Adverse Childhood Experiences, Depressive Symptoms, and Binge Drinking: A Mediation Analysis

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ABSTRACT

ADVERSE CHILDHOOD EXPERIENCES, DEPRESSIVE SYMPTOMS, AND BINGE DRINKING: A MEDIATION ANALYSIS

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Sixty-one percent of adults in a national CDC study reported experiencing at least one Adverse Childhood Experience (ACE), and 1 in 6 reported 4 or more ACEs. The purpose of this hierarchical regression analysis is to target gaps in research specific to examining the relationships between Adverse Childhood Experiences (ACEs), depressive symptoms experienced in adolescence, and binge drinking behaviors in emerging adulthood using Bronfenbrenner’s Ecological Systems Theory. Longitudinal, secondary data from the National Longitudinal Study of Adolescent to Adult Health dataset (Add Health) (Harris et al., 2009) was used in this study. Data was collected in four waves of surveys and in-person interviews starting with adolescents in grades 7th through 12th and followed them into emerging adulthood and 6,504 adolescents were used to collect the survey data used in this analysis. The predictor variable in this study is the presence of ACEs, the outcome variable is binge drinking in emerging adulthood, and the mediating variable is depressive symptoms experienced in adolescence. This study aims to determine if there are statistically significant relationships between these variables and if there is a mediating effect of depressive symptoms on the relationship between ACEs and binge drinking in emerging adulthood. Results indicate that there is a significant relationship between ACEs and depressive symptoms and there is no mediating effect of depressive symptoms on the relationship between ACEs and binge drinking in emerging adulthood.
ADVERSE CHILDHOOD EXPERIENCES, DEPRESSIVE SYMPTOMS, AND BINGE DRINKING: A MEDIATION ANALYSIS

BY

NICOLE SMALLEY
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A THESIS SUBMITTED TO THE GRADUATE SCHOOL
IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE
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Thesis Director:
Dr. Lindsey G. Hawkins
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example of what it means to be a good person in a storm. I will never forget about the good you did for me and the effort you put into making me a good person.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>LIST OF TABLES</th>
<th>vi</th>
</tr>
</thead>
<tbody>
<tr>
<td>LIST OF FIGURES</td>
<td>vii</td>
</tr>
</tbody>
</table>

Chapter

I. INTRODUCTION ......................................................... 1
   - Purpose Statement ............................................. 3
   - Research Questions .......................................... 4
   - Hypotheses ...................................................... 4

II. LITERATURE REVIEW .................................................. 5
   - Bronfenbrenner’s Ecological Systems Theory .......... 5
   - Emerging Adulthood ............................................ 9
   - Adverse Childhood Experiences (ACE’s) ................ 10
   - ACEs and Alcohol Use ......................................... 12
   - Depressive Symptoms as a Mediator of the Relationship Between ACEs and Binge Drinking in Emerging Adulthood 14

III. METHOD ............................................................. 15
   - Overview and Design ........................................ 15
   - Procedure ......................................................... 16
   - Sample ............................................................. 17
   - Measures .......................................................... 18
      - Adverse Childhood Experiences ....................... 18
      - Depressive Symptoms ..................................... 19
Binge Drinking ................................................................. 19
Control Variables ............................................................. 19
Demographic Variables ..................................................... 19
Peer Alcohol Use .............................................................. 20
Planned Analysis .............................................................. 20
Preliminary Analysis .......................................................... 20
Hierarchical Linear Regression Model .................................. 21

IV. RESULTS  ........................................................................ 22
Preliminary Analyses .......................................................... 22
Primary Analysis ............................................................... 24

V. DISCUSSION ................................................................... 26
Overview ........................................................................... 26
Clinical Implications .......................................................... 30
Limitations and Future Directions ........................................ 31

REFERENCES .................................................................. 33
### LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table 4.1: Descriptive Statistics</td>
<td>23</td>
</tr>
<tr>
<td>Table 4.2: Correlations for All Primary and Control Variables</td>
<td>23</td>
</tr>
<tr>
<td>Table 4.3: Full Hierarchal Model with Covariates</td>
<td>25</td>
</tr>
</tbody>
</table>
## LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Figure 2.1:</td>
<td>Bronfenbrenner’s Ecological Systems Theory</td>
<td>6</td>
</tr>
<tr>
<td>Figure 3.1:</td>
<td>Conceptual Mediation Model</td>
<td>16</td>
</tr>
<tr>
<td>Figure 4.1:</td>
<td>Measurement Model with ACEs</td>
<td>25</td>
</tr>
</tbody>
</table>
CHAPTER I
INTRODUCTION

