

Pakistan Social Sciences Review www.pssr.org.pk

RESEARCH PAPER

Impact of Adverse Childhood Experiences on Crime Orientation among Young Adults: Mediating Role of Criminal Thinking Styles

¹Saima Kaniz, ²Mehak Haroon and ³Aqsa Abdul Khaliq*

- 1. M. Phil Scholar, Department of psychology Institute of Southern Punjab Multan, Punjab, Pakistan
- 2. Lecturer, Department of psychology Institute of Southern Punjab Multan, Punjab, Pakistan
- 3. Ph. D Scholar, Department of psychology Islamia University Bahawalpur, Punjab, Pakistan

*Corresponding Author: aqsakhali60@gmail.coResultm

ABSTRACT

The objective of study to investigate the impact of adverse childhood experiences on crime orientation among young adults, focusing on the mediating role of criminal thinking style. Adverse childhood experiences (ACEs) are linked to increased criminal behavior in adulthood. Understanding how ACEs influence crime orientation is crucial for developing prevention strategies. Data were collected from 300 young adults aged 18-29 years from Punjab, Pakistan, using purposive sampling. The study utilized the ACE scale, MCAA scale, and PICTS. Statistical analysis and mediation analysis were conducted using SPSS and the Process macro. ACEs and crime orientation were significantly positively correlated. Criminal thinking style significantly mediated the relationship between ACEs and crime orientation. Criminal thinking style mediates the relationship between ACEs and crime orientation among young adults. These findings have theoretical and practical implications for future research and interventions.

KEYWORDS

Adverse Childhood Experiences, Crime Orientation, Criminal Thinking Styles, Mediation Analysis, Young Adults

Introduction

Since the 20th century, adverse experiences during childhood have been associated with later-rising mental and physical health disorders (Pervanidou & Chrousos, 2007). This includes hosting worldwide concerns associated with family and childhood development (Chan & Yeung, 2009), adolescent health risk behaviors (Clark et al., 2010) as well as a slew of filed challenging physical and mental diseases among adults. Studies in developing as well as industrial countries demonstrate the global prevalence of adverse childhood experiences and their gravity.

Even though the impact of Adverse Childhood Experiences (ACEs) is now well known, there is still no clear understanding on what constitutes an ACE. The main ACEs include physical, sexual, and psychological abuse along with family breakdown/household dysfunction (e. g., substance use in the home or a mental illness diagnosed within the household) (Anda et al., 2008; Dube et al., 2010; Wickrama & Noh, 2010). The etiology of these experiences range from the nuclear family all the way up to macro social contexts (Noll et al., 2007; Wickrama & Noh, 2010). We measure these experiences using different scales, such as the Conflict Tactics Scale and Adverse Childhood Experiences (ACE) score however often we use terminologies that overlap which create confusion.

The concept "adverse childhood experiences" refers to a wider range of negative incidents in addition to direct abuse -such as witnessing violence, exposure to family disorganization and dysfunction (Chung et al., 2010). Parents who are unable to fulfil

their roles due for example, substance abuse, mental ill health or parental skills (Maughan & McCarthy 1997) can end up having such experiences. Such environments may encourage an abusive environment leading to physical abuse and neglect, therefore even more complicating the childs development and overall well-being (Repetti et al., 2002).

This means that individual health and behaviour is influenced by adverse childhood experiences to a greater extent than was previously suspected. Other types of violence, such as children's exposure to relationship or family substance abuse has been shown to have long term health effects and be associated with similar problems in adulthood (Gunn et al., 2010). Additionally, the socio-structural context in which these transitions are experienced is important and framed by broader social factors like poverty or community violence (Mock & Arai, 2011). Knowledge about what was behind these relationships is a key factor in developing successful interventions and support structures.

Succinctly put, childhood adversities are bad for children (development) and make them sick. These adverse experiences may be acute or chronic and are traumatic, accumulating in the severity of their toll over time with profound lasting impacts. As more research supports the importance of addressing ACEs, Sohail suggests efforts need to be multifaceted and incorporate individual patient-level solutions as well as policy recommendations that address systemic inequalities.

Adverse Childhood Experiences (ACEs)

Adverse childhood experiences involve an array of unfavorable events and conditions faced during child rearing, inclusive of physical such as sexual abuse or psychological maltreatment with the family life disruptions like household dysfunction defined by substance misuse and psychiatric disease in house members (Anda et al., 2008; Dube et al., 2010; Wickrama & Noh, 2010).

Orientation to Crime

Orientation to crime is the cultural, lifestyle attitudes and values that endorse or predispose others toward criminal behavior. It is how people justify their behavior and see crime as an approach to reaching their objectives (Sykes & Matza,1957; Walters, 2006).

