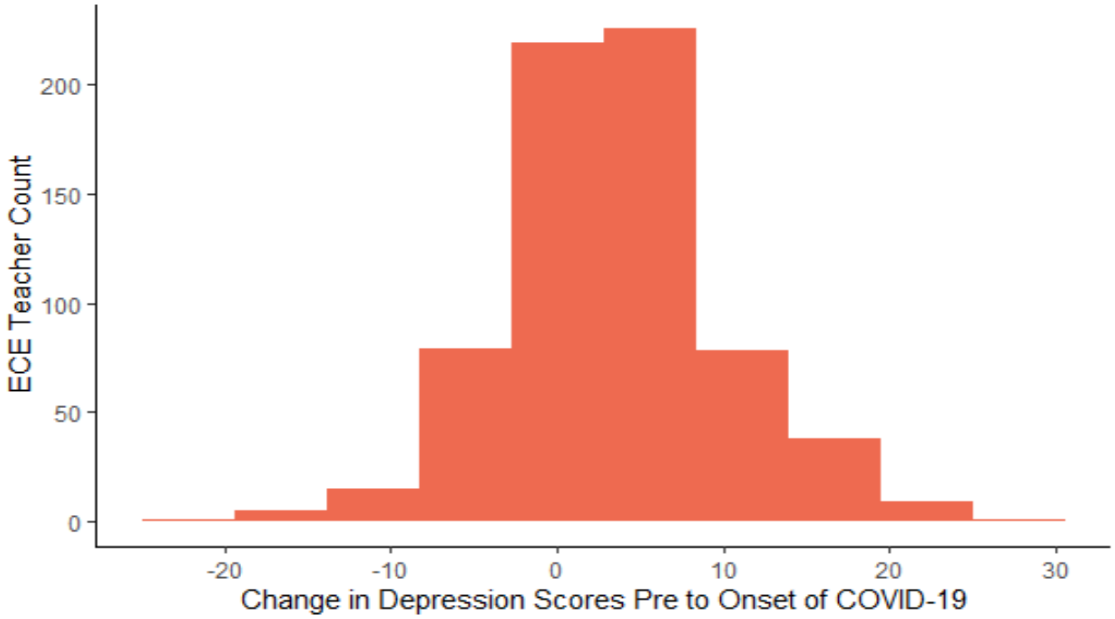
Distribution of Depression Scores in ECE Teachers during the Onset of the COVID-19 Pandemic



Note. N = 670 participants with depression scores at both Time 1 and Time 2.

Figure 5.3

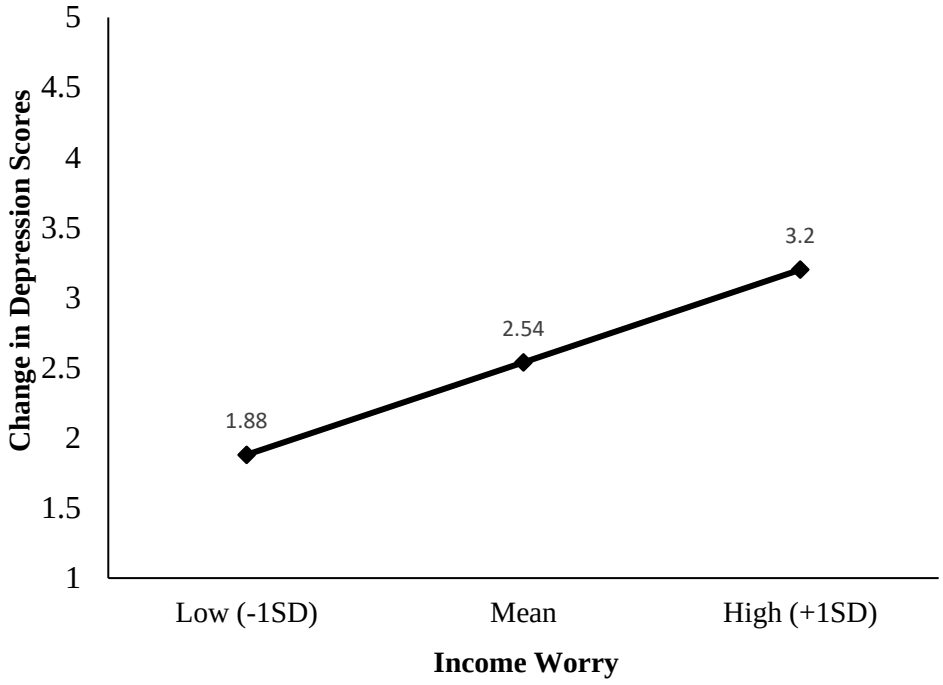
Distribution of Change in Depression Scores in ECE Teachers from Pre to Onset of the COVID-19 Pandemic



Note. N = 670 participants with depression scores at both Time 1 and Time 2.

Figure 5.4

Predicted Depression Change Scores by Income Worry



APPENDIX A

IRB Review

STATE OF WASHINGTON

DEPARTMENT OF SOCIAL AND HEALTH SERVICES
WASHINGTON STATE INSTITUTIONAL REVIEW BOARD
P.O. Box 45205 ●Olympia, Washington 98504-5205●360.902.8075●wsirb@dshs.wa.gov

July 22, 2019

Gail Joseph, Ph.D.

CQEL Center for Research and Professional Development
5001 25th Ave NE, Suite #201E
Seattle, WA 98103

Re: Exempt Determination 2019-072: Washington Early Childhood Workforce Survey

Dear Dr. Joseph:

Washington State Institutional Review Board (WSIRB) has reviewed your Exempt Determination Request for the activity identified above. This opinion is based on federal regulation 45 CFR 46 and associated guidance and the Washington State Agency Policy on Protection of Human Research Subjects, Chapter IV.

WSIRB has determined that the project meets the criteria delineated in 45 CFR 46.102(l), and that the findings from this project will not be conducted as "a systematic investigation… to develop or contribute to generalizable knowledge". Specifically, this project employs survey methods to collect data about the early childcare workforce throughout Washington state. This project is being conducted in order to provide information on the early childcare workforce for the purposes of developing/influencing policy, identifying resource needs, and increasing/cultivating professional development in related fields. The PI has confirmed this intention. DCYF has documented their support of the project via letter.

Therefore, your proposed activity does not require further review by WSIRB. Please promptly inform the WSIRB if this activity will be changed in any manner that might affect this determination.

The Review Board finds that disclosure of identifiable records needed for this research meets the requirements in 45 CFR 46.116(f) for waiver of informed consent. Disclosure of these records is subject to the negotiation of a legally binding Confidentiality Agreement, as required by Washington State law (RCW 42.48). This Agreement must be established before you will be authorized to have access to confidential information contained in these records.

The Agreement is attached. Please read the terms and conditions carefully to ensure that they are compatible with your study objectives. If the Agreement is acceptable, please sign the document, and obtain the signatures of all persons on the research team who will have access to confidential information provided under the Agreement. When you have returned the Agreement to me, I will ask the designated leadership individual to sign the document and then return a copy to you.

UNIVERSITY of WASHINGTON
HUMAN SUBJECTS DIVISION

NOT HUMAN SUBJECTS

May 31, 2022

Dear Cinthia Palomino:

On 5/31/2022 the University of Washington Human Subjects Division (HSD) reviewed the following application:

Type of Review:	Initial Study
Title of Study:	Secondary data analysis of the Washington Early Childhood Workforce Survey
Investigator:	Cinthia Palomino
IRB ID:	STUDY00015729
Funding:	None
IND, IDE, or HDE:	None

HSD determined that the proposed activity does not involve human subjects, as defined by federal and state regulations. Therefore, review and approval by the University of Washington IRB is not required.