This thesis specifically aims to target the effects of Adverse Childhood Experiences (ACEs) as they relate to depressive symptoms experienced in adolescence and binge drinking in emerging adulthood. One of the first pioneering articles that researched the effects of ACEs concluded that the experiences in childhood and exposure to childhood abuse or household dysfunction can predict multiple risk factors for several of the leading causes of death and disease in adults (Felitti et al., 1998). The United States Centers for Disease Control and Prevention (CDC) estimates 61% of adults in their study reported experiencing at least one ACE, and 1 in 6 reported 4 or more ACEs (CDC, 2021). ACEs often result in lasting, negative effects on health, well-being, life opportunities in education, and career potential (Felitti et al., 1998; Goodman & Whitaker, 2007; Van Lieshout et al., 2008). ACEs have also been found to increase the risk of injuries, sexually transmitted infections (STIs), maternal and child health problems, involvement in sex trafficking, and a wide range of chronic diseases leading to cancer, diabetes, heart disease, mental health issues like depression, suicide, and drug use behaviors like binge drinking (CDC, 2021). The urgent need to address the occurrences and impacts of ACEs is critical in the United States. ACEs are found to be preventable through creating safe, stable, nurturing relationships, and environments for children and families through increasing public knowledge of ACEs and their effects, shifting the focus from individual responsibility to community solutions, reducing stigmas around mental health and parents asking for help with their mental health, parenting challenges, or substance use (CDC, 2021).
As previously stated, one of the impacts that ACEs have on individuals includes, but is not limited to, a significant decrease in overall mental health and wellbeing such as the experience of depression or depressive symptoms. With experiencing ACEs, adolescents often then experience depression or depressive symptoms which can adversely affect school and work performance, impair peer and family relationships, and exacerbate the severity of other health conditions such as asthma and obesity (Goodman & Whitaker, 2007; Van Lieshout et al., 2008). Depressive episodes experienced often persist and reoccur into older age which puts youth and emerging adults at greater risk for suicide and alcohol and drug use (Cummings, et al., 2014; Cummings et al., 2011; Nock et al., 2013; Substance Abuse and Mental Health Services Administration (SAMSHA), 2014). Binge drinking often becoming a way to emotionally cope after experiencing ACEs and the effects of ACEs (Dube et al., 2006). Binge Drinking is defined by the CDC as a pattern of drinking that brings a person’s blood alcohol concentration (BAC) to .08 g/dl or above in 2 hours or less, usually caused by drinking approximately 5 or more alcoholic drinks within an hour or two (CDC, 2019). Binge Drinking behaviors are found to be more common in younger adults ages 18-34 but there is a large majority of people younger than 21 that report binge drinking often and in large amounts (CDC, 2019). Binge drinking is associated with the following outcomes: unintentional serious injuries possibly leading to death, high blood pressure, stroke, heart disease, liver disease, and violence such as homicide, suicide, intimate partner violence (IPV), sexual assault, sexually transmitted infections (STIs), and unintended pregnancy (CDC, 2019). The relational theory between these variables, based from current literature and Bronfenbrenner’s ecological systems theory, is that as the number of ACEs increase the outcome of a higher increase in binge drinking in emerging adulthood.
Purpose Statement.

The purpose of this study is to examine the links between ACEs, depressive symptoms experienced in adolescence, and binge drinking in emerging adulthood. Most studies focusing on direct and/or indirect associations between ACEs and alcohol consumption focus primarily on binge drinking (Loudermilk et al., 2018). Eaton et al., (2012) suggests that women and men react to stressors differently and suggest that future research could explore in providing women and men differing coping behavior tools to reduce mental illness and unhealthy coping skills like binge drinking. Hong et al. (2013) is a study that looks at alcohol consumption in adolescents across genders and they suggest that because their study only focused on individuals in the 9th through 12th grades that future research would be beneficial in following and collecting data on these variables after high school and emerging adulthood, which is what this aims to do. In targeting this need in the research, this thesis also adds to fill the gap within the clinical aspect for practicing marriage and family therapists (MFTs) who are systemic thinkers and need to consider influences such as ACES and depressive symptoms and the effect they have on alcohol use, or more specifically binge drinking, in their clinical work. Therefore, this study aims to not only explore these links but also to provide insight to systemic thinkers to improve their clinical assessments for ACEs, depressive symptoms, and binge drinking for all individuals.

Accomplishing these findings will not only provide support for or fail to provide support for the hypothesis that predicts these links, but the findings will also provide direction for future research and implementing improved interventions and systemic assessment that could affect these relationships in a way that brings individuals relief from their symptoms. By knowing the influences these variables have on an individual MFTs can address and possibly prevent
destructive behaviors, like binge drinking, by specifically assessing for the occurrences of ACEs and depressive symptoms early on in childhood or adolescence.

**Research Questions**

The following research questions will be examined in this study: (RQ1) Is there a statistically significant relationship between ACEs, depressive symptoms in adolescence, and binge drinking in emerging adulthood? and (RQ2) Is there a mediating effect of depressive symptoms in adolescence on the relationship between ACEs and binge drinking in emerging adulthood? To answer these research questions, two hypotheses will be examined:

**Hypotheses**

H$_1$: Positive significant direct links will exist between ACEs, depressive symptoms in adolescence, and binge drinking in emerging adulthood.

H$_2$: Positive significant indirect links will exist between ACE’s and binge drinking in emerging adulthood through the mediator of depressive symptoms experienced in adolescence. As the number of an individual ACE’s score increases the frequency of binge drinking increases in emerging adulthood through depressive symptoms in adolescence.
CHAPTER II

LITERATURE REVIEW

This literature review begins with summarizing the foundational and guiding theory for this thesis, Bronfenbrenner’s ecological systems theory. Then, Bronfenbrenner’s ecological systems theory will be explored and applied to emerging adulthood as this thesis examines how a child’s adverse experiences influence their development into adulthood. Following, a discussion of ACEs, binge drinking in emerging adulthood, depressive symptoms in adolescence as a mediator between ACEs and binge drinking. The literature then concludes with a discussion that summarizes how ACEs, depressive symptoms, and binge drinking relate to one another.

**Bronfenbrenner’s Ecological Systems Theory**

This thesis applied Bronfenbrenner’s ecological systems theory to further understand links between individuals who report ACEs, depressive symptoms in adolescence, and binge drinking in emerging adulthood (Figure 2.1). This theory is a holistic approach which is inclusive of all aspects of a child’s environment (e.g., school, family, neighborhood) including the influence the larger society has on a child’s development, also known as a child’s ecological systems (Bronfenbrenner, 1974; Hayes & O’Toole, 2017). The foundations of this theory emphasize a multidirectional approach to understanding a child’s development by observing a child in their environment and all forces that influence their environment rather than a lab created environment (Bronfenbrenner, 1974). Bronfenbrenner argued that a child’s ecological
systems are complex, interrelated and that they are all important to examine to fully grasp a child’s development.

Bronfenbrenner’s theory involves the following five interlocking ecological systems, ordered from most influential to less influential for a child’s development: microsystem, mesosystem, exosystem, macrosystem, and chronosystem (Bronfenbrenner, 1977). These systems are interrelated, meaning that they influence each other and are dependent on their relationship with each other (Guy-Evans, 2020). The microsystem, the first level of Bronfenbrenner’s theory, includes the environment that has direct contact with the child/individual (e.g., siblings, parents, friends, teachers) and is a very personal system. Bronfenbrenner suggests that a child’s development in the microsystem is rooted not in how they gauge their freedom by the open areas surrounding them but rather the liberty they must be
around people and things that excite them and ignite their imagination. Using Bronfenbrenner’s model, this would mean if a child experienced an ACE in their microsystem, then it would affect the next ecological system, the child’s mesosystem. ACEs are conceptualized to be happening almost exclusively in a child’s microsystem and mesosystem as these are the systems closest to the child. For example, in a child’s home they have their parents which would correlate with the microsystem but if the parents are arguing in front of the child, then it is an interaction of the microsystems which would be an example of the mesosystem.

