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Latent Class Analysis of Adolescents' Adverse Childhood Experiences and Associated Mental  
Health Outcomes

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## ABSTRACT

Childhood adversity is prevalent and associated with adverse mental health outcomes (Brown et al., 2009; Grasso, Dierkhising, Branson, Ford, & Lee, 2016). The person-centered approach of Latent Class Analysis (LCA) can be used to identify co-occurring patterns of childhood adversity and their increased risk for psychopathology (Ford & Delker, 2018; Rivera, Fincham, & Bray, 2018). Previous research studies have found high adversity, moderate adversity, and low adversity classes which are associated with unique psychological outcomes (Bussemakers, Kraaykamp, & Tolsma, 2019; Kim, Kim, Chartier, Wike, & McDonald, 2021; Lee, Kim, & Terry, 2020; Modrowski, Rizzo, Collibee, Houck, & Schneider, 2021; Rebbe, Nurius, Ahrens, & Courtney, 2017). Therefore, this study used LCA with data from the National Survey of Adolescents in the United States (Kilpatrick & Saunders, 1995). Adolescents ( $N = 4,023$ ) in this study reported on 15 varying forms of adversity and 4 mental health outcomes, including: MDD, PTSD, alcohol use, and delinquency. The results indicated that the four-class solution was the best model. The following latent classes were found: Class 1: High Adversity, Class 2: Moderate Adversity – Physical Danger, Class 3: Moderate Adversity – Family Dysfunction, and Class 4: Low Adversity. Adolescents belonging to the High Adversity Class had increased risk for MDD, PTSD, alcohol use, and delinquent behaviors. Additionally, adolescents belonging to the Physical Danger Class had increased risk for MDD, PTSD, alcohol use, and delinquent behavior. Adolescents belonging to the Family Dysfunction Class had increased risk for delinquent behavior. Therefore, prevention efforts should focus on developing targeted interventions for adolescents based on class membership.

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## **Chapter 1**

### **Introduction**

Childhood adversity, which comprises experiences of trauma, loss, and family dysfunction during childhood, is common (Brown et al., 2009; Grasso et al., 2016). For example, one study of adolescents found that parent unemployment rate was 16.9% (Alaimo, Olson, & Frongillo, 2002). Another study found that 13.4% of adolescents experienced parental divorce and 7.84% of adolescents experienced parental death (Tebeka, Hoertel, Dubertret, & Le Strat, 2016). One prevalent and traumatizing form of adversity, child abuse, is the act of harassing, teasing, or neglecting children younger than 18 years old. In hospital patients, a study found that 5.2% of young adults between the ages of 18-30 were physically abused, 11.3% witnessed violence, and 5.5% experienced sexual abuse (Riedl et al., 2020). Each of these prevalent forms of adversity was associated with adverse mental health outcomes such as Posttraumatic Stress Disorder (PTSD), depression, anxiety, substance abuse, and other health issues (Cutajar et al., 2010; Fergusson, McLeod, & Horwood, 2013; Mills et al., 2013; Wang, Tian, Guo, & Huebner, 2020). Understanding the relationships between diverse childhood adversities and mental health outcomes is critical to develop preventative interventions for adolescents exposed to adversity.

Adding complexity to the study of childhood adversity is the finding that many forms of adversity co-occur (Ford & Delker, 2018). Therefore, it is important for research to understand the patterns of co-occurrence and identify potential mental health outcomes associated with co-occurring forms of childhood adversity. Latent Class Analysis (LCA) is a useful method for understanding patterns of co-occurring adversity and identifying mental health correlates of co-

occurring adversity. LCA identifies subpopulations, termed *latent classes*, of individuals with similar characteristics (e.g., adverse experiences) based on patterns of co-occurrence observed in real data; thus, LCA is considered a person-centered approach (Rivera et al., 2018). A growing literature has applied LCA to identify latent classes of youth who differ on adverse experiences and identify distinct mental health outcomes associated with latent class membership (Rivera et al., 2018). Research using this method has potential to advance the field's understanding of the nature of adversity as it is experienced in real life and to lead to targeted interventions designed to mitigate risks experienced in distinct sub-populations.