This determination applies only to the activities described in this application. Because this study involves secondary use of de-identified data collected by study that is overseen by Washington State IRB you should contact WSIRB about any requirements they may have related to this use of data. See the HSD webpage on Research Involving Washington State Agencies.

Depending on the nature of your study, you may need to obtain other approvals or permissions to conduct your research. For example, you might need to apply for access to data or specimens (e.g., to obtain UW student data). Or, you might need to obtain permission from facilities managers to conduct activities in the facilities (e.g., Seattle School District; the Harborview Emergency Department).

If you need to make changes in the future that may affect this determination or are not sure, contact us or submit a new request for a determination. You can create a modification by clicking Create Modification within the study.

We wish you great success.

Sincerely,
Tasha Mikko, MSW
IRB Administrator – Committee D
206-221-5664 | tasham@uw.edu

APPENDIX B

Washington State ECE Workforce Surveys

Washington Workforce Survey

Throughout this survey, we will use the terms facility, center, and program interchangeably to refer to your work – this can be a family childcare (FCC) program, a center-based program, a school-based program, or an expanded learning opportunities (ELO) program. We will use the terms classroom and program space interchangeably to refer to the space where you teach or care for children and youth. This can be a classroom in a center-based or school-based program, the home of an FCC program, or the space in which care is provided for an ELO program. We will also use the term provider to include directors, owners, caregivers, youth development professionals, and other roles responsible for working with children and youth.

Washington Workforce Survey

1 **In what county is your program located?**

2 **What is the zip code where your program is located?**

3 **Who is your employer?**

- ❍ Educational Service Unit
- ❍ Public School District
- ❍ Parochial/Private School
- ❍ Early Head Start
- ❍ Head Start
- ❍ Public Childcare/Preschool (non-profit, ECEAP)
- ❍ Private Childcare/Preschool
- ❍ Other (please specify)

4 **Which of the following best describes your job title?**

- ❍ Director or Owner
- ❍ Program Coordinator
- ❍ Youth Development Professional
- ❍ Lead Teacher/Lead Instructor
- ❍ Teacher/Instructor
- ❍ Assistant Teacher/Assistant Instructor
- ❍ Aide
- ❍ Family Support Worker
- ❍ Other (please specify)

5 **Is your program currently accredited by:**

	No	Yes	I don't know
a. The National Association for Family Child Care?	❍	❍	❍
b. The National Association for the Education of Young Children *(NAEYC)*?	❍	❍	❍
c. Any other national or state-recognized childcare accrediting body? *(If yes, please specify):*	❍	❍	❍

6 **Please indicate which of the following characterize your relationship with the local school system. *Please select N/A if this does not apply to your setting.***

	No	Yes	N/A
a. We plan transitions for children moving to preschool or kindergarten.	❍	❍	❍
b. The school(s) provide special education services for some of our children.	❍	❍	❍
c. We engage in professional development activities together.	❍	❍	❍
d. We communicate about children who attend both our programs.	❍	❍	❍
e. We coordinate transportation.	❍	❍	❍
f. We provide care and/or enrichment activities for children during school breaks.	❍	❍	❍
g. We provide before and after school care.	❍	❍	❍
h. Teachers represent families at parent-teacher conferences/meetings.	❍	❍	❍

Washington Workforce Survey

7 **How long have you worked for this program?** ***If less than one year, enter the number of months.***

Years Months

8 **How many more years do you plan to continue in this position?**

Years

9 **How many years of paid experience *(not babysitting)* do you have working with children who are under age *8? Please include any paid experiences in a home, school, or center-based setting. If less than one year, enter the number of months. If you have never worked with children under age 8 please enter 0.***

Years Months

10 **Which one of the following best describes the main reason that you work with children?**

- ❍ It is my career or profession.
- ❍ It is a step towards a related career.
- ❍ It is my personal calling.
- ❍ It is a job with a paycheck.
- ❍ It is work I can do while my children are young.
- ❍ It is a way to help children.
- ❍ It is a way to help parents.
- ❍ None of these reasons apply.

11 **Do you feel that your current job gives you opportunities to advance your career?**

- ❍ No
- ❍ Yes

12 **Have you ever worked in the following settings?**

	No	Yes
a. In a home-based childcare program	❍	❍
b. In a center-based childcare program	❍	❍
c. As a teacher in a classroom for kindergarten, 1st, 2nd, or 3rd grade?	❍	❍
d. In an expanded learning opportunities program?	❍	❍

13 **With which age group do you work most often?**

- ❍ Infants (*0-18 months*)
- ❍ Toddlers (*18 months-3 years*)
- ❍ Preschoolers *(3-5 years)*
- ❍ Kindergarten - 3rd grade
- ❍ 4th grade and higher

14 **What language do you speak with the children/youth in your program space?**

- ❍ Mostly or all English
- ❍ Mostly or all Spanish
- ❍ A mix of English and Spanish
- ❍ Mostly a language other than English or Spanish (*specify other language*):
- ❍ A mix of English and a language other than Spanish (*specify other language*):

Washington Workforce Survey

15 **In the past 12 months how many different main classrooms/program spaces *(that you spend most of your day in)* have you been assigned to?**

☐ Different classroom assignments

16 **Some providers move between program spaces throughout the day. In the past 12 months, on a typical day, how many classrooms/program spaces do you work in as a provider? *Please do not include kitchen/office duty in this count.***

☐ Different classrooms per day

17 **When all the children are present, how many providers work in your current main classroom/program space together at the same time? Please only include providers assigned to that room at the time and do not include parents or other volunteers.**

☐ Providers

18 **On a typical day, how many total different adults *(including yourself)* work in your current main program space? *This includes coverage for breaks and shift changes.***

☐ Different adults

19 **For what reasons might a child be moved from your classroom/program space to another during the day? *Please select all that apply.***

- ❍ Based on daily ratio.
- ❍ At scheduled times of the day *(beginning of the day, end of the day, nap/activity/ club time, etc.)*
- ❍ Planned transition to a new age group.
- ❍ Due to behavior concerns.
- ❍ Due to a specific request from the child's family.
- ❍ N/A *(children don't move into/out of my classroom/program space during the day).*
- ❍ Other *(please specify)*:

☐

20 **When do children officially transition into another classroom/program space? *Please select all that apply.***

- ❍ All children transition together at a specific time point (*always in January, September, etc.*)
- ❍ Individually, based on each child's age
- ❍ Other (*please specify*):

☐

21 **If an individual child transitions into another program space based on age, at what age does this typically occur? *If Not Applicable, please put N/A in that column.***

	Years	Months	N/A
Infants	☐	☐	☐
Toddlers	☐	☐	☐
Preschool	☐	☐	☐
School age	☐	☐	☐
Other population	☐	☐	☐
(*please specify*):	☐		

22 **Over the past 12 months, approximately how many children in your classroom/ program space have unenrolled *(for any reason)* from the facility?**

☐ Children

Washington Workforce Survey

23 **Other than children aging out of the program, what are the top three reasons that children in your classroom/program space unenrolled from the facility in the last 12 months? *Please choose the top 3.***