The second layer, the mesosystem, includes interactions with the child’s immediate environment (e.g., interactions with parents, teachers, siblings, school) and demonstrates where the microsystems interact and are together (Bronfenbrenner, 1974; Guy-Evans, 2020). The mesosystem includes these microsystem interactions and the spaces outside of the immediate environment but are still influential. Current use of this theory explores ACEs occurring in all levels and systems on Bronfenbrenner’s Ecological model. When a child experiences an ACE in the microsystem, based on Bronfenbrenner’s theory, a child may be at an increased risk for substance abuse, physical and mental health problems, and other negative effects (Bronfenbrenner, U., & Evans, G. W., 2000). A child can experience ACEs in the mesosystem when there is abuse happening outside of the home like at school, a daycare, or in an extended family member’s home. Because things like family dysfunction and incarceration within the family are included as an adverse experience in ACEs assessments it can be concluded that ACEs are likely to occur in many of the systems closer to the child like the microsystem. Within the microsystem houses the child’s home and immediate environment which is where abuse from parents is more likely to occur which would classify as an ACE.
The third ecological system is the exosystem, which includes the formal and informal structures that indirectly influence the child as they affect a child’s microsystem (Bronfenbrenner, 1974; Guy-Evans, 2020). A child’s neighborhood, community events, parent’s workplace, and the mass media are all aspects of the exosystem that influence a child’s development. An example of an ACE occurring in the exosystem and influencing a child would be if a parent lost their job or for some reason was not able to provide for the child’s basic needs like food, good hygiene, and clothing. Another example of an ACE experienced in this system would be if the child witnessed violence within their neighborhood or community.

The fourth ecological system is the macrosystem and focuses on cultural elements like socioeconomic status (SES) which affect the child’s development and influence a child’s beliefs and perceptions about events in their life. It is not in reference to a specific environment of a child but an already established society or culture of which the child is developing in (Bronfenbrenner, 1974; Guy-Evans, 2020). A child can experience an ACE in this system similarly to in the exosystem. For example, when a family is struggling financially, a child may go to bed hungry or go without other necessities necessary for survival. Gender and gender norms and roles in society and across peers’ influence behavior in that individuals do not want to be ostracized from and excluded by their peer groups (Borsari & Carey, 2001). An example of this is when there is an unconscious connection that boy or male gendered items, like clothes, tend to be more blue or dark colors, and girl or female gendered items or clothes tend to be more pink, light, and bright in colors and design. This norm of associating a specific gender with a specific color scheme or design pushes a development for females to gravitate towards choices that are more pink or bright and for males choosing things that are more blue or dark colored.
Children often fall into these choices more often than adults do because children are still developing physically and cognitively, but also socially and look for ways to gain acceptance in their social and cultural circles with their peers (Woolman et al., 2015).

The last and final layer, the chronosystem, represents normative and non-normative environmental changes and major life transitions over time that influences a child’s development. An ACE that can be experienced in this system is when a child experiences a death close to them or a divorce in the family which are also examples of family crisis and are conceptualized to be pivotal points in a child’s life. The chronosystem also represents the time periods from childhood, adolescence, emerging adulthood, and adulthood. In this study the theoretical lens is that ACEs are experienced in the childhood microsystem and mesosystems, then depressive symptoms happen in adolescence, and then binge drinking behaviors happens in emerging adulthood. Bronfenbrenner’s theory focuses on how each system influences the development over time of an individual. Using this theory to look across the developmental periods over time can help us understand the connections between ACEs and the resulting binge drinking and what happens in the time period between that determines a result of binge drinking in emerging adulthood.

**Emerging Adulthood.**

Bronfenbrenner’s theory has continued to develop and change through many family scientists and its application to the individual and how the experiences a child has in their ecosystems influence their development into adulthood. When individuals reach emerging adulthood ecological systems theory states that individuals begin to have an interdependent
relationship with their family and will reach out to them often for support for their mental health (Finan et al., 2019). During this time, they also will experience many lifestyle changes including becoming more independent and relying more on social relationships and close significant others. They are also making the transition from living at home and during adolescence to becoming self-reliant as emerging adults (Lindell & Campione-Barr, 2016). When experiencing an ACE there is a change in the development of their ability to cope and they will look for other ways to cope, which contributes to an increased risk of turning to using substances as a means to help regulate or cope with emotional states and high stress (Dube et al., 2006) Negative affect in early adolescence predicts substance use in later adolescence (Mason et al., 2009), and depression can predict what trajectory of binge drinking from adolescence to emerging adulthood one may follow (Chassin et al., 2002).

**Adverse Childhood Experiences (ACEs)**

Adverse Childhood Experiences (ACES) refers to the kinds of adversity or trauma children have faced in the home environment such as physical and emotional abuse, neglect, and household dysfunction (CDC, 2021; Felitti et al., 1998). Specifically with this thesis, the variables chosen focused on physical abuse, sexual abuse, neglect, parental alcohol use and abuse, parental relationship satisfaction, foster home experience, witnessing violence, and neighborhood crime which has been guided by the variables used within a similar study using ACEs as a variable (Brumley et al., 2017). The concept of ACEs is summarized as a score an individual will have to represent the number of traumatic or adverse experiences this individual has had in their childhood (Felitti et al., 1998). Research of the results of ACEs on an individual revealed several themes, ACEs are very common, there is a strong correlation between an
increase in ACEs and negative outcomes later in life, and an increased risk of experiencing health and mental health problems (CDC, 2019).