Criminal Thinking Styles

Criminal thinking styles are ways of thinking that support and maintain a criminal life. These styles involve rationalizations and justifications, cognitive reframing that enables the offender to commit crime without remorse. These elements are described as being entitled, or power oriented, and lacking accountability (Walters 1995; Yochelson & Samenow 1976).

Literature Review

Adverse childhood experiences (ACEs) have been associated with an increased risk of later criminal behavior. Most existing research on this topic has been conducted in Western developed countries, with cross-cultural studies being rare. For instance, Basta-Pereira et al. (2020) noted the lack of clarity in defining ACEs due to the diverse range of experiences it encompasses, including abuse, neglect, and household dysfunction. This diversity in ACEs and their cultural interpretations highlights the need for a more comprehensive understanding of how these experiences influence criminal behavior globally.

Leban and Gibson (2020) conducted a significant study examining the relationship between cumulative ACEs and delinquency among boys and girls aged 9 to 15 years in Chicago neighborhoods. Their findings indicated that cumulative ACEs were a significant risk factor for delinquency among both boys and girls. However, after controlling for various risk and protective factors, the ACE score remained a significant predictor of delinquency only among boys. This suggests that for females, the relationship between ACEs and delinquency might be influenced by other factors such as family dysfunction.

Basta-Pereira et al. (2020) further explored the relationship between specific ACEs and criminal behavior across diverse cultural and socio-economic backgrounds. Their study aimed to determine whether different ACEs (e.g., child abuse, neglect, family dysfunction) were independently associated with criminal behavior among young adults in ten countries across five continents. They found that ACEs have a cumulative effect on criminal behavior, with the impact varying by gender and socio-economic context.

The Unified Nations Development Program (UNDP) ranks countries based on three dimensions: education, health, and standard of living (Ngoo & Tey, 2019). This ranking provides insight into the social well-being and life satisfaction in different countries, further emphasizing the need for cross-cultural research on ACEs and their long-term effects.

Recent studies also highlight the role of psychosocial stress and socio-economic status (SES) in adulthood as mediators in the relationship between ACEs and health outcomes. Basto-Pereira et al. (2022) conducted a systematic review investigating the association of ACEs and childhood SES with allostatic load (AL) in adults. Their findings suggest that early psychosocial stress and low SES are related to higher AL, which in turn predicts adverse health outcomes in adulthood. This highlights the importance of considering psychosocial and socio-economic factors in understanding the long-term effects of ACEs.

Yun et al. (2022) examined the impact of trauma and school problems on offending behaviors among LGBTQ youth. Their study found that experiences of trauma and school-related issues significantly predicted delinquency and criminal behavior. The study also controlled for various socio-demographic factors, emphasizing the complex interplay between individual experiences and broader social influences on criminal behavior.

Squillaro (2023) explored the relationship between future time orientation and criminal thinking styles. The study measured multiple aspects of future time orientation, including impulsivity, self-control, delay discounting, and future time perspective. The findings supported previous research, indicating that higher future time orientation (e.g., lower impulsivity, higher self-control) was significantly associated with lower criminal thinking and fewer unlawful behaviors.

Overall, recent studies underscore the importance of understanding the multifaceted nature of ACEs and their long-term impact on criminal behavior. They highlight the need for cross-cultural research and consideration of various mediating factors, such as family dysfunction, socio-economic status, and psychosocial stress, to develop effective prevention and intervention strategies.

Hypotheses

- 1 It hypothesized that there is a relationship between adverse childhood experiences, criminal thinking styles and crime orientation among young adults.
- 2 It hypothesized that there is a mediating role of criminal thinking styles between adverse childhood experiences and crime orientation.

There is a difference between adverse childhood experiences, criminal thinking styles and crime orientation on demographic variables (Age, Religion, Gender, Education, Monthly pocket money, Marital status of your parents, Employment status, Family system).

Material and Methods

Research Design

The current study employed a correlational research strategy to facilitate the easy collection of data and to enable practical interpretation of observations.

Participants

A purposive sampling technique was used to collect data from 300 young adults aged 18-29 years from educational institutions in Punjab, Pakistan. An additional five participants were included to account for potential dropout and bias. The sample was drawn from universities and colleges, excluding working organizations and schools for those under 18.

Research Instruments

Adverse Childhood Experience (ACE) Scale: The ACE Scale measures ten types of childhood trauma, including abuse (physical, emotional, sexual) and family dysfunction (substance abuse, mental illness, incarceration of a family member, domestic violence, and parental separation or divorce). Each "Yes" response scores one point, with a cumulative score indicating the level of risk. A score above four indicates a high risk for developing long-term health and behavioral issues. The reliability of the ACE Scale has been reported with a Cronbach's alpha of 0.88, indicating high internal consistency (Dube et al., 2003). The scale's validity is supported by its significant correlations with various health outcomes (Felitti et al., 1998).