- ❍ Parents/family move
- ❍ Parents can no longer afford payments/tuition
- ❍ Subsidy loss *(parents no longer qualify)*
- ❍ Parents feel the child is having difficulty adjusting to the program
- ❍ The commute to the facility/center is too far
- ❍ The child requires different programming or special services that are not provided
- ❍ Your facility/center does not offer the hours needed by the parents
- ❍ Parents disapprove of the facility/center's quality rating *(Early Achievers, etc.)*
- ❍ The family was asked to leave the program *(the child was expelled)*
- ❍ Other *(please specify)*:

24 **In educational settings, it is common for providers to be faced with challenging behaviors from children/youth. In the past 12 months, when faced with a challenging behavior, how often have you needed to take the following actions:**

	Daily	Several times per week	Several times per month	Once every few months	Once a year	I've never needed to do this	This does not apply to my setting
a. Work directly with the child on their behavior	❍	❍	❍	❍	❍	❍	❍
b. Discuss/work with fellow teachers to resolve the behavior	❍	❍	❍	❍	❍	❍	❍
c. Discuss/work with a supervisor/director to resolve the behavior	❍	❍	❍	❍	❍	❍	❍
d. Discuss/work with parents to resolve the behavior	❍	❍	❍	❍	❍	❍	❍
e. Discuss/work with a coach to resolve the behavior	❍	❍	❍	❍	❍	❍	❍
f. Discuss/work with a mental health consultant or behavior specialist to resolve the behavior	❍	❍	❍	❍	❍	❍	❍
g. Move the child to a different classroom	❍	❍	❍	❍	❍	❍	❍
h. Send the child to director's office	❍	❍	❍	❍	❍	❍	❍
i. Ask parents to pick up their child early	❍	❍	❍	❍	❍	❍	❍
j. Reduce the number of hours the child is enrolled in the program	❍	❍	❍	❍	❍	❍	❍
k. Ask the family to keep the child home for one or more days *(suspension)*	❍	❍	❍	❍	❍	❍	❍
l. Ask the family to leave theprogram *(expulsion)*	❍	❍	❍	❍	❍	❍	❍

Washington Workforce Survey

25a **Has your program ever asked a family to unenroll a child due to behavior issues?**

- ❍ No ***if no go to question 26***
- ❍ Yes

If Yes

25b **In the last 12 months, how many children have been asked to leave your program due to behavior issues?**

☐ Children

26 **For the following statements, please think about the parents and youth who are enrolled in your program. By *parent*, we mean the family member or other adult who is most responsible for the youth *(e.g., grandparent, guardian, or other)*. How often do the following things happen to you at work? *If this is not applicable to your setting, please select N/A.***

	Never	Seldom	Sometimes	Often	Most of the time	N/A
a. Parents don't let me know where they are during the day.	❍	❍	❍	❍	❍	❍
b. Parents blame their children's bad behaviors on childcare.	❍	❍	❍	❍	❍	❍
c. Children have behavior problems that are hard to deal with.	❍	❍	❍	❍	❍	❍
d. I feel like I have to be a parent and a teacher to the children.	❍	❍	❍	❍	❍	❍
e. All of the children need attention at the same time.	❍	❍	❍	❍	❍	❍
f. I get praise from the parents for the work that I do.	❍	❍	❍	❍	❍	❍
g. I feel respected for the work that I do.	❍	❍	❍	❍	❍	❍
h. I feel like I am helping the children grow and develop.	❍	❍	❍	❍	❍	❍
i. I see that my work is making a difference with a child.	❍	❍	❍	❍	❍	❍
j. I feel the satisfaction of knowing that I am helping parents.	❍	❍	❍	❍	❍	❍

Washington Workforce Survey

29 **How important do you think the following are to the overall quality of early childhood and youth educational settings?**

	Very important	Important	Somewhat important	Not important
a. Curriculum	❍	❍	❍	❍
b. Teacher-child interactions	❍	❍	❍	❍
c. Staff qualifications *(including professional development and training)*	❍	❍	❍	❍
d. Ratio, group sizes	❍	❍	❍	❍
e. Family engagement and partnerships	❍	❍	❍	❍
f. Assessment of children	❍	❍	❍	❍
g. Program administration	❍	❍	❍	❍
h. Physical environment and materials	❍	❍	❍	❍
i. Community engagement and partnerships	❍	❍	❍	❍
j. Commitment to diversity, equity, and inclusion	❍	❍	❍	❍

30 **How would you rate <u>your</u> classroom/program space on the following items?**

	7 Excellent	6	5 Good	4	3 Minimal	2	1 Inadequate
a. Curriculum	❍	❍	❍	❍	❍	❍	❍
b. Teacher-child interactions	❍	❍	❍	❍	❍	❍	❍
c. Staff qualifications (*including professional development and training*)	❍	❍	❍	❍	❍	❍	❍
d. Ratio, group sizes	❍	❍	❍	❍	❍	❍	❍
e. Family engagement and partnerships	❍	❍	❍	❍	❍	❍	❍
f. Assessment of children	❍	❍	❍	❍	❍	❍	❍
g. Program administration	❍	❍	❍	❍	❍	❍	❍
h. Physical environment and materials	❍	❍	❍	❍	❍	❍	❍
i. Community engagement and partnerships	❍	❍	❍	❍	❍	❍	❍
j. Commitment to diversity, equity, and inclusion	❍	❍	❍	❍	❍	❍	❍

Washington Workforce Survey

31a **Do you use a curriculum or prepared set of learning and play activities in your classroom/program space?**

- ❍ No ***if no go to question 32***
- ❍ Yes

If Yes

31b **What is the name of the curriculum or approach used?**

- ❍ A curriculum developed by our center/program
- ❍ District or school developed curriculum
- ❍ Partners for a Healthy Baby
- ❍ Creative Curriculum
- ❍ HighScope
- ❍ Assessment, Evaluation, and Programming System *(AEPS)*
- ❍ Tools of the Mind
- ❍ Curiosity Corner
- ❍ Learn Every Day
- ❍ Montessori
- ❍ Opening the World of Learning *(OWL)*
- ❍ Other *(please specify)*: _____

32a **Do you use a formal assessment in your classroom/program space?**

- ❍ No ***if no go to question 33***
- ❍ Yes

If Yes

32b **Which assessment system do you use?**

- ❍ An assessment developed by our center/program
- ❍ Creative Curriculum/Teaching Strategies **gold** (*"My Teaching Strategies"*)
- ❍ HighScope/CORE
- ❍ Assessment, Evaluation, and Programming System *(AEPS)*
- ❍ Work Sampling System
- ❍ Other (*please specify*): _____

33 **We would like to have some more demographic information about the children/youth in your program space. For each item, please give the total number of children with the following characteristics in your classroom/program space. *Please make your best guess, and if you can't, please select don't know (not zero).***

a. How many children are there total in your classroom?	☐
b. **African American or Black** *(e.g., African American, Jamaican, Haitian, Nigerian, Ethiopian, Somalian, etc.)*	☐
c. **American Indian, Native** American, or Alaska Native *(e.g., Navajo Nation, Mayan, Aztec, Nome Eskimo Community, etc.)*	☐
d. **Native Hawaiian or other Pacific Islander** *(e.g., Native Hawaiian, Samoan, Chamorro, Tongan, Fijian, etc.)*	☐
e. **Asian** *(e.g., Chinese, Filipino, Asian Indian, Vietnamese, Korean, Japanese, etc.)*	☐
f. **European American or White** *(e.g., German, Irish, English, Italian, Polish, French, etc.)*	
g. **Latinx, Hispanic/Hispano, or Spanish Origin** *(e.g., Mexican or Mexican American, Puerto Rican, Cuban, Salvadoran, Dominican, Colombian, etc.)*	☐
h. **Middle Eastern, Arab, or North African** *(e.g., Lebanese, Iranian, Egyptian, Syrian, Moroccan, Algerian, etc.)*	☐
i. **Bi-racial/multi-racial**	☐