The foundational studies of ACE research focused on understanding ACEs and how ACEs effects an individual as a child and later in adulthood has expanded significantly. The original study, from 1995 to 1997, covered two waves of data about individuals’ childhood experiences, current health status and behaviors (CDC, 2021b). A pioneering study of ACE’s found that 70% of their participants scored a zero on the risk assessment used in their study (Felitti et al., 1998). Of those participants who resulted with no risk factors, 56% of them had no adverse childhood experiences, but 14% of them had 4 or more ACEs, concluding that those with 4 or more ACEs are more likely to score higher and therefore are interpreted to have more risks factors that can negatively impact their life significantly (Felitti et al., 1998). As research surrounding the effects of ACEs expands, studies have found that the likelihood of suicidal ideation in adulthood doubles if an individual experiences ACEs (Thompson et al., 2018). Additionally, ACEs research finds that an individual with at least 4 or more ACEs is two times more likely to be smokers or heavy drinkers than those with no ACEs (Burnett et al., 2015). This study, gathering data from individuals from 188 different countries from 1990-2013, also found that participants identifying with 4 or more ACEs are almost six times more likely to drink problematically then those without ACEs (Burnett et al., 2015; Hughes et al., 2017).

The ACE pyramid is the conceptual framework for understanding how strongly related ACEs put individuals at risk for disease and a decline in well-being in their life from the adverse experience and on (CDC, 2021b). Each level is a mechanism of which an ACE influences an individual’s health and well-being in their lifetime. The pyramid has 8 levels representing at
what level does an ACE affect the individual’s wellbeing. Levels range from generational embodiment/historical trauma to early death (CDC, 2021b; Felitti et al., 1998). The most severe being at the top, early death, and generational embodiment/historical trauma at the bottom closest to the point of conception of the adverse experience.

ACE’s studies also aimed to further examine an adult’s engagement in risky behavior and the occurrence of physical and mental illnesses when they reported experiences of childhood emotional abuse, physical abuse, sexual abuse, and household dysfunction (Felitti et al., 1998). To fill a gap in the research surrounding ACEs studies’ findings pointed to a correlation to those who experienced ACEs and their risky behavior, mental health, and physical health (Felitti et al., 1998). In addition to the advances in ACE research the knowledge and research of trauma has significantly expanded as ACEs has become common and well-known in the mental health and medical field as well as with researchers who specialize their focus towards trauma. With this expansion of knowledge findings indicate that individuals with at least four or more ACEs were at increased risk of multiple health outcomes varying from disease, illnesses, and disorders (Hughes et al., 2017).

**ACEs and Alcohol Use**

There is a strong relationship between ACEs and adult alcohol outcomes among persons with and without a history of parental alcoholism (Dube et al., 2002; Dube et al., 2006; Jung et al., 2020; Strine et al., 2012). Individuals who had grown up with at least one alcohol-abusing parent were two to three times as likely to report childhood histories of emotional abuse, physical abuse, sexual abuse, and parental separation due to divorce (Anda et al., 2002). Additionally,
ACEs are associated with risky coping mechanisms and mental health problems that adolescents and emerging adults develop such as substance abuse, risky sexual activity, eating disorders, and depression and/or suicidality (Windle et al., 2018; Woolman et al., 2015). Those with at least 4 ACEs had twice the likelihood of reporting heavy drinking behaviors in the past and in adulthood even if they do not experience parental alcoholism (Dube et al., 2002; Dube et al., 2006). However, Strine et al., (2012), argues that more longitudinal studies of adults with documented histories of childhood abuse is needed to determine more accurate results of these connections.

Looking further into these studies advancing trauma and ACE research it is found that ACEs can cause biological changes in people that alter how they respond to perceived stressful situations in everyday life (Woolman et al., 2015). This can increase sensitivity for individuals to increased perceptions of stress, including those found in college students that often experience stressors related to academics or exacerbated symptoms of PTSD (Woolman et al., 2015). With that in mind, college students who were exposed to ACEs were found to be at higher risk for substance use because alcohol and substances are often used as coping mechanism to deal with or escape psychological distress possibly caused from the ACEs experienced. Anda et al., (2002), argues that for this reason, among others, that health care providers need more training in identifying and treating the whole family for ACEs and parental alcoholism. Connections can then be made from these findings that there is also a potential direct or indirect link between psychiatric disorders, like depression with ACEs and high intensity binge drinking (Jung et al., 2015; Wollman et al., 2015). In supporting this potential connection, ACE research consistently finds that ACEs remain strongly associated also with the development of depressive disorders.
across the life span of an individual (Anda et al., 2002; Chapman et al., 2004; Windle et al., 2018; Woolman et al., 2015). Soloski (2020) found that depressive symptoms were not only associated with ACEs but also consistently related to binge drinking behaviors both concurrently and longitudinally as compared to parent-child closeness that alcohol use is often used as a coping habit for many adolescents and adults with depressive symptoms.

**Depressive Symptoms as a Mediator of the Relationship Between ACEs and Binge Drinking in Emerging Adulthood.**

ACEs have very clear impacts on the individual’s physical health, mental health, and behaviors. In this quickly advancing research it is also found that one of these impacts specifically includes a higher frequency of binge drinking in those who have experienced ACEs (Dube et al., 2002; Dube et al., 2006; Jung et al., 2020; Strine et al., 2012; Windle et al., 2018; Woolman et al., 2015). However, studies have only scratched the surface on the relationship of depressive symptoms experienced because of ACEs and as a possible predictor of binge drinking (Hart et al., 2018; Hong et al., 2013; Vaughan et al., 2014) Links have been found to validate that parental alcohol abuse increased the risk of depression for their children by 30 to 50 percent (Anda et al., 2002). Soloski (2020) found that depressive symptoms were directly related to binge drinking in young adulthood through their association with binge drinking in emerging adulthood and those frequent binge drinking behaviors in adolescence and emerging adulthood predicted more depressive symptoms in young adulthood. It can be suggested from this evidence and evidence previously stated that binge drinking is used to cope with depressive symptoms experienced most likely from ACEs earlier in life.
CHAPTER III

METHOD

Overview and Design

This study examined a hierarchical linear regression model using a secondary data set from the National Longitudinal Study of Adolescent Health (Add Health) aimed to examine adolescent health and risk behaviors (Harris et al., 2009). It is nationally representative sample of individuals from the grades of 7th through 12th, ages 12 through 18, starting in the beginning of 1994 to 2009. This study adds to the current literature by proposing a hierarchical linear regression model with depressive symptoms mediating the relationship between ACEs and binge drinking in emerging adulthood, consistent with the ecological systems theory.