Many LCA studies have provided evidence for a high adversity class, a low adversity class, and moderate levels of adversity (e.g., Bussemakers et al., 2019; Kim et al., 2021; Lee et al., 2020; Modrowski et al., 2021; Rebbe et al., 2017). High adversity classes are typically at high risk for multiple, co-occurring forms of adversity, low adversity classes typically do not experience elevated risk for any forms of adversity, and moderate adversity classes typically experience high risk for one or a small number of forms of adversity. For example, one LCA found three classes including: poly-victimization, low victimization, and emotional victimization (Modrowski et al., 2021). Individuals in the poly-victimization class experienced the greatest number of adversities, and they also scored highest on posttraumatic stress symptoms, suicidal behaviors, sexual risk behaviors, and substance use. Individuals in the emotional victimization class had less overall adversity than the high adversity class, yet still had high rates of emotional victimization; importantly, this class had similarly high suicidal behaviors compared to the poly-victimization class. These individuals also experienced more posttraumatic stress symptoms than the low victimization class. Thus, the high, low, and moderate classes of adversity in this study had not only different experiences of adversity, but also different mental health risks. Another



LCA found three classes including: complex adversity, environmental adversity, and lower adversity (Rebbe et al., 2017). The Lower Adversity class had the lowest risk for socioeconomic, psychosocial problems, and delinquent behavior. Individuals in the Complex Adversity class experienced more depressive symptoms than individuals in the Lower Adversity class.

Individuals in the Environmental Adversity class experienced more PTSD symptoms, drug abuse treatment, alcohol abuse symptoms, and delinquency problems than individuals in the Low Adversity Class (Rebbe et al., 2017). Therefore, high, moderate, and low adversity classes represent unique subpopulations of adolescents, and the mental health risks experienced across the classes differ.

In fact, some studies have provided evidence for multiple classes characterized by moderate adversity beyond the high and low adversity classes, and the moderate adversity classes differed on risk for a number of forms of adversity and mental health problems. For example, an LCA found four classes with varying types of adversity including low adversity, moderate adversity: household dysfunction, moderate adversity: maltreatment, and high adversity (Bussemakers et al., 2019). Another LCA found three moderate adversity classes including child maltreatment, household dysfunction, and community violence, as well as a low adversity class (Lee et al., 2020). These subpopulations of adversity differed in their associated mental health outcomes. For example, participants in the child maltreatment and community violence classes experienced the highest occurrence of PTSD. Also, participants in the child maltreatment class experienced the highest amount of anxiety and depression compared to the other three classes (Lee et al., 2020). Another LCA found four classes including: high adversity, moderate adversity: child abuse, moderate adversity: parental substance use, and low adversity (Kim et al., 2021). The high adversity and child abuse classes correlated with MDD, while the

high adversity, child abuse, and parental substance use classes were associated with substance use disorder. The existence of multiple classes that differed in rates of specific forms of co-occurring adversity and associated mental health outcomes demonstrates that the association between childhood adversity and mental health is complex and nonlinear; thus, the field needs additional research identifying subpopulations of adverse experiences and associated mental health outcomes.

The current study used LCA to examine subpopulations of exposure to a wide range of childhood adversity and corresponding psychological outcomes. Data were derived from a large national sample of adolescents in the United States (Kilpatrick & Saunders, 2000). These adolescents provided retrospective reports of exposure to various forms of childhood adversity and reports of current MDD, PTSD, alcohol use, and delinquency. Since LCA is a data driven approach, I did not have a specific hypothesis regarding the exact number and nature of the classes. However, based on existing research using LCA (e.g., Kim et al., 2019; Modrowski et al., 2020), I expected the LCA to yield one low adversity class, one high adversity class, and one or more moderate adversity classes that differ in terms of risk for distinct forms of adversity and mental health outcomes. Identifying subpopulations based on a wide range of forms of adversity would contribute to the literature by replicating existing studies that have identified high, low, and moderate adversity classes and helping identify populations with unique mental health risks who may benefit from targeted preventive interventions.

## **Chapter 2**

### **Methods**

#### **Participants and Procedures**

The data from the National Survey of Adolescents in the United States (Kilpatrick & Saunders, 1995) was collected from 1995 to 2006. 4,023 participants were included in the study. Participants completed assessments of adversity and mental health via phone-based interviews. The participants were between the ages of twelve and seventeen, and they resided in the New England (3.7%, 150), Mid Atlantic (13.2%, 530), East North Central (17.4%, 699), West North Central (8.6%, 346), South Atlantic (15.5%, 622), East South Atlantic (7.1%, 287), West South Atlantic (12.9%, 520), Mountain (7.1%, 286), and Pacific (14.5, 583) regions the United States. The races that were represented in the sample were Pacific islander (1.5%, 60), American Indian (4.9%, 199), Asian (1.7%, 67), African-American (14.9%, 600), white/Caucasian (72.1%, 2,901), and Hispanic (9.7%, 390). There were 2,005 female participants (49.8%) and 2,018 male participants (50.2%).