Washington Workforce Survey

34 **We would like to have some more contextual information about the children/youth in your program space. For each item, please give the total number of children with the following characteristics in your classroom/ program space. *Please make your bestguess, and if you can't, please select* don't know *(not zero).***

a. On full or partial child care subsidy	
b. On reduced or free lunch program	
c. Homeless	
d. Parent is a teen	
e. Parent is LGBTQ	
f. Have an IEP/IFSP	
g. On the autism spectrum	
h. Challenging behaviors or mental health impairments	
i. Gifted/talented	
j. Speak a language other than English at home	

35 **Does your program setting provide any of the following benefits for you?**

	No	Yes
a. Paid vacation days	❍	❍
b. Paid sick days	❍	❍
c. Paid days to attend professional meetings or training	❍	❍
d. Paid training or professional development dollars	❍	❍
e. Paid time off to attend school	❍	❍
f. Paid tuition and/or school expenses to attend school	❍	❍
g. Retirement benefits	❍	❍
h. Health insurance for yourself	❍	❍
i. Health insurance for your family	❍	❍
j. Reduced or paid childcare for your children	❍	❍
k. Paid bereavement leave	❍	❍
l. Paid maternity leave	❍	❍
m. Unpaid maternity leave	❍	❍
n. Paid family leave	❍	❍
o. Free meals	❍	❍

36 **Do you currently have or receive any of the following benefits *(from* any *source)*?**

	No	Yes
a. Health insurance for yourself *(from any source)*	❍	❍
b. Health insurance for your family *(from any source)*	❍	❍
c. Medicaid or Medicare *(adults)*	❍	❍
d. Medicaid/CHIP *(children)*	❍	❍
e. Food Stamps	❍	❍
f. WIC	❍	❍
g. TANF	❍	❍
h. Free or reduced-price school lunches for your own children	❍	❍
i. Childcare Subsidy	❍	❍
j. Public Housing	❍	❍
k. Section 8 Housing Voucher	❍	❍
l. Social Security Payments	❍	❍
m. Disability *(SSI)* for yourself	❍	❍
n. Disability *(SSI)* for other family members	❍	❍
o. Other forms of assistance *(please specify)*:	❍	❍

Washington Workforce Survey

About Your Education, Experiences, and Early Learning Resources
In this section, we would like you to answer questions about your education, your work experiences, and your use of educational resources. This information will help us better understand the current status of our workforce, and guide our work toward additional supports for your profession.

37 **Please select all your educational experiences, including what year and where you received your degrees or certificates. Please include education in progress *(degrees not yet completed)* and the year you anticipate completion.**

	Status			Details		
	In progress	Completed	Not applicable	Year (completed or anticipated)	Institution	Major or Endorsement
GED	❍	❍	❍			
High School Diploma	❍	❍	❍			
Child Development Associate (CDA) certificate	❍	❍	❍			
Initial Teaching Certificate	❍	❍	❍			
Short-term Teaching Certificate	❍	❍	❍			
State Teaching Certificate	❍	❍	❍			
Associate's Degree	❍	❍	❍			
Bachelor's Degree	❍	❍	❍			
Master's Degree	❍	❍	❍			
Additional degree/certificate (please specify):	❍	❍	❍			
Additional degree/certificate (please specify):	❍	❍	❍			

38 **Are you currently taking any education or child development courses at a community college or 4-year college/university?**

- ❍ No
- ❍ Yes

39 **Do you plan on taking any education or child development courses at a community college or 4-year college/university in the next year?**

- ❍ No
- ❍ Yes

40 **Please indicate which, if any, of the following programs you have received scholarships or financial support for your education or professional development. *Please select all that apply.***

- ❍ Early Achievers Grants
- ❍ WA Scholarships
- ❍ VA Benefits
- ❍ Other *(please specify):*
- ❍ I have not received any scholarships or financial support for my education or professional development

Washington Workforce Survey

41 **Are you currently a member of any of the following organizations?**

	No	Yes
a. National Association for the Education of Young Children (*NAEYC*)	❍	❍
b. National Association for Family Child Care (*NAFCC*)	❍	❍
c. Division of Early Childhood *(DEC)*	❍	❍
d. Council for Exceptional Children *(CEC)*	❍	❍
e. National Afterschool Association (*NAA*)	❍	❍
f. Other (*please specify*):	❍	❍

42 **When you started this job, how *prepared* were you to work with:**

Directions. For the next set of statements, please select the response that best describes your opinion on how prepared you were to work with the following age groups and ability levels of children/youth when you started this job. The choices range from:
4 = Well Prepared 3 = Somewhat Prepared 2 = Minimally Prepared 1 = Not Prepared N/A = Not Applicable

	Birth to Age 3	Preschool (3-5 years)	K-3rd Grade (6-8 years)	4th Grade and Older (9+ years)	N/A
a. Children/youth developing typically					
b. Children/youth with developmental delays					
c. Children/youth with disabilities					
d. Children/youth from culturally and linguistically diverse backgrounds					
e. Children/youth who are gifted/talented					
f. Children/youth with challenging behaviors					
g. Children/youth learning to read					

Washington Workforce Survey

43 **When you started this job, how prepared were you to work with:**

Directions. For the next set of statements, please select the response that best describes your opinion on how prepared you were to work with the following age groups, ability levels, families, staff, and curricula when you started this job. The choices range from: **4 = Well Prepared 3 = Somewhat Prepared 2 = Minimally Prepared 1 = Not Prepared N/A = Not Applicable**

	Birth to Age 3	Preschool (3-5 years)	K-3rd Grade (6-8 years)	4th Grade and Older (9+ years)	N/A
a. Families of children who are typically developing					
b. Families of children with developmental delays					
c. Families of children with disabilities					
d. Families from culturally and linguistically diverse backgrounds					
e. Paraeducators (for example, classroom aide or similar support staff)					
f. Special education team members					
g. Family support workers/advocates					
h. Program observation assessments					
i. Math/Science curricula					
j. Language Arts curricula					
k. Music/Arts opportunities					

44 **In the past year, have you received training or coaching from any of the following groups or organizations?**

	No	Yes
a. Training from my employer or organization	❍	❍
b. Community-based training such as Child Care Aware or Imagine Institute	❍	❍
c. Training from a local school or Educational Service District	❍	❍
d. Coaching or mentoring from a trained coach	❍	❍
e. Online training from any source	❍	❍
f. Other organized school support or training effort *(please specify)*:	❍	❍

Washington Workforce Survey

45 **Please indicate how strongly you agree or disagree with the following statements.**
In my opinion...