The data collection process involved following the same cohort with the fourth wave of data being collected in 2009 (see Harris et al., 2009, for full data collection procedures). Waves I, III, and IV are used in this study. Data was collected from 80 high schools across the United States to achieve a nationally representative sample and informed consents were obtained from the parents of adolescents for all four waves which included in-home interviews as well as other data collection methods. Waves I through IV include the three developmental periods: adolescence (ages 12-20), emerging adulthood (ages 18-26), and young adulthood (ages 24-32). For this thesis, all waves were utilized except Wave II. The composite ACEs variables included variables from Wave I, Wave III, and Wave IV. Depressive symptoms for this thesis I used variables from
Wave III. The Binge drinking variable is from Wave IV. All control variables were utilized from Wave I. To address the gaps and limitations presented above in the literature review, this study proposes to add to the current literature with the proposed hierarchical linear regression model outlined in Figure 3.1.

![Diagram](image)

Figure 3.1: Conceptual mediation model. Adverse Childhood Experiences (independent variable), Depressive Symptoms (mediator variable), Binge Drinking in Emerging Adulthood (dependent variable).

**Procedure**

The Add Health dataset was data collected from a self-report survey for a total of four waves (Harris et al., 2009). The selection criteria for adolescents were built on a school-based research design that involved selecting schools for participation based on the following: school size, school type, region, level of urbanization, and the percentage of White and Black students to create a nationally representative sample. With this selection criteria, 80 high schools initially were selected for data collection. These 80 schools were then asked to evaluate the junior high schools that would have students attend their school in the following year. After obtaining the proper informed consent, adolescents from these schools were followed into young adulthood with four waves of in-home interviews and data collection via survey. The study surveyed adolescents over various topics including social, economic, psychological, physical health,
adolescent’s family structure, peer influences, romantic relationships, neighborhood and community characteristics, and alcohol and substance use. Of which these data subjects were used for each variable concerning adverse childhood experiences, depressive symptoms, and alcohol abuse or more specifically, binge drinking. Overall, more than 90,000 adolescents were surveyed during the in-school component in Wave I (Harris et al., 2003).

Sample

Participants included in this thesis were adolescents (Wave III) and emerging adults in (Wave IV) of the public-use data (Harris et al., 2009). The most recent wave has participants within the ages of 24 to 32 in 2008. In Wave I there were more than 90,000 students in grades 7 through 12. In Wave II almost 15,000 of participants were from Wave I. In Wave II there were almost 15,000 participants originally from Wave 1. In Wave III participants ranged from the age of 18 and 26, and 15,170 of them are from Wave I. The final wave, Wave IV, participants are between the ages of 24 to 32 (Harris et al., 2009). The current sample (n = 6,504) consists of those who have experienced at least one ACE and reported it in any of the wave surveys, have responded to the depressive symptoms assessed for in the survey in adolescence which correlates with Wave III, and have responded in Wave IV for binge drinking which correlates with emerging adulthood. After preliminary data cleaning and coding the final sample reduced to 6,504 which can be assumed to be as nationally representative as the original data is because of the over-sampling done in multiple different classes of socioeconomic status, race, ethnicity, sex, and other demographic descriptive groups. Ages ranged from 24 to 33 years. The average age in this sample was 28 (SD = 1.79). The sample consisted of 51.6% female and 48.4% male. The sample identified as 57.5% White and 42.5% All others.
Measures

Adverse Childhood Experiences

This predictor variable included items selected from Wave I, Wave III, and Wave IV to create a composite ACEs variable that closely reflects the original ACEs measure that was created by Felitti et al., 1998. Other studies utilizing the Add Health dataset have utilized a composite ACEs variable and for this thesis, Brumley et al. (2017), Evans et al. (2013), LeTendre et al., (2017), and Thompson et al. (2018) were utilized as a guide to create the composite ACE variable to be used in this thesis. The composite ACEs variable includes survey questions pertaining to emotional abuse, physical abuse, sexual abuse, parent incarceration, parent alcoholism, low parental warmth, foster home placement, community violence, poverty status, and under-resourced school and neighborhood disadvantage. All variables included in the composite ACE variable were dichotomized for the analysis. Each item is answered on a scale ranging from 1 = one time to 6 = This has never happened. Examples include, “Before your 18th birthday, how often had a parent or adult caregiver hit you with a fist, kicked you, or thrown you down on the floor, into a wall, or down the stairs?” and “Before 6th grade, how often had your parents or other adult caregivers not taken care of your basic needs, such as keeping you clean or providing food or clothing?” Then each variable assessing for this was recoded to show that any answer 1 through 5 was a “yes” to not having experienced it and 0 was “never happened.” Each variable was recoded and summed into one collective variable to create the composite ACE variable that assessed if a participant experienced an ACE or not. The reported alpha coefficient for this study is $\alpha = .45$. 
**Depressive Symptoms**

This dependent variable, or the mediating variable, was measured in Wave III using a 5-item version of the Center for Epidemiological Studies Depression Scale (CES-D). The reliability of the five-item CES-D is .81 meaning that 19% of the variance is related to measurement error (Perreira et al., 2005). Participants indicated the frequency of depressive symptoms in the past week on a scale ranging from \(0 = \text{never or rarely}\) to \(3 = \text{most of the time or all of the time}\). Example items include, “You were bothered by things that usually don’t bother you” and “You could not shake off the blues, even with help from your family and friends.”. Previous research has also utilized these variables from this 5-item version of the CES-D (Soloski, 2020). In this study, the reported alpha coefficient for this variable is \(\alpha = .74\).