#### **Measures**

##### **Childhood Adversity.**

A total of 15 forms of childhood adversity were assessed. Please see Appendix A for a table of questions used to assess each form of childhood adversity. Participants were asked a range of questions to assess whether they had experienced (1) sexual assault victimization, (2)

physical assault victimization, (3) experienced serious accident at school, in a car or somewhere else, (4) experienced a natural disaster such as a tornado, hurricane, flood, major earthquake, or similar natural disaster, and (5) witnessed violence. If participants answered “yes” to any of the questions corresponding to a given form of adversity, they were categorized as having experienced this form of adversity. Participants were also asked if they had (6) moved to a new home, (7) changed to a new school, (8) had their parents separate or become divorced, (9) had their mother or father lose his or her job, (10) experienced the death of a family member, (11) experienced the death of a friend, and (12) experienced a serious illness or injury of a family member. In addition, participants were asked if they (13) never lived with both parents, (14) felt that they had nobody to count on, and (15) had a family member with a drinking or drug problem. All forms of childhood adversity were treated as binary to indicate whether participant had experienced a given form of adversity.

### **Mental Health Outcomes**

All mental health outcomes were treated as binary variables to indicate whether a participant had a given mental health outcome. For alcohol use, participants were asked in the past twelve months, if they had ever had a drink of beer wine, liquor, or any alcohol beverage. For delinquent behaviors, participants were asked whether they had ever in their lifetime stolen or tried to steal something worth more than \$100, stolen or tried to steal a motor vehicle, broken or tried to break into a building or vehicle to steal something or just look around, been involved in gang fights, used force or strong-arm methods to get money or things from people, had or tried to have sexual relations with someone against their will, or attacked someone with the idea of

seriously hurting or killing that person. Participants responding “yes” to any of the delinquent behavior questions were scored as having delinquent behavior. Posttraumatic stress disorder (PTSD) over the past six months was assessed using a structured interview from the modified version of the National Women’s Study (NWS) PTSD Module (Kilpatrick et al., 1989). Major depressive disorder (MDD) over the past six months was assessed using a structured interview from the National Women’s Study Depression Module. Questions asked about complete diagnostic criteria for each disorder as denoted in the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (American Psychiatric Association, 1994).

### **Data Analyses**

Latent Class Analysis was performed in Mplus Version 8. All variables were treated as binary using the maximum likelihood estimator with robust standard errors. Childhood adversity variables were used as latent class indicators (i.e., variables used to determine latent classes), and mental health variables were treated as distal outcomes of latent class membership. Thus, analyses identified patterns of co-occurrence of adversity and the mental health outcomes associated with latent class membership. For the missing data on latent class indicators, full information maximum likelihood was used, and for the missing data on the distal outcomes, multiple imputation was used.

To determine the number of latent classes, models were fit sequentially with an increasing number of latent classes, beginning with a two-class model. Models with increasing numbers of latent classes were compared using the Akaike Information Criteria (AIC) and Bayesian Information Criteria (BIC) and the Lo-Mendell-Rubin Likelihood Ratio Test (LMR).

Lower values for AIC and BIC, as well as a significant ( $p < .05$ ) value for the LMR indicated that given model fit better than the model to which it was compared. Model selection was terminated once the LMR did not indicate significant improvement in model fit for a more complex model. Once the latent class solution was selected, latent classes were compared based on the rates of adversity in each class and rates of associated mental health outcomes using chi-square tests.

## Chapter 3

### Results

#### Descriptive Statistics

Please see Table 1 for rates of adversity and mental health in the sample. The most common form of adversity is witnessed violence.

**Table 1: Rates of Adversity and Mental Health Outcomes**

	<i>n</i>	%
<b>Childhood Adversity</b>		
Sexual Assault Victimization	327	8.26%
Physical Assault Victimization	734	18.24%
Accident	839	20.92%
Natural Disaster	964	24.03%
Witnessed Violence	2,949	73.3%
New Home	865	21.53%
New School	1,028	25.57%
Parent Divorce	304	7.58%
Parent Lose Job	451	11.26%

Family Death	1,446	36.35%
Friend Death	819	20.40%
Family Illness	448	11.12%
Never Lived with Both Parents	381	9.53%
Nobody to Count on	264	6.59%
Family Drinking or Drug Problem	796	19.78%
<b>Mental Health Outcomes</b>		
MDD	499	12.4%
PTSD	435	10.79%
Delinquency	535	13.28%
Alcohol Use	1715	42.76%