	Strongly Disagree	Mildly Disagree	Neither Agree nor Disagree	Mildly Agree	Strongly Agree
a. Since parents lack special training in education, they should not question the teacher's teaching methods.	❍	❍	❍	❍	❍
b. Children should be treated the same regardless of differences among them.	❍	❍	❍	❍	❍
c. Children should always obey the teacher.	❍	❍	❍	❍	❍
d. Preparing for the future is more important for a child than enjoying today.	❍	❍	❍	❍	❍
e. Children will not do the right thing unless they are told what to do.	❍	❍	❍	❍	❍
f. Children should be kept busy with work and study when at home and in school.	❍	❍	❍	❍	❍
g. The major goal of education is to put basic information into the minds of the children.	❍	❍	❍	❍	❍
h. In order to be fair, a teacher must treat all children alike.	❍	❍	❍	❍	❍
i. The most important thing to teach children is absolute obedience to whoever is in authority.	❍	❍	❍	❍	❍
j. Children learn best by doing things themselves rather than listening to others.	❍	❍	❍	❍	❍
k. Children must be carefully trained early in life or their natural impulses will make them unmanageable.	❍	❍	❍	❍	❍
l. Children have a right to their point of view and should be allowed to express it.	❍	❍	❍	❍	❍
m. Children's learning results mainly from being presented basic information again and again.	❍	❍	❍	❍	❍
n. Children like to teach each other.	❍	❍	❍	❍	❍
o. The most important thing to teach children is absolute obedience to parents.	❍	❍	❍	❍	❍

Washington Workforce Survey

About You

In this section, we would like to learn more about you outside of your role as an education or early care professional. There will be questions regarding your health, lifestyle, and demographic information. Some of the questions ask personal information. We ask these personal questions to help us understand the characteristics of learning professionals throughout the state. Please remember, these responses will remain confidential. They will not be linked to any identifying information about you or your facility. The more accurately you respond, the more we can support improvements for education and early learning providers in Washington State. This survey asks some personal questions about your recent experiences and feelings. We understand some of these might be sensitive issues and appreciate you taking the time to answer these questions. If you have any concerns about answering, please contact Heather Cook at waworkforcesurvey@uw.edu. As a reminder, your information will remain confidential.
If you would like additional resources or support, you can call the **Substance Abuse and Mental Health Services Administration National Hotline**, a confidential, free, 24-hour-a-day, 365-day-a-year information service that provides referrals to support groups, treatment facilities and community-based organizations: **1-800-662-HELP (1-800-662-4357)**

46 **What is your gender?**

- ❍ Female
- ❍ Male
- ❍ Transgender
- ❍ Non-binary or gender fluid
- ❍ Other *(please specify):*
- ❍ I prefer not to answer

47 **What is your age?**

Years

48 **What is your marital status?**

- ❍ Single, never married
- ❍ Single, living with a partner
- ❍ Married, living with a spouse
- ❍ Married, separated
- ❍ Divorced
- ❍ Widowed

49 **What is your ethnicity or national origin** ***Check all the apply.***

- ❍ **African American or Black** (*e.g., African American, Jamaican, Haitian, Nigerian, Ethiopian, Somalian, etc.*)
- ❍ **American Indian, Native American, or Alaska Native** (*e.g., Navajo Nation, Mayan, Aztec, Nome Eskimo Community, etc.*)
- ❍ **Native Hawaiian or other Pacific Islander** (*e.g., Native Hawaiian, Samoan, Chamorro, Tongan, Fijian, etc.*)
- ❍ **Asian** (*e.g., Chinese, Filipino, Asian Indian, Vietnamese, Korean, Japanese, etc.*)
- ❍ **European American or White** (*e.g., German, Irish, English, Italian, Polish, French, etc.*)
- ❍ **Latinx, Hispanic/Hispano, or Spanish Origin** (*e.g., Mexican or Mexican American, Puerto Rican, Cuban, Salvadoran, Dominican, Colombian, etc.*)
- ❍ **Middle Eastern, Arab, or North African** (*e.g., Lebanese, Iranian, Egyptian, Syrian, Moroccan, Algerian, etc.)*
- ❍ **Bi-racial/multi-racial.**

Washington Workforce Survey

50 **What language do you speak at home with family members?**

- ❍ Mostly or all English
- ❍ Mostly or all Spanish
- ❍ A mix of English and Spanish
- ❍ Mostly a language other than English or Spanish *(specify other language)*:

  [ ]
- ❍ A mix of English and a language other than Spanish *(specify other language)*:

  [ ]

51 **On average how many paid hours per week and months per year do you work as a teacher/ provider at this program?**

[ ] Hours per week

[ ] Months per year

52 **What is your salary/wage for your childcare/education job before taxes? Answer in the one unit that is easiest for you.** ***Please use whole numbers and do not enter symbols, for example, Per hour:*** **15**

[ ] Per hour **or**

[ ] Per week **or**

[ ] Per month **or**

[ ] Per year

53 **In addition to your job as a teacher/ provider, do you have another paid job?**

- ❍ No
- ❍ Yes

54 **In a typical month, how much of your own money (that is not reimbursed) do you spend on food, supplies, or other materials for your classroom/ program space?**

[ ] Per month

55 **How many people, including yourself, live in your household?**

[ ] People

56 **How many people in your household are under 18 years of age?**

[ ] People under 18

57 **How many individuals living in your household contribute to your household income?** ***(Be sure to include yourself.)***

[ ] People

58 **What is your best estimate of your total household income from all sources last year, before taxes?**

[ ] Total household income

Washington Workforce Survey

59 **Please indicate how much you agree or disagree with the following statements.**

	Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly Agree
a. I am satisfied with my life.	❍	❍	❍	❍	❍	❍
b. I consider myself a happy person.	❍	❍	❍	❍	❍	❍
c. The conditions of my life are excellent.	❍	❍	❍	❍	❍	❍

60 **Have you ever been told by a doctor or other health professional that you have any of the following?**

	No	Yes
Obesity	❍	❍
Asthma	❍	❍
Hypertension (*high blood pressure*)	❍	❍
Diabetes/Prediabetes	❍	❍
Depression	❍	❍

61 **Would you say that in general, your health is:**

- ❍ Excellent
- ❍ Very Good
- ❍ Good
- ❍ Fair
- ❍ Poor

62 **Now thinking about your physical health, which includes physical illness and injury, for how many days during the past 30 days was your physical health not good?**

_____ Days

63 **Now thinking about your mental health, which includes stress, depression, and problems with emotions, for how many days during the past 30 days was your mental health not good?**

_____ Days

64 **During the past 30 days, for about how many days did poor physical or mental health keep you from doing your usual activities, such as self-care, work, or recreation?**

_____ Days

Washington Workforce Survey

65 **Thinking about the <u>past week</u>, please use the following to describe how often you felt that way.**

During the past week...

	Less than 1 day	1-2 days	3-4 days	5-7 days
a. I was bothered by things that usually don't bother me.	❍	❍	❍	❍
b. I felt that I could not shake off the blues even with help from my family.	❍	❍	❍	❍
c. I felt that I was just as good as other people.	❍	❍	❍	❍
d. I had trouble keeping my mind on what I was doing.	❍	❍	❍	❍
e. I felt that everything I did was an effort.	❍	❍	❍	❍
f. I felt hopeful about the future.	❍	❍	❍	❍
g. I thought my life had been a failure.	❍	❍	❍	❍
h. I felt fearful.	❍	❍	❍	❍
i. I felt lonely.	❍	❍	❍	❍
j. People were unfriendly.	❍	❍	❍	❍
k. My sleep was restless.	❍	❍	❍	❍
l. I could not get going.	❍	❍	❍	❍

Thank you!

That completes our questions. We greatly appreciate the time you have taken to complete this survey. For your convenience, please use the postage-paid return envelope included in your survey packet to return your questionnaire to Cultivate Learning.