Measures of Criminal Attitude and Associates Scale (MCAA): The MCAA is a two-part self-report measure that assesses criminal associations and attitudes. Part A measures criminal affiliations, and Part B consists of 46 items assessing attitudes with subscales for Violence, Entitlement, Antisocial Intent, and Associates. The reliability of the MCAA subscales has been reported with Cronbach's alphas ranging from 0.70 to 0.85 (Jackson, 1971; Novaco, 1994). The scale's validity is demonstrated by its ability to differentiate between offenders and non-offenders and predict recidivism (Mills & Kroner, 2001).

The Psychological Inventory of Criminal Thinking Styles (PICTS): The PICTS is an 80-item self-report measure that assesses eight criminal thinking styles: mollification (Mo), cutoff (Co), entitlement (En), power orientation (Po), sentimentality (Sn), super optimism (So), cognitive indolence (Ci), and discontinuity (Ds). Each item is rated on a four-point Likert scale ranging from "strongly agree" to "strongly disagree." The reliability of the PICTS subscales is reported with Cronbach's alphas ranging from 0.69 to 0.92 (Walters, 1995). The validity of the PICTS is supported by its significant

correlations with criminal behavior and its predictive power for recidivism (Walters, 2002).

Procedure

Participants were briefed on the study's aims and assured of confidentiality. They completed the questionnaires in one session, taking approximately 45 minutes. Data were entered into SPSS for analysis.

Ethical Considerations

The study adhered to ethical guidelines of the American Psychological Association. Participants were informed about the study's purpose, assured of confidentiality, and participation was voluntary.

Data Analysis

Data were analyzed using IBM SPSS 23. Descriptive statistics (mean, standard deviation) and correlational analyses were conducted to examine the relationships between ACEs, crime orientation, and criminal thinking styles. Mediation analysis was performed using Process macro in SPSS to investigate the mediating role of criminal thinking styles.

Results and Discussion

This chapter presents the findings of the study on the impact of adverse childhood experiences (ACEs) on crime orientation among young adults, with a focus on the mediating role of criminal thinking styles. The analysis includes descriptive statistics, correlation analysis, and mediation analysis to understand the dynamics between these variables.

Table 1
Correlation between adverse childhood experiences, crime orientation and criminal thinking styles.

Variables	Mean	SD	PPC	SDM	SE
ACE	3.130	2.693	-	225**	215**
CO	71.686	6.927		-	.367**
CTS	29.307	5.301			-

Thinkin Styles.*correlation is significant at the 0.05 level (2-tail) **correlation is significant at the 0.01 level (2-tail)

The table 1 shows that Adverse Childhood Experiences have significant relationship with Crime Orientation and Criminal Thinking Styles. Adverse Childhood Experiences have Mean (3.13) and SD (2.693), Crime Orientation had Mean (71.686) and SD (6.927) and Criminal Thinking Styles have Mean (5.301) and SD (5.301). Correlation analysis between adverse childhood experiences, crime orientation and criminal thinking styles shows positive and significant relationship. Correlation is significant at the 0.05 level (2-tail) and 0.01 level (2-tailed). Its shows that ACE is positively significant correlated to MCA. ACE is positively significant correlated to PICTS. MCA is positively significant correlated to PICTS. PICTS is positively significant correlated to MCA.

Table 2
Linear regression to check the impact of adverse childhood experiences on criminal thinking styles.

Predictor	В	Std. Error	Beta	t	P
(Constant)	9.121	1.593		5.725	.000***
CTS	078	.031	152	-2.532	.012**

Note: $R^2 = .099$, Adjust $R^2 = .096$, (F=43.533, p $\leq 0.001***$)

According to Table 2, which used linear regression to examine the relationship between adverse childhood experiences and criminal thinking styles, there is a significant impact of adverse childhood experiences on criminal thinking styles among young adults. R2 = .099 and Adjust R2 = .096 with F=43.533 and $p \le 0.001$ indicate that there is a significant relationship between the independent variable adverse childhood experiences and the dependent variable criminal thinking styles.

Mediation Analysis

This analysis was done to explore the mediating role of criminal thinking styles and process macro was used for this purpose

Table 3
Mediation effect of Criminal Thinking styles on the relationship between Adverse Childhood Experience and Crime Orientation (N= 300)

Predictor	Crime Orientation					
	Model 1	Model 2			95% CL	
	В	В	∆ R2	Δ F	LL	UL
Constant	1.050	.923			.881	1.219
ACE	.275	.210			.120	.299
CT		.015			.054	.115
R2	.107	.190	.083			
F	35.61	34.70			30.28	

Note: CL= Confidence Interval, UL= Upper Limit, LL= Lower Limit

Table 3 shows that criminal thinking style had significant effect on adverse childhood experiences and crime orientation. Mediator had effect on both independent and dependent variables.