**Binge Drinking**

This outcome variable was assessed with the following question from Wave IV, “During the past 12 months, on how many days did you drink \([5 \text{ or more}/4 \text{ or more}]\) drinks in a row?” and responses ranged from a scale of \(0 = \text{none}\) to \(6 = \text{every day or almost every day}\). Responses were coded the same and preliminary cleaning and coding for this variable will include excluding responses “refused”, “skip”, and “I don’t know” from further inclusion in future statistical steps. Similar to Soloski et al. (2020) article only this question from the Wave IV survey was used to determine if binge drinking was present in emerging adulthood.

**Control Variables**

**Demographic Variables**

The following demographic variables were used as controls: gender, age, and race. Gender was dichotomized \((\text{male} = 0, \text{female} = 1)\) and age is a continuous measure ranging from
11 to 32. Age, since it is continuous, was calculated by using the date of birth and the date of the survey within Wave I. For Race 0 = *White* and 1 = *All others* due to the unequal distribution of racial groups in the dataset.

**Peer Alcohol Use**

Peer alcohol use was assessed in Wave I by asking adolescent participants, “of your 3 best friends, how many drink alcohol at least once a month?” and responses ranged from 0 = *no friends* to 3 = *three friends* and this variable were dichotomized so answers 1 through 3 were reflected as a “yes” and a 0 was reflected a “no”.

**Planned Analysis**

**Preliminary Analysis**

To best examine the research questions and hypotheses presented above, several interconnected steps were utilized. First, using SPSS version 24 (IBM Corp., 2016) the data was cleaned to ensure that all variables being utilized in this study aligns with how the variable was coded in the original codebook. Then each variable was recoded to ensure that any missing data will not be included in the analysis. For example, some responses on certain variables may include “refused”, “do not know”, or “not applicable” and were recoded to ensure missing data is not included in the analysis. Following that, individual variables were coded together to create a larger dichotomized variable for ACEs and depressive symptoms. Additionally, to ensure normality, the variables were tested for skewness (less than an absolute value of 2) and kurtosis (less than an absolute value of 7) (Kline, 2015). Then, Cronbach’s alpha was ran for the composite variable for ACEs and depressive symptoms. Following insurance of normality across
all variables, descriptive statistics, and preliminary bivariate correlations were run and examined for any preliminary significant relationships.

Hierarchical Linear Regression Model

This hierarchical linear regression model examined the relationships of ACEs, depressive symptoms, and binge drinking as well as the mediating effect of depressive symptoms on the association between ACEs and binge drinking in emerging adulthood. First, following the steps suggested by Baron and Kenny (1986), a regression analysis was run to test the relationship between ACEs and binge drinking in emerging adulthood. This specifically involved running binge drinking in emerging adulthood as the criterion variable and ACEs as the predictor variable. Second, a regression analysis was run to test the relationship between ACEs and depressive symptoms in adolescence, which included running depressive symptoms as the criterion variable and ACEs as the predictor variable. Then, the final step involved running a regression analysis between depressive symptoms in adolescence and binge drinking in emerging adulthood. This specifically included running binge drinking as the criterion variable and depressive symptoms in adolescence as the predictor variable. Then, a full hierarchical model was run to test for the mediating effect of depressive symptoms in adolescence along with all control variables.
CHAPTER IV

RESULTS

Preliminary Analyses

To ensure normality of data, skewness and kurtosis were ran. Among variables of interest, values of skewness (< | 2|) and kurtosis (< | 7|) fell within the appropriate ranges (Kline, 2015). Descriptive statistics are presented in Table 4.1 below. Descriptive statistics show that the mean number of ACEs is 2.51, which is considered low as the variable ranges from 0 to 6. This means that on average the individuals in this sample reported at least experiencing two ACEs in their childhood. The mean for depressive symptoms for this sample was .45, which is relatively low as the range for depressive symptoms was 0 to 3. In regard to binge drinking, 22.2% of the sample reported drinking five or more in a row, 1 to 2 days in the past 12 months and 1.4% of the sample reported drinking five or more drinks in a row every day or almost every day. Preliminary bivariate correlation analysis showed that depressive symptoms in adolescences was correlated with ACEs. Binge drinking was significantly correlated with peer binge drinking. Bivariate correlations are presented in Table 4.2 below.
Table 4.1 Descriptive Statistics \((N = 6504)\)

<table>
<thead>
<tr>
<th>Variables</th>
<th>(M)</th>
<th>(SD)</th>
<th>Range</th>
<th>Cronbach’s Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACEs</td>
<td>2.51</td>
<td>1.75</td>
<td>0-11</td>
<td>.45</td>
</tr>
<tr>
<td>Depressive Symptoms</td>
<td>.45</td>
<td>.37</td>
<td>0-3</td>
<td>.74</td>
</tr>
<tr>
<td>Binge Drinking</td>
<td>1.60</td>
<td>1.61</td>
<td>0-6</td>
<td></td>
</tr>
<tr>
<td>Controls:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>28.37</td>
<td>1.79</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender (Females &amp; Males)</td>
<td>.52</td>
<td>.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peer Alcohol Use</td>
<td>1.11</td>
<td>1.17</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Race</td>
<td>.43</td>
<td>.49</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

ACEs comes from Waves I, III, & IV, Depressive Symptoms comes from Wave III, and Binge Drinking comes from Wave IV.