Questions or requests from this survey can be directed to:
Heather Cook at **waworkforcesurvey@uw.edu**

Washington Workforce Survey

Thank you!

Questions or requests from this survey can be directed to:
Heather Cook at **waworkforcesurvey@uw.edu**

Please fill out the bottom portion of this form to select your gift card.
This page will be removed from the survey and kept separately by the research staff.

First Name:

Last Name:

Social Security Number or Taxpayer Identification Number

(This information is required by the UW in order to track the amount of incentives given to any particular participant in one calendar year for tax purposes. It will not be used for any other purposes, and will be stored separately from survey information until the completion of the study):

$15 Gift Card *(please select one):*

- ❍ Amazon
- ❍ Starbucks
- ❍ Target

Mailing address where you would like your gift card sent:

E-mail address:

The Washington Workforce COVID-19 Survey

The University of Washington (UW), in partnership with DCYF, is sending this short survey to you because of your recent participation in the Washington Workforce Survey. Thanks again for submitting your survey and sharing your experiences with us! We appreciate your responses and look forward to analyzing the data to help support the field. We are following up with an additional survey that contains some new questions and also a few similar ones to follow up since the recent COVID-19 impacts on our state.

The Washington Workforce COVID-19 Survey

1 How worried are you, if at all, that:	Very worried	Some-what worried	Not too worried	Not worried at all	Don't know
a. You or someone in your family will get sick from COVID-19	❍	❍	❍	❍	❍
b. You will lose income due to a workplace closure or reduced hours because of COVID-19	❍	❍	❍	❍	❍

2 Is the stress from COVID-19 impacting the quality of programming with children where you work?

- ❍ Yes
- ❍ No

3 During the COVID-19 restrictions are/were you working in a capacity different from what you usually do *(e.g., emergency childcare, mixed age groups, expanded hours)*?

- ❍ Yes
- ❍ No

4 During COVID-19, approximately how many parents have un-enrolled their child?

5 Have you applied for a small business loan due to hardships associated with COVID-19?

- ❍ Yes
- ❍ Yes, and I have also accessed other loans/ resources. Please describe.
- ❍ No, but I have accessed other loans/resources. Please describe.
- ❍ No, but I have accessed other loans/resources. Please describe.

6 I am hopeful that I will be able to bounce back when my facility returns to normal operations.

- ❍ Strongly agree
- ❍ Agree
- ❍ Somewhat agree
- ❍ Somewhat disagree
- ❍ Disagree
- ❍ Strongly disagree

The Washington Workforce COVID-19 Survey

7 Please indicate how much you agree or disagree with the following statements.	Strongly disagree	Disagree	Somewhat disagree	Somewhat agree	Agree	Strongly agree
a. I am satisfied with my life.	❍	❍	❍	❍	❍	❍
b. I consider myself a happy person.	❍	❍	❍	❍	❍	❍
c. The conditions of my life are excellent.	❍	❍	❍	❍	❍	❍

8 Now thinking about your mental health, which includes stress, depression, and problems with emotions, for how many days during the past 30 days was your mental health not good?

9 Thinking about the past week, please use the following to describe how often you felt that way.

During the past week...	less than 1 day	1-2 days	3-4 days	5-7 days
a. I was bothered by things that usually don't bother me.	❍	❍	❍	❍
b. I felt that I could not shake off the blues even with help from my family.	❍	❍	❍	❍
c. I felt that I was just as good as other people.	❍	❍	❍	❍
d. I had trouble keeping my mind on what I was doing.	❍	❍	❍	❍
e. I felt that everything I did was an effort.	❍	❍	❍	❍
f. I felt hopeful about the future.	❍	❍	❍	❍
g. I thought my life had been a failure.	❍	❍	❍	❍
h. I felt fearful.	❍	❍	❍	❍
i. I felt lonely.	❍	❍	❍	❍
j. People were unfriendly.	❍	❍	❍	❍
k. My sleep was restless.	❍	❍	❍	❍
l. I could not get going.	❍	❍	❍	❍

10 If your workplace has stayed open during COVID-19, what has the impact been on parents and children? Please explain.

The introduction was pared for brevity. Contact Cultivate Learning for more information.