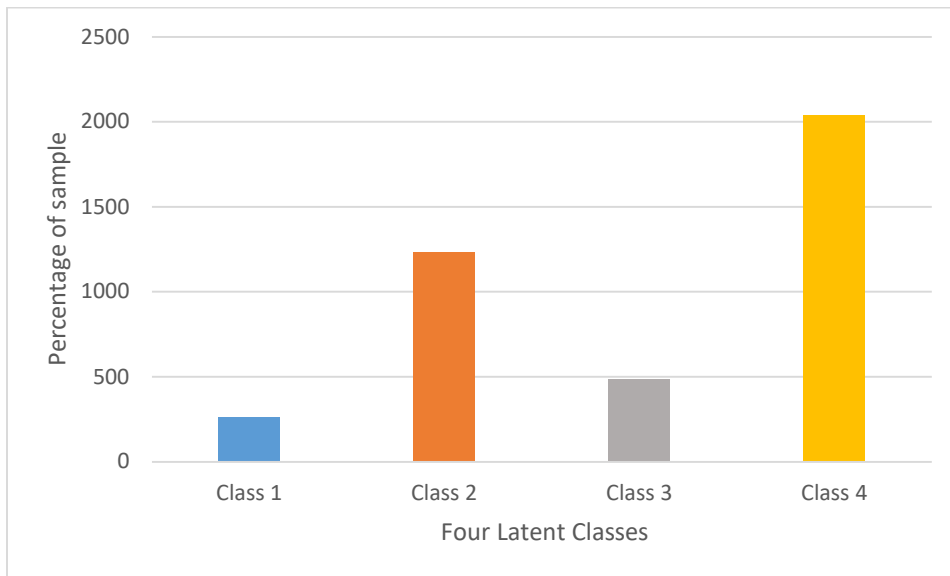
### Latent Class Solution

Please see Table 2 for model selection information. Despite having a slightly higher AIC than the five-class model, the four-class model had the lowest BIC, and the LMR test portrayed a significantly better fit than the three-class solution. Additionally, the LMR test did not portray improvement in fit for the five-class model. Therefore, the four-class solution was selected as the best model.

**Table 2: Model Fit Across Latent Class Solutions**

	5 class	4 class	3 class	2 class
Akaike (AIC)	51434.06	51476.78	51647.82	51941.79
Bayesian (BIC)	51931.72	51873.65	51943.9	52136.46
LMR p- value	.3000	.0426	.0108	< .0001
LMR Value	74.163	208.735	322.923	1587.052

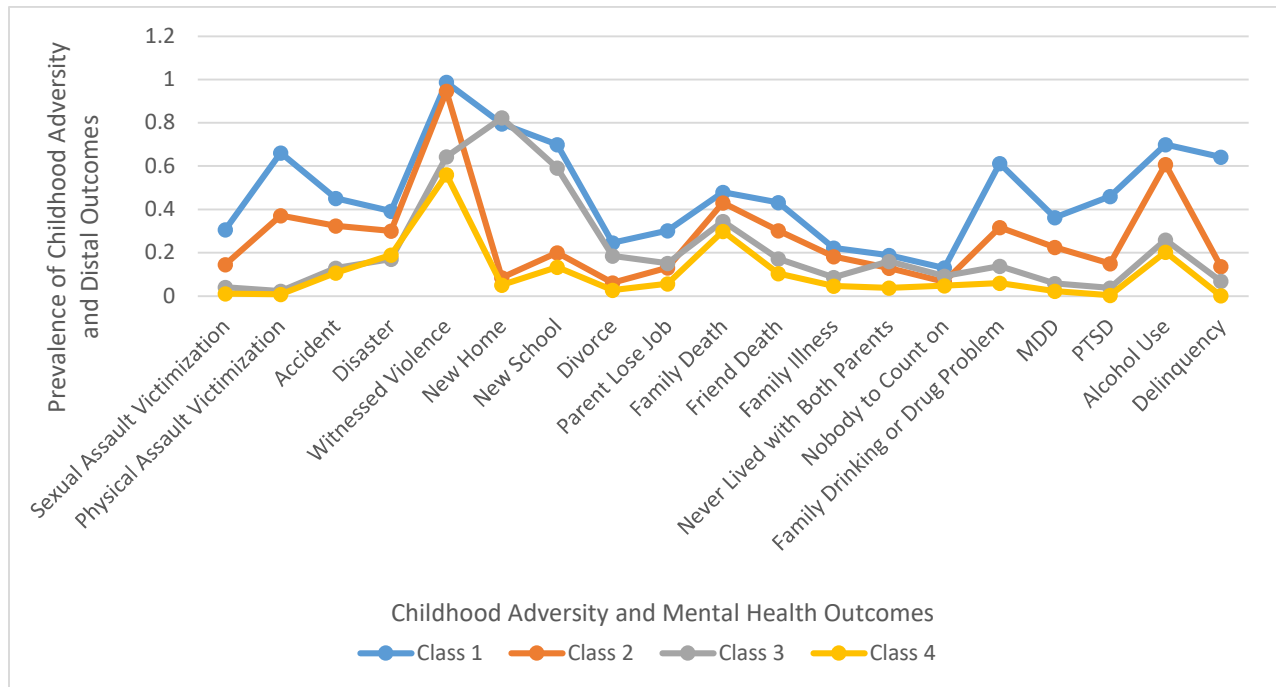
### Latent Class Comparisons



**Figure 1: Latent Class Distribution**

Please see Figure 1 for percentage of the sample in each latent class. Class 1 consisted of 264 members or 6.56% of the sample, Class 2 consisted of 1231 members or 30.61% of the sample, Class 3 consisted of 488 members or 12.13% of the sample, and Class 4 consisted of 2039 members or 50.70% of the sample.