Table 4.2 Correlations for All Primary and Control Variables \((n = 6504)\)

<table>
<thead>
<tr>
<th>Variables</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. ACE_SCORE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Depressive Symptoms in Adolescents</td>
<td>.138**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Binge Drinking in Emerging Adulthood</td>
<td>.026</td>
<td>.008</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Age</td>
<td>-.018</td>
<td>-.035*</td>
<td>-.034*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Biological Sex</td>
<td>-.007</td>
<td>.104*</td>
<td>-.231**</td>
<td>-.063**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Race</td>
<td>.006</td>
<td>.071**</td>
<td>-.102**</td>
<td>.012</td>
<td>.004</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Peer Binge Drinking</td>
<td>.106**</td>
<td>.048**</td>
<td>.128**</td>
<td>.322**</td>
<td>-.040**</td>
<td>-.093**</td>
<td></td>
</tr>
</tbody>
</table>

\(*p < .05. **p < .01.\)
Primary Analysis

Following the steps provided by Baron and Kenny (1986), regression analyses were run to test for the relationships among ACEs, depressive symptoms in adolescence, and binge drinking in emerging adulthood to answer research question one. ACEs was not a significant predictor of binge drinking in emerging adulthood (.01% \( R^2 = .001 \), \( F(1,3655) = 2.42, p = .12 \)). ACEs was a significant predictor of depressive symptoms in adolescence as 19% \( R^2 = .019 \), \( F(1,4879) = 94.12, p < .001 \) of the variance in depressive symptoms is explained by ACEs. Depressive symptoms was not a significant predictor of binge drinking in emerging adulthood (0% \( R^2 = .000 \), \( F(1,3024) = .215, p = .64 \)). Although Baron and Kenny (1986) suggest that a mediation model should not be tested due to the lack of significance in relationships between the predictor variable, mediating variable, and outcome variable, the full hierarchical regression model was run to answer research question two. The full hierarchical model including covariates is presented in Table 4.3 and the measurement model is presented in Figure 4.1. Overall, depressive symptoms were not a significant mediator of the relationship between ACEs and binge drinking in emerging adulthood. Based on the bivariate correlations presented below, the lack of a significant mediating effect was expected.
Table 4.3 Full Hierarchical Model with Covariates (N = 6504)

<table>
<thead>
<tr>
<th>Variable</th>
<th>$B$</th>
<th>$SE(B)$</th>
<th>$\beta$</th>
<th>$T$</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACEs</td>
<td>.01</td>
<td>.01</td>
<td>.80</td>
<td>.26</td>
</tr>
<tr>
<td>Depressive Symptoms</td>
<td>.09</td>
<td>.026</td>
<td>.16</td>
<td>1.42</td>
</tr>
<tr>
<td>Age</td>
<td>-.09</td>
<td>-.10</td>
<td>.00**</td>
<td>-5.39</td>
</tr>
<tr>
<td>Gender (Females &amp; Males)</td>
<td>-.78</td>
<td>-.24</td>
<td>.00**</td>
<td>-13.69</td>
</tr>
<tr>
<td>Peer Alcohol Use</td>
<td>.19</td>
<td>.14</td>
<td>.00**</td>
<td>7.33</td>
</tr>
<tr>
<td>Race</td>
<td>-.26</td>
<td>-.08</td>
<td>.00**</td>
<td>-4.45</td>
</tr>
</tbody>
</table>

*p ≤ .05, **p ≤ .01

Figure 4.1: Measurement model with ACEs. This figure presents the standardized beta weights for the full hierarchical regression model. *p ≤ .05, **p ≤ .01
CHAPTER V

DISCUSSION

Overview

The purpose of this study is to explore the overall mediating effects of depressive symptoms on the relationship between ACEs and binge drinking in emerging adulthood. The specific purpose of this study is to first explore if there is a statistically significant relationship between ACEs, depressive symptoms in adolescence, and binge drinking in emerging adulthood. Considering Bronfenbrenner’s theory, each system connects and plays a role in the development of an individual and this thesis hypothesized that there will be significant direct links between ACEs, depressive symptoms in adolescence, and binge drinking in emerging adulthood. Additionally, this study hypothesized that positive indirect links would exist between ACEs and binge drinking in emerging adulthood through the mediator of depressive symptoms experienced in adolescence. The results of this study did not support the theoretical lens that depressive symptoms in adolescence is a mediator on the relationship between ACEs and binge drinking in emerging adulthood. Specifically, there was no relationship supported by the data findings between ACEs predicting binge drinking, and depressive symptoms predicting binge drinking. The only relationship supported by the data was between ACEs and depressive symptoms which is not enough to support this mediation model hypothesis. Based on the data, this would mean that there is not support in these findings to show that ACEs predicts binge drinking in emerging
adulthood and that there is no mediating effect from depressive symptoms within this relationship.

First this study reviews the significant link that is supported by the data between ACEs and depressive symptoms. The relationship between ACEs and mental health problems such as depression and depressive symptoms is found to be strongly supported in previous literature (CDC, 2019; Felitti et al., 1998; Hughes et al., 2017). Park et al. (2021), found in their study that those who experienced ACEs were more likely to have current suicide ideation over the past year and a lifetime histories of suicide planning and attempts. These results, both from supporting literature and the results of this current study, means that there is a significant relationship between the occurrences of ACEs and depressive symptoms in adolescence. This finding is central because adolescents who report ACE experiences may be at a higher risk for depressive symptoms in adolescence which may flow into emerging adulthood as adaptations to Bronfenbrenner’s theory state that emerging adulthood is an extension of adolescence.

Between ACEs and binge drinking in emerging adulthood a significant link was not supported by the data findings in this thesis. This finding is not consistent with previous research that has found a significant relationship between these variables as several studies specifically found a significant relationship between ACEs and problematic drinking behaviors (Burnett et al., 2015, Dube et al., 2002, Dube et al., 2006, Hughes et al., 2017, Jung et al., 2020, & Strine et al., 2012). Furthermore, it is expected that drinking and binge drinking behaviors would increase and become more prevalent in emerging adulthood as this is where individuals turn 21 which is the legal drinking age in the United States. Soloski (2020), Windle et al, (2018), and Woolman et al., (2015) recognize that in this time period of emerging adulthood it is a developmental period
filled with stressors and social experiences that often result in higher rates of alcohol use and alcohol abuse. In considering that factor as well, any increase in rates of binge drinking in this developmental period could also be attributed to the natural timeline of an individual turning 21 and coming into adulthood.