APPENDIX C

R Code for Imputation and Regression Data Analyses

```
## 1: set up packages and rounding ----
library(mice)
library(miceadds)
library(psych)
library(dplyr)

options(scipen = 100)
options(digits = 3)

## remove old objects ----
# rm(list=ls()) clears all objects from workspace
# rm() requires identifying specific object to remove
rm(list=ls())

## memory ----
# check Memory
#memory.size()
# increase memory size
#memory.size(8000)
# clean up global env
gc()

## 2: import data ----
TeacherData = read.delim(file.choose(), header = TRUE)

# check descriptives of orig data
head(TeacherData)
tail(TeacherData)
names(TeacherData)
str(TeacherData)
summary(TeacherData)

## 3: select dataset variables for DV  ----
# note: PublicFund.dum <------- this variable's effect code version has a different name

#Depression Time 1

TeacherDep1_partial1 <- data.frame(
  "Total1CESD" = TeacherData$Total1CESD, #adding DV
  "Age.z" = TeacherData$Age.z,
  "Asian.dum" = TeacherData$Asian.dum,
  "Black.dum" = TeacherData$Black.dum,
  "Latino.dum" = TeacherData$Latino.dum,
  "Other.dum" = TeacherData$Other.dum,
  "College.dum" = TeacherData$College.dum,
  "AssistPrograms.z" = TeacherData$AssistPrograms.z,
  "YearsWorkExp.z" = TeacherData$YearsWorkExp.z,
  "IntriMotiv.”um" = TeacherData$IntriMotiv.dum,“
  "WageHou.z" = TeacherData$WageHour.z,
  "PaidVacay.dum" = TeacherData$PaidVacay.dum,
  "PaidSick.dum" = TeacherData$PaidSick.dum,
  "Insurance.dum" = TeacherData$Insurance.dum,
  "WorkHourWeek.z" = TeacherData$WorkHourWeek.z,
  "PublicFund.dum" = TeacherData$PublicFund.dum,
  "IT.dum" = TeacherData$IT.dum,
  "AvgStressD.z" = TeacherData$AvgStressD.z,
  "AvgStressCR.z" = TeacherData$AvgStressCR.z)

# specify as numeric to get descriptives

TeacherDep1_partial2 <- TeacherDep1_partial1 %>%
  mutate(
    Total1CESD = as.numeric(Total1CESD), #adding DV
```

```
    Age.z = as.numeric(Age.z),
    Asian.dum = as.numeric(Asian.dum),
    Black.dum = as.numeric(Black.dum),
    Latino.dum = as.numeric(Latino.dum),
    Other.dum = as.numeric(Other.dum),
    College.dum = as.numeric(College.dum),
    AssistPrograms.z = as.numeric(AssistPrograms.z),
    YearsWorkExp.z = as.numeric(YearsWorkExp.z),
    IntriMotiv.dum = as.numeric(IntriMotiv.dum),
    WageHour.z = as.numeric(WageHour.z),
    PaidVacay.dum = as.numeric(PaidVacay.dum),
    PaidSick.dum  = as.numeric(PaidSick.dum),
    Insurance.dum = as.numeric(Insurance.dum),
    WorkHourWeek.z = as.numeric(WorkHourWeek.z),
    PublicFund.dum = as.numeric(PublicFund.dum),
    IT.dum= as.numeric(IT.dum),
    AvgStressD.z = as.numeric(AvgStressD.z),
    AvgStressCR.z = as.numeric(AvgStressCR.z)
  )

#Depression Change
TeacherChangeDep_partial1 <- data.frame(
  "ChangeCESD" = TeacherData$ChangeCESD, #adding DV
  "Total1CESD.z" = TeacherData$Total1CESD.z, #adding pre
  "Age.z" = TeacherData$Age.z,
  "Asian.dum" = TeacherData$Asian.dum,
  "Black.dum" = TeacherData$Black.dum,
  "Latino.dum" = TeacherData$Latino.dum,
  "Other.dum" = TeacherData$Other.dum,
  "College.dum" = TeacherData$College.dum,
  "AssistPrograms.z"= TeacherData$AssistPrograms.z,
  "YearsWorkExp.z" = TeacherData$YearsWorkExp.z,
  "IntriMotiv.dum" = TeacherData$IntriMotiv.dum,
  "WageHour.z" = TeacherData$WageHour.z,
  "PaidVacay.dum" = TeacherData$PaidVacay.dum,
  "PaidSick.dum" = TeacherData$PaidSick.dum,
  "Insurance.dum" = TeacherData$Insurance.dum,
  "WorkHourWeek.z" = TeacherData$WorkHourWeek.z,
  "PublicFund.dum" = TeacherData$PublicFund.dum,
  "IT.dum" = TeacherData$IT.dum,
  "AvgStressD.z" = TeacherData$AvgStressD.z,
  "AvgStressCR.z" = TeacherData$AvgStressCR.z,
  "IncomeWorry.z" = TeacherData$IncomeWorry.z, #adding COVID-19 stressors
  "ParentUnenroll.z" = TeacherData$ParentUnenroll.z,
  "OtherPosition.dum" = TeacherData$OtherPosition.dum)

# specify as numeric to get descriptives
TeacherChangeDep_partial2 <- TeacherChangeDep_partial1 %>%
  mutate(
    ChangeCESD = as.numeric(ChangeCESD), #adding DV
    Total1CESD.z = as.numeric(Total1CESD.z), #adding pre
    Age.z = as.numeric(Age.z),
    Asian.dum = as.numeric(Asian.dum),
    Black.dum = as.numeric(Black.dum),
    Latino.dum = as.numeric(Latino.dum),
    Other.dum = as.numeric(Other.dum),
    College.dum = as.numeric(College.dum),
    AssistPrograms.z = as.numeric(AssistPrograms.z),
    YearsWorkExp.z = as.numeric(YearsWorkExp.z),
    IntriMotiv.dum = as.numeric(IntriMotiv.dum),
    WageHour.z = as.numeric(WageHour.z),
    PaidVacay.dum = as.numeric(PaidVacay.dum),
    PaidSick.dum  = as.numeric(PaidSick.dum),
    Insurance.dum = as.numeric(Insurance.dum),
    WorkHourWeek.z = as.numeric(WorkHourWeek.z),
    PublicFund.dum = as.numeric(PublicFund.dum),
    IT.dum= as.numeric(IT.dum),
    AvgStressD.z = as.numeric(AvgStressD.z),
    AvgStressCR.z = as.numeric(AvgStressCR.z),
    IncomeWorry.z = as.numeric(IncomeWorry.z),
    ParentUnenroll.z = as.numeric(ParentUnenroll.z),
```

```
    OtherPosition.dum = as.numeric(OtherPosition.dum)
  )

## 4: Get (Observed) Descriptives ----

# Depression Descriptives

# Depression Time 1
Dep1_str_orig <- str(TeacherDep1_partial2)
Dep1_desc_orig_mean <- sapply(TeacherDep1_partial2, mean, na.rm=TRUE)
Dep1_desc_orig_mean
Dep1_desc_orig_sd <- sapply(TeacherDep1_partial2, sd, na.rm=TRUE)
Dep1_desc_orig_sd
TeacherDep1_partial2 %>% summarise_if(is.numeric, mean, na.rm = TRUE)
TeacherDep1_partial2 %>% summarise_if(is.numeric, sd, na.rm = TRUE)
Dep1_corr_orig <- cor(na.omit(TeacherDep1_partial2))
Dep1_corr_orig

# Depression Time 2
ChangeDep_str_orig <- str(TeacherChangeDep_partial2)
ChangeDep_desc_orig_mean <- sapply(TeacherChangeDep_partial2, mean, na.rm=TRUE)
ChangeDep_desc_orig_mean
ChangeDep_desc_orig_sd <- sapply(TeacherChangeDep_partial2, sd, na.rm=TRUE)
ChangeDep_desc_orig_sd
TeacherChangeDep_partial2 %>% summarise_if(is.numeric, mean, na.rm = TRUE)
TeacherChangeDep_partial2 %>% summarise_if(is.numeric, sd, na.rm = TRUE)
ChangeDep_corr_orig <- cor(na.omit(TeacherChangeDep_partial2))
ChangeDep_corr_orig

## 5: Respecify variables to have correct categorical/numeric labeling for mice ----

# Depression dataset for imputation

# Depression Time 1
TeacherDep1_partial3 <- TeacherDep1_partial1 %>%
  mutate(
    Total1CESD = as.numeric(Total1CESD), #adding DV
    Age.z = as.numeric(Age.z),
    Asian.dum = as.factor(Asian.dum),
    Black.dum = as.factor(Black.dum),
    Latino.dum = as.factor(Latino.dum),
    Other.dum = as.factor(Other.dum),
    College.dum = as.factor(College.dum),
    AssistPrograms.z = as.numeric(AssistPrograms.z),
    YearsWorkExp.z = as.numeric(YearsWorkExp.z),
    IntriMotiv.dum = as.factor(IntriMotiv.dum),
    WageHour.z = as.numeric(WageHour.z),
    PaidVacay.dum = as.factor(PaidVacay.dum),
    PaidSick.dum  = as.factor(PaidSick.dum),
    Insurance.dum = as.factor(Insurance.dum),
    WorkHourWeek.z = as.numeric(WorkHourWeek.z),