**Figure 2: Characteristics of Four Latent Classes**

Please see Figure 2 for rates of each type of adversity and mental health outcome in each latent class. Compared to members of Class 2, members of Class 1 had significantly higher rates of changing to a new school ( $Z = 1.968, p = .049$ ), parental divorce ( $Z = 3.032, p = .002$ ), and parent losing a job ( $Z = 2.846, p = .004$ ). Compared to members of Class 3, members of Class 1 also had significantly higher rates of disaster ( $Z = 2.41, p = .016$ ), friend death ( $Z = 2.746, p = .006$ ), family illness ( $Z = 2.086, p = .037$ ), and family drinking or drug problem ( $Z = 2.078, p = .038$ ). Compared to members of Class 4, members of Class 1 furthermore had significantly higher rates of accident ( $Z = 3.481, p = .000$ ), disaster ( $Z = 2.988, p = .003$ ), divorce ( $Z = 2.129, p = .033$ ), parent losing job ( $Z = 3.558, p = .000$ ), family death ( $Z = 2.541, p = .011$ ), friend death ( $Z = 2.879, p = .004$ ), family illness ( $Z = 2.316, p = .021$ ), never lived with both parents ( $Z = 2.758, p = .006$ ), nobody to count on ( $Z = 2.092, p = .036$ ), and family drinking or drug problem ( $Z = 2.812, p = .005$ ). Compared to members of Class 4, members of Class 2 had significantly

higher rates of sexual assault victimization ( $Z = 1.985, p = .047$ ), accident ( $Z = 3.53, p = .000$ ), disaster ( $Z = 3.543, p = .000$ ), witnessed violence ( $Z = 3.226, p = .001$ ), parent losing job ( $Z = 2.712, p = .007$ ), family death ( $Z = 3.751, p = .000$ ), friend death ( $Z = 4.801, p = .000$ ), family illness ( $Z = 3.665, p = .000$ ), never lived with both parents ( $Z = 2.265, p = .024$ ), and family drinking or drug problem ( $Z = 3.755, p = .000$ ). Compared to members of Class 4, members of Class 3 had significantly higher rates of new school ( $Z = 3.201, p = .001$ ), divorce ( $Z = 2.94, p = .003$ ), and never lived with both parents ( $Z = 3.043, p = .002$ ). Compared to members of Class 3, members of Class 2 had significantly lower rates of new home ( $Z = -55.32, p = .000$ ), new school ( $Z = -9.93, p = .000$ ), and divorce ( $Z = -5.033, p = .000$ ). Therefore, the results indicated the following classifications for the latent classes: Class 1: High Adversity, Class 2: Moderate Adversity – Physical Danger, Class 3: Moderate Adversity – Family Dysfunction, and Class 4: Low Adversity.

Members of Class 1 were more likely to have MDD than members of Class 3 ( $Z = 24.668, p < .001$ ) and Class 4 ( $Z = 15.037, p < .001$ ). Members of Class 1 were not significantly more likely to have MDD compared to members of Class 2 ( $Z = .762, p = .383$ ). Members of Class 2 were not significantly more likely to have MDD compared to members of Class 3 ( $Z = 2.26, p = .133$ ) but were more likely to have MDD compared to members of Class 4. Members of Class 3 were not significantly more likely to have MDD compared to members of Class 4 ( $Z = .745, p = .388$ ). Members of Class 1 were more likely to have PTSD compared to members of Class 2 ( $Z = 39.507, p < .001$ ), members of Class 3 ( $Z = 91.365, p < .001$ ), and members of Class 4 ( $Z = 107.513, p < .001$ ). Members of Class 2 were more likely to have PTSD compared to members of Class 3 ( $Z = 11.276, p < .001$ ) and members of Class 4: ( $Z = 54.92, p < .001$ ). Members of Class 3 were not significantly more likely to have PTSD compared to members of