More specifically, Windle et al., (2018), finds that there are significant relationships for ACE scores and predicting poorer mental health outcomes, higher substance use, and poor lifestyle habits. LeTendre & Reed, (2017) found that for each unit increase in the ACEs scale was associated with 34% higher odds of developing an alcohol use disorder in adulthood. The lack of significance was at first surprising but after a close examination of ACE scores and binge drinking it was revealed that the sample in this thesis reported low ACE scores and low binge drinking behaviors. Additionally, these differences in results could possibly be explained by the fact that these other studies had broader variables as this study looked at very specific variables like depressive symptoms instead of suicidality and binge drinking instead of an alcohol use disorder. Because these studies used variables with more room for interpretation rather than just looking at a specific disorder (i.e., depressive symptoms and binge drinking) they are more likely to find significant results between their variables. Additionally, the lack of significance could be due to the way binge drinking was measured in this thesis as only a single item question was utilized to assess for binge drinking where other studies utilized several questions to assess for binge drinking.

The second hypothesis that examined the mediating effects of depressive symptoms on the relationship between ACEs and binge drinking in emerging adulthood was not supported. Following those two examinations, a significant relationship between depressive symptoms and
binge drinking in emerging adulthood was not supported by this data for this thesis. Jung et al., (2015) & Wollman et al., (2015) supports the possibility that there is a connection between depression from ACEs and high intensity binge drinking. Soloski (2020) supports with evidence that depressive symptoms were associated with ACEs but also related to binge drinking behaviors as binge drinking often plays a role as a coping habit for many adolescents and adults with depressive symptoms. This study’s finding clearly does not match existing investigating research on these links. This lack of significance could be due to this thesis not utilizing the full measure of the CES-D and this sample reported low depressive symptoms.

The lack of significant findings between ACEs and depressive symptoms and binge drinking could be explained by the sample. Because the sample used in this study had a relatively low level of ACEs and thus the significant relationship between the occurrence of ACEs and the outcome variable could not be established or supported. Lee & Chen (2017), finds that ACEs were most commonly associated with four outcomes, two of those are depression and excessive alcohol use meaning that individuals with higher ACEs will be more likely to have a higher outcome consequent mental health and alcohol related problems. Furthermore, they report that child abuse and household challenges independently increase the risk of depression, binge drinking and heavy drinking (Lee & Chen, 2017). This study reports that 11% of their study population reports only household challenges, 15% of their population reports only experiencing some form of child abuse, and 23% reports experiencing both household challenges and some form of child abuse (Lee & Chen, 2017).
**Clinical Implications**

Although there was not a significant relationship between ACEs, depressive symptoms in adolescence, and binge drinking in emerging adulthood, it is important to discuss the significance between ACEs and depressive symptoms in adolescence. Furthermore, there was no mediating effect on the relationship between ACEs and binge drinking, ACEs were significantly related to depressive symptoms. This significant relationship can be used to inform systemic thinkers and enhance their systemic assessments within each layer of Bronfenbrenner’s system. Specifically, informing MFTs that ACEs is a predictor for depressive symptoms in adolescence. This means that there is possibility that ACEs can be considered a risk factor for depressive symptoms in adolescents which clinical systemic thinkers can then use in their assessments for depressive symptoms. With these results it is important to note that recognizing ACEs in initial assessments could mean potentially working to prevent depressive symptoms later as this study supports that these two variables share a significant relationship. Also, with these results systemic thinkers can be supported in considering ACEs as a potential risk factor and/or contributing factor to a client’s depressive symptoms. In these assessments it is important to gather a comprehensive family history and background knowledge of the client’s systems which includes the assessment of ACEs especially since it is supported that they are linked to depressive symptoms. Assessments for ACEs and depressive symptoms should include the full ACEs assessment and the full CES-D measure. Through these assessments MFTs will have a better idea into the individual’s history of childhood experiences, current depressive symptoms, and the ecological systems that influence the individual.
Limitations and Future Directions

This study has several limitations, first is that the secondary data does not include a comprehensive assessment for ACEs in the variables. Therefore, variables used to compile a total ACEs variable had to be found throughout the first two waves and one variable in the fourth wave of data instead of using just one assessment for ACEs given in the first wave. This is another limitation that because of this one variable coming from the fourth wave it cannot be certain that the ACEs occurred before the depressive symptoms occurred. The second limitation is that the sample used in this study had a low number of ACEs occurring in the first two waves, and one in the fourth, which made finding a significant relationship between the occurrence of ACEs and depressive symptoms and binge drinking more of a challenge. Additionally, the reported Cronbach’s alpha coefficient for this summed variable resulted low which impacts the results. The resulting alpha coefficient translates that the individual ACEs variables poorly fit together. This could have been the result because the variables lacked the entire ACEs assessment, there was one variable from wave IV, and all the variables were not coded and written in the same way. Because the variables worked poorly together it could have affected the results and contributed to the lack of significant findings.

Data collection methods for ACEs, including child abuse, relied on retrospective self-report measure which leave results vulnerable to potential biases. Also, questions asked participants to recall if these events experienced happened before the age of 18 but the average age of the participants was 28. Additionally, child abuse is often associated with guilt and shame from both victims and perpetrators of child abuse and because of this it is possible that ACEs, specifically ACEs relating to abuse, could be underreported by participants thus affecting the
results. Physical, emotional, and sexual abuse were all self-reported and are subjected to recall bias. Additionally, there is only two variables that ask about an ACE occurring outside of the home so there is a possibility that ACEs experienced outside of the home are not being accounted for in this study which would mean that the results of ACEs are underreported and can therefore skew the data and results. When it comes to physical abuse there is only one question that assesses for that and it only assesses for that occurrence inside the household, this is also the case in assessing for sexual abuse. This limits the opportunity for other occurrences of physical and sexual abuse happening outside of the household go unreported, yet again contributes to the possibility that results on ACEs are underreported and possibly skewing the data and affecting the results.

For future research this study suggests that studies look at a sample with a higher occurrence of ACEs as this study’s sample had a low occurrence of ACEs. With a population or higher ACEs, the relationships between ACEs and depressive symptoms and binge drinking is hypothesized to be more significant and prevalent. Secondly, future research could also look at general alcohol use in emerging adulthood instead of specifically binge drinking in emerging adulthood. Another avenue for future research that this study suggests is to incorporate examining these relationships while also looking at depressive symptoms in emerging adulthood in addition to just in adolescence. Finally, future research should look at these relationships using the full ACEs and full CES-D measure instead of their shorter forms used in this study.
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