    PublicFund.dum = as.factor(PublicFund.dum),
    IT.dum = as.factor(IT.dum),
    AvgStressD.z = as.numeric(AvgStressD.z),
    AvgStressCR.z = as.numeric(AvgStressCR.z)
  )

# Depression Time 2
TeacherChangeDep_partial3 <- TeacherChangeDep_partial1 %>%
  mutate(
    ChangeCESD = as.numeric(ChangeCESD), #adding DV
    Total1CESD.z = as.numeric(Total1CESD.z), #adding pre
    Age.z = as.numeric(Age.z),
    Asian.dum = as.factor(Asian.dum),
    Black.dum = as.factor(Black.dum),
    Latino.dum = as.factor(Latino.dum),
    Other.dum = as.factor(Other.dum),
    College.dum = as.factor(College.dum),
    AssistPrograms.z = as.numeric(AssistPrograms.z),
    YearsWorkExp.z = as.numeric(YearsWorkExp.z),
    IntriMotiv.dum = as.factor(IntriMotiv.dum),
```

```
    WageHour.z = as.numeric(WageHour.z),
    PaidVacay.dum = as.factor(PaidVacay.dum),
    PaidSick.dum  = as.factor(PaidSick.dum),
    Insurance.dum = as.factor(Insurance.dum),
    WorkHourWeek.z = as.numeric(WorkHourWeek.z),
    PublicFund.dum = as.factor(PublicFund.dum),
    IT.dum = as.factor(IT.dum),
    AvgStressD.z = as.numeric(AvgStressD.z),
    AvgStressCR.z = as.numeric(AvgStressCR.z),
    IncomeWorry.z = as.numeric(IncomeWorry.z),
    ParentUnenroll.z = as.numeric(ParentUnenroll.z),
    OtherPosition.dum = as.factor(OtherPosition.dum)
  )

## 6: initialize mice ----

#Depression Time 1
Dep1_init = mice(TeacherDep1_partial3, maxit = 0) ## just running this so we can extract the
      predictorMatrix
Dep1_predM = Dep1_init$predictorMatrix
Dep1_predM[,c(1)] <- 0  ## exclude ID
Dep1_meth = Dep1_init$method

#Depression Time 2
ChangeDep_init = mice(TeacherChangeDep_partial3, maxit = 0) ## just running this so we can extract
      the predictorMatrix
ChangeDep_predM = ChangeDep_init$predictorMatrix
ChangeDep_predM[,c(1)] <- 0  ## exclude ID
ChangeDep_meth = ChangeDep_init$method

## 7: specify what type of distribution each variable is to be drawn from for imputation ----
# norm = normal (continuous variables), logreg = for binary logistic (dummy variables), and polyreg
      = for multicategorical variables

# Depression Time 1
Dep1_meth[c
          ("Total1CESD", "YearsWorkExp.z", "AvgStressD.z",
            "AvgStressCR.z", "Age.z", "WageHour.z",
            "AssistPrograms.z", "WorkHourWeek.z")] = "norm"
Dep1_meth[c
          ("Asian.dum", "Black.dum", "Latino.dum",
            "Other.dum")] = "logreg"
Dep1_meth[c
          ("IT.dum", "College.dum", "PublicFund.dum",
            "IntriMotiv.dum", "PaidVacay.dum",
            "PaidSick.dum", "Insurance.dum")] = "logreg"


# Depression Time2
ChangeDep_meth[c
               ("ChangeCESD", "Total1CESD.z", "YearsWorkExp.z",
                 "AvgStressD.z", "AvgStressCR.z", "Age.z",
                 "WageHour.z", "AssistPrograms.z", "WorkHourWeek.z",
                 "IncomeWorry.z", "ParentUnenroll.z")] = "norm"
ChangeDep_meth[c
               ("Asian.dum", "Black.dum", "Latino.dum",
                "Other.dum")] = "logreg"
ChangeDep_meth[c
               ("IT.dum", "College.dum", "PublicFund.dum",
                 "IntriMotiv.dum", "PaidVacay.dum", "PaidSick.dum",
                 "Insurance.dum", "OtherPosition.dum")] = "logreg"


## 8: Impute 1 dataset per DV to check to make sure it works ----
# default uses m = 5 iterations; we are changing m to 1 iteration here

# Depression Time 1
Dep1_imp1 = mice(TeacherDep1_partial3, method = Dep1_meth, predictorMatrix=Dep1_predM, m = 1, seed
      = 2931)
Dep1_imp1dat <- complete(Dep1_imp1, "long") # imputed dataset stacked, but only one since m = 1
```

```
# Depression Change
ChangeDep_imp1      =      mice(TeacherChangeDep_partial3,      method      =      ChangeDep_meth,
      predictorMatrix=ChangeDep_predM, m = 1, seed = 2931)
ChangeDep_imp1dat <- complete(ChangeDep_imp1, "long") # imputed dataset stacked, but only one since
      m = 1

# check data
View(ChangeDep_imp1dat)

## 9: Run a regression model on the single set of imputed data as a check ----

# Depression Time 1
Dep1_testmod_imp1dat <- lm(
  data = Dep1_imp1dat,
  Total1CESD ~ Insurance.dum
)
summary(Dep1_testmod_imp1dat)

# Depression Change
ChangeDep_testmod_imp1dat <- lm(
  data = ChangeDep_imp1dat,
  ChangeCESD ~ Insurance.dum
)
summary(ChangeDep_testmod_imp1dat)

## 10: Impute 100 datasets per DV now to achieve good precision of estimates ----

# Depression Time 1
Dep1_imp100 = mice(TeacherDep1_partial3, method = Dep1_meth, predictorMatrix=Dep1_predM, m = 100,
      seed = 2931)
Dep1_imp100dat <- complete(Dep1_imp100, "long") # imputed dataset stacked, but only one since m =
      1

# Depression Time 2
ChangeDep_imp100      =      mice(TeacherChangeDep_partial3,      method      =      ChangeDep_meth,
      predictorMatrix=ChangeDep_predM, m = 100, seed = 2931)
ChangeDep_imp100dat <- complete(ChangeDep_imp100, "long") # imputed dataset stacked, but only one
      since m = 1

## 11: Analyze data and get pooled estimates across imputations for intercept-only results ----

# Depression Time 1
# Run intercept-only model to get mean depression at Time 1
Dep1_mod0_imp100 <- with(data = Dep1_imp100,
                         lm(Total1CESD ~ 1))
# pool across datasets
Dep1_mod0_imp100_pooled_coeff <- summary(pool(Dep1_mod0_imp100), conf.int = TRUE)

# print results
Dep1_mod0_imp100_pooled_coeff

# Depression Change
# Run intercept-only model to get mean change in depression
ChangeDep_mod0_imp100 <- with(data = ChangeDep_imp100,
                              lm(ChangeCESD ~ 1))

# pool across datasets
ChangeDep_mod0_imp100_pooled_coeff <- summary(pool(ChangeDep_mod0_imp100), conf.int = TRUE)

# print results
ChangeDep_mod0_imp100_pooled_coeff

## 12: Analyze data and get pooled estimates across imputations for final results ----

# Run full model Model1 on each imputed dataset
Dep1_mod_imp100 <- with(data = Dep1_imp100,
                         lm(Total1CESD ~ Insurance.dum))

# pool across datasets
Dep1_mod_imp100_pooled_coeff <- summary(pool(Dep1_mod_imp100), conf.int = TRUE)
Dep1_mod_imp100_pooled_rsq <- pool.r.squared(Dep1_mod_imp100, adjusted = FALSE)
```

```
Dep1_mod_imp100_pooled_adjrsq <- pool.r.squared(Dep1_mod_imp100, adjusted = TRUE)

# print results
Dep1_mod_imp100_pooled_coeff
Dep1_mod_imp100_pooled_rsq
Dep1_mod_imp100_pooled_adjrsq

# Depression Change
# run Model2 on each imputed dataset (added Total1CESD and IncomeWorry)
ChangeDep_mod_imp100 <- with(data = ChangeDep_imp100,
                             lm(ChangeCESD ~ Insurance.dum))

# pool across datasets
ChangeDep_mod_imp100_pooled_coeff <- summary(pool(ChangeDep_mod_imp100), conf.int = TRUE)
ChangeDep_mod_imp100_pooled_rsq <- pool.r.squared(ChangeDep_mod_imp100, adjusted = FALSE)
ChangeDep_mod_imp100_pooled_rsqadj <- pool.r.squared(ChangeDep_mod_imp100, adjusted = TRUE)
# print results
ChangeDep_mod_imp100_pooled_coeff
ChangeDep_mod_imp100_pooled_rsq
ChangeDep_mod_imp100_pooled_rsqadj
```