Class 4 ( $Z = 2.47, p = .116$ ). Members of Class 1 were more likely to consume alcohol compared to members of Class 2 ( $Z = 3.541, p = .006$ ), members of Class 3 ( $Z = 64.319, p = .000$ ), and members Class 4 ( $Z = 112.62, p = .000$ ). Members of Class 2 were more likely to consume alcohol compared to members of Class 3 ( $Z = 49.951, p = .000$ ) and members of Class 4 ( $Z = 146.091, p = .000$ ). Members of Class 3 not significantly more likely to consume alcohol compared to members of Class 4 ( $Z = .839, p = .36$ ). Members of Class 1 were more likely to engage in delinquent behaviors compared to members of Class 2 ( $Z = 117.84, p = .000$ ), members of Class 3 ( $Z = 196.347, p = .000$ ), and members of Class 4 ( $Z = 230.276, p = .000$ ). Members of Class 2 were not significantly more likely to engage in delinquent behaviors compared to members of Class 3 ( $Z = 3.177, p = .075$ ). Members of Class 2 were more likely to engage in delinquent behaviors compared to members of Class 4 ( $Z = 22.997, p = .000$ ). Members of Class 3 were more likely to engage in delinquent behaviors compared to members of Class 4 ( $Z = 7.012, p = .008$ ). Therefore, adolescents belonging to the High Adversity Class had high risk for MDD, PTSD, alcohol use, and delinquent behavior, individuals belonging to the Physical Danger Class had high risk for MDD, PTSD, alcohol use, and delinquent behavior, and individuals belonging to the Family Dysfunction Class had high risk for engaging in delinquent behavior.

## **Chapter 4**

### **Discussion**

This study used LCA to identify sub-populations of adverse experiences among adolescents, as well as the mental health outcomes associated with membership in each sub-

population. The results suggested that there were four classes of adversity characterized as: Class 1: High Adversity, Class 2: Moderate Adversity – Physical Danger, Class 3: Moderate Adversity – Family Dysfunction, and Class 4: Low Adversity. Classes 1 through 4 differed in terms of the mental health outcomes the members experienced such as Major Depressive Disorder (MDD), Post-traumatic Stress Disorder (PTSD), alcohol usage, and delinquency. Members of the High Adversity Class had the highest prevalence of psychopathology for PTSD, alcohol use, and delinquent behaviors compared to members of the Physical Danger, Family Dysfunction, and Low Adversity classes. However, members of the High Adversity Class were equally likely to have MDD compared to the members of the Physical Danger Class. Members of the Physical Danger Class were equally likely to have MDD and engage in delinquent behaviors compared to members of the Family Dysfunction Class, whereas they were more likely to have MDD and engage in delinquent behaviors compared to members of the Low Adversity Class. However, members of the Physical Danger Class were more likely to have PTSD and consume alcohol compared to both members of the Family Dysfunction and Low Adversity classes. Members of the Family Dysfunction Class were only more likely to engage in delinquent behaviors compared to members of the Low Adversity Class, and they were not significantly more likely to have MDD, PTSD, and use alcohol compared to members of the Low Adversity Class. These results portray the complex associations between adversity and adolescent mental health.

These results are congruent with existing research with the finding of high, moderate, and low adversity classes with varying mental health outcomes. The High Adversity Class in this study along with an analogous high adversity (“Poly-Victimization”) class in another study both experienced high overall levels of psychopathology (Modrowski et al., 2021). Specifically, the present study found that the High Adversity Class was more likely to experience PTSD, alcohol

use, and delinquency compared to members of the Physical Danger, Household Dysfunction, and Low Adversity classes. Therefore, the present results suggest that experiencing multiple forms of adversity could have either additive or multiplicative associations with mental health. Thus, identifying adolescents with high overall adversity could be critical to provide intervention to this especially high-risk group.

The results of this study suggested that multiple moderate adversity classes exist with distinct mental health risks, building on literature establishing the importance of sub-populations with certain forms of moderate adversity. Members in the Physical Danger Class and the Family Dysfunction Class in the present study experienced varying forms of adversity and mental health outcomes. Specifically, members of the Physical Danger Class experienced elevated risk for MDD, PTSD, alcohol use, and delinquent behavior, while members of the Family Dysfunction Class experienced elevated risk for delinquent behavior. Along similar lines, previous studies found four latent classes with two moderate adversity classes, and these moderate adversity classes differed in mental health outcomes (Kim et al., 2021; Lee et al., 2020). For example, members of the Household Dysfunction Class in one study were less likely to experience depression, anxiety, and PTSD than members of the Community Violence Class and Child Maltreatment Class (Lee et al., 2020). This finding converges with the present study's finding that the Family Dysfunction Class was likely to experience PTSD and alcohol use compared to members of the Physical Danger Class and the High Adversity Class. Moderate adversity in the form of physical danger could be especially related to PTSD risk due to the traumatizing nature of these forms of adversity. Another study found that members of the Parental Substance Use class were more likely to have Substance Use Disorder than members of the Low Adversity class (Kim et al., 2021). Although the present study did not identify a parent substance use class, the

Family Dysfunction Class in this study was more likely to engage in delinquent behavior than the Low Adversity Class. Thus, adolescents experiencing chaotic households could be in need of screening and intervention to reduce the risk of delinquent behavior. In general, the results of this study provide further evidence for the existence of multiple moderate adversity sub-classes and highlight potential mental health risks in these sub-populations.

Prevention efforts could be improved if developed and delivered to adolescents based on class membership. Recognizing that adolescents experience co-occurring forms of adversity during childhood may help mental health professionals create targeted interventions. A possible approach involves screening adolescents for adverse experiences and delivering appropriate interventions to individuals with exposure to one or more forms of adversity (Mayer & Thursby, 2012). Interventions focused on strengthening adolescents' accumulation of beneficial social support and further developing adolescents' positive coping styles appear promising (Mayer & Thursby, 2012)), though few controlled outcome studies have been conducted. Increased awareness of the mental health needs of adolescents based on their experiences of adversity could assist families, schools, and public health agencies in identifying appropriate treatment options based on adolescents' co-occurring forms of adversity. Future research should investigate these forms of intervention especially delivering treatment to these specific sub-populations of adversity with unique risk for psychopathology.

This study had several limitations. One limitation is that the sample overall had high levels of witnessed violence. Having a higher threshold for severe forms of witnessed violence might better differentiate the latent classes. Additionally, adversity was assessed retrospectively, and analyses were cross sectional as a result. Therefore, any causal claims cannot be made about the subclasses of adversity resulting in mental health outcomes. The difficulty in making causal

claims is further compounded by the fact that different time scales were used when asking participants about their adverse experiences (i.e., from lifetime to past year) and mental health outcomes (i.e., from lifetime to past six months), which obscures temporal precedence. To overcome these limitations in future research, a prospective method should be used to study how subpopulations of childhood adversity experienced during a given time relate to mental health outcomes at a later time. Finally, because the analyses used data driven method, the findings should be replicated in an independent sample to improve confidence in the generalizability of latent class solutions.

Overall, this LCA study highlights the importance of understanding patterns of co-occurrence of adversity, as well as the mental health risks associated with co-occurring forms of adversity. Not only is experiencing a high number of adversities associated with risk for MDD, PTSD, alcohol use, and delinquent behavior, but also experiencing moderate adversity in the form of physical danger is associated with risk for MDD, PTSD, alcohol use, and delinquent behavior and moderate adversity in the form of family dysfunction is associated with risk for delinquent behavior. Future research should seek to further replicate the patterns of co-occurring adverse experiences and mental health outcomes observed in the present study; if the patterns prove reliable, intervention efforts should seek to identify targeted mental health prevention efforts based on an adolescent's membership in a given adversity sub-population.

## Appendix A

### Question Assessment for Childhood Adversity and Mental Health Outcomes

#### Childhood Adversity

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##### Sexual Assault Victimization

---

Has a man or boy ever put a sexual part of his body inside your private sexual parts, inside your rear end or inside your mouth when you didn't want them to?

---

(Not counting any incidents you already told me about), has anyone, male or female, ever put fingers or objects inside your private sexual parts or inside your rear end when you didn't want them to?

---

(Not counting any incidents you already told me about), has anyone, male or female, ever put their mouth on your private sexual parts when you didn't want them to?

---

(Not counting any incidents you already told me about), has anyone, male or female, ever touched your private sexual parts when you didn't want them to?

---

(Not counting any incidents you already told me about), has anyone ever made you touch their private sexual parts when you didn't want them to?

---

##### Physical Assault Victimization

---

Has anyone – including family members or friends – ever attacked you with a gun, knife or some other weapon, regardless of when it happened or whether you ever reported to police?



(Not counting any incidents you already told me about), has anyone – including family members or friends – ever physically attacked you without a weapon, but you thought they were trying to kill or seriously injure you?

---

(Not counting any incidents you already told me about), has anyone – including family members or friends – ever threatened you with a gun or knife, but didn't actually shoot or cut you?

---

(Not counting any incidents you already told me about), has anyone – including family members or friends – ever beat you up, attacked you, or hit you with something like a stick, club, or bottle so hard that you were hurt pretty bad?

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(Not counting any incidents you already told me about), has anyone – including family members or friends – ever beat you up with their fists so hard that you were hurt pretty bad?

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#### **Accident**

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During your life, have you had a serious accident at school, in a car or somewhere else?

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#### **Disaster**

---

During your life, experience a natural disaster, such as a tornado, hurricane, flood, major earthquake, or similar natural disaster?

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#### **Witnessed Violence**

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Have you ever seen someone actually shoot someone else with a gun?

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(Not counting any incidents you already told me about), have you ever seen someone actually cut or stab someone else with a knife?

(Not counting any incidents you already told me about), have you ever seen someone being sexually assaulted or raped?

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(Not counting any incidents you already told me about), have you ever seen someone being mugged or robbed?

---

(Not counting any incidents you already told me about), have you ever seen someone threaten someone else with a knife, a gun, or some other weapon?

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(Not counting any incidents you already told me about), have you ever seen someone beaten up, hit, punched, or kicked such that they were hurt pretty badly?

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**New Home**

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During the last year, since [MONTH] a year ago, did you move to a new home?

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**New School**

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During the last year, since [MONTH] a year ago, did you change to a new school?

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**Divorce**

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During the last year, since [MONTH] a year ago, did your parents separate or divorced?

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**Parent Lose Job**

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During the last year, since [MONTH] a year ago, did your mother/father lose job?

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**Family Death**

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During the last year, since [MONTH] a year ago, did you experience the death of a family member?

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**Friend Death**

---

During the last year, since [MONTH] a year ago, did you experience the death of a close friend?

**Family Illness**

---

During the last year, since [MONTH] a year ago, did you experience a serious illness or injury of family member?

---

**Never Lived with Both Parents**

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Did you ever live with both your natural mother and father?

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**Nobody to Count on**

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When you were growing up, how much of the time did you feel scared or frightened that someone you knew might physically hurt you or someone you cared about?

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**Family Drinking or Drug Problem**

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Has anyone either in your family or who lived with you, not counting you, drink alcohol (beer, wine) so much that it became a problem? (For example, did anyone drink SO much they got into fights with other People, or started to beat the kids, or couldn't get out of bed the next day, or had difficulty holding a job?) OR Did anyone in your family or who lived with you, not counting yourself, use hard drugs, such as heroin, cocaine, speed, or uppers or downers, or have a drug problem?

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## ACADEMIC VITA

### Education

- The Pennsylvania State University, Schreyer Honors College, 2017-2021, Dual-Major:
  - Science with the Biological Sciences and Health Professions option
  - Psychology with the Neuroscience option

### Work Experience, Activities, and Service

#### **PSU Student Engagement Network Remote Innovation Grant** (Summer 2020)

- Received grant to conduct research for my honors thesis project about the impact of Adverse Childhood Experiences on mental health

#### **College of the Liberal Arts Undergraduate Research Funding Award** (Summer 2020)

- Received grant to develop my honors thesis research

#### **Whitemarsh Township Camp Counselor** (Summers 2016-2019)

#### **THON 2021 Communications Captain**, General Organizations Liaison (2020-2021)

- Provided General THON Organizations with essential information to succeed.
- Assisted organizations with financial, engagement, or motivational problems.

#### **THON 2020 Family Relations Captain**, Bereaved Family Contact (2019-2020)

- Main contact for Four Diamonds families who have experienced the loss of a child.
- Presented the Perpetual Pennant Project to thousands of THON volunteers.

#### **Schreyer Honors College Student Council** (2017-present)

##### *Primary THON 2019 and 2020 Chair, Executive Board (2018-2020)*

- Encouraged executive board and member involvement within our THON organization.
- Paired with a new Four Diamonds family, the Sylveses

##### *THON 2018 Family Relations Chair (2017-2018)*

- In charge of communicating and planning events with our THON family, the Millers.

#### **THON Dancer Relations Committee Member (2017-2019)**

##### *Family Relations Chair (2018-2019)*

- Planned activities for our THON teen, Destiny, to bond with our committee

#### **Research Assistant** (Fall 2019 - present, minimum of 9 hours per week)

- Laboratory for Anxiety & Depression Research, Dr. Michelle Newman, Ph.D.

#### **Teaching experience/leadership**

##### *Math 033 Learning Assistant (Fall 2019, 6 hours per week)*

- Instructional team member working with Dr. Russel deForest in Math 33.

##### *CHEM 212 and 202 Learning Assistant (Spring 2020, Summer 2020, Fall 2020, Spring 2021, 6 hours per week)*

- Instructional team member working with Dr. Masters in CHEM 212 and CHEM 202.

#### **Gamma Sigma Sigma National Service Sorority** (2017-present, minimum of 30 hours)

##### *Service Vice President, Executive Board (Fall of 2020)*

- Responsible for scheduling and planning service events with various service partners

##### *Service Auditor (Spring of 2020)*

- Ensured that each member fulfills the minimum requirement of 30 hours of service

##### *Blood Drive Chair (Fall of 2019)*

- Ensured participation in the blood drives by speaking about the significance of donations.

##### *Assistant Service Vice President (Spring of 2019)*

- Responsible for the service event, Project Post-It, and collecting donations.

**Clinical Shadowing** (Summer of 2018-present)

- Shadowed psychologist, Marla S. McLaughlin, Ph.D., at the VA Medical Center
- Shadowed pediatrician, Catherine Bonita, M.D., at CHOP
- Shadowed Cardiologist, Raphael Bonita, M.D., at Einstein Hospital Heart Failure Clinic
- Shadowed Obstetrics/Gynecology Physician, Dr. Catherine Bernardini, D. O., at Main Line Women's Healthcare

**Habitat for Humanity Spring Break Service Trip** (spring break 2018, 7 days)