Direct Effect of X on Y

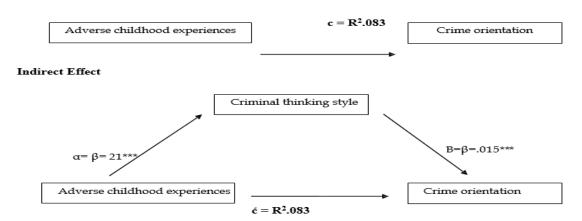


Figure 1 Mediating analysis for Criminal Thinking styles on the relationship between Adverse Childhood Experience and Crime Orientation

Conclusion

The impact of adverse childhood experiences (ACEs) on crime orientation among young adults is a complex issue that has garnered significant attention in psychology, criminology, and sociology. This study explores how ACEs influence criminal behavior and the mediating role of criminal thinking styles.

Adverse childhood experiences include various undesirable situations encountered during early life, such as physical, emotional, and sexual abuse, neglect, and exposure to domestic violence or substance abuse. Research indicates a substantial link between ACEs and an increased risk of engaging in criminal activities during adolescence and early adulthood (Fergusson et al., 2000; Widom et al., 2012).

Crime orientation refers to a person's tendency towards criminal actions, including theft, drug abuse, and violence. The relationship between ACEs and crime orientation is influenced by individual resilience and coping mechanisms.

Criminal thinking styles are patterns of thought that justify or rationalize criminal behavior. These may include cognitive distortions and justifications that enable individuals to minimize the perceived consequences of their actions. Studies show that individuals with criminal thinking styles are more prone to criminal behavior (Walters, 1995).

Several studies suggest that criminal thinking styles mediate the relationship between ACEs and crime orientation. Individuals who have experienced ACEs may develop maladaptive thinking patterns as a coping mechanism, increasing the likelihood of criminal behavior (Baldry et al., 2003; Swogger et al., 2010). For instance, someone who experienced childhood abuse might rationalize violence as a way to resolve conflicts or gain power.

Understanding the mediating role of criminal thinking styles has important implications for prevention and intervention. Early identification and support for individuals exposed to ACEs can prevent the development of maladaptive thinking patterns and reduce the risk of criminal behavior. Interventions focusing on cognitive-behavioral therapy and addressing cognitive distortions can help minimize criminal thinking styles and subsequent criminal behavior (McMurran, 2009).

Basto-Pereira et al. (2020) investigated the link between ACEs and criminal behavior across different cultures, highlighting that problematic household situations might exacerbate the links between ACEs and delinquency. This study underscores the importance of considering social and environmental factors in understanding the impact of ACEs.

Adverse childhood experiences can lead to long-lasting effects on health and behavior. Chronic criminal thinking styles predict criminal behavior, with individuals engaging in these thinking patterns at higher risk of criminal actions. Sutherland's Differential Association Theory suggests that criminal peer associations are a primary cause of criminal behavior.

Limitations of this study include the geographic focus on Punjab, potential subject bias, and limited generalizability due to cultural, socioeconomic, and regional differences. Additionally, the effects of ACEs and criminal thinking styles on crime orientation may evolve over time, and self-reported data on criminal behavior may not always be accurate.

Recommendations

- Future studies should collect data from a wider range of geographic areas and include more variables.
- Research should investigate the impact of parental neglect on crime orientation.
- Explore protective factors or interventions that mitigate the impact of ACEs on criminal thinking and behavior.
- Collaborate with community organizations to develop prevention strategies targeting ACEs and criminal thinking styles through educational programs, support services, and awareness campaigns.

By focusing on early intervention and support, it is possible to reduce the development of maladaptive thinking patterns and the subsequent risk of criminal behavior among individuals exposed to adverse childhood experiences.

References

- Anda, R. F., Felitti, V. J., Bremner, J. D., Walker, J. D., Whitfield, C., Perry, B. D., ... & Giles, W. H. (2006). The enduring effects of abuse and related adverse experiences in childhood. *European Archives of Psychiatry and Clinical Neuroscience*, 256(3), 174-186. https://doi.org/10.1007/s00406-005-0624-4
- Baldry, A. C., & Farrington, D. P. (2003). A comparison of bullying in English and Italian secondary school students. *Educational and Child Psychology*, 20(1), 58-72.
- Basto-Pereira, M., Começanha, R., Ribeiro, S., & Maia, Â. (2020). Long-term predictors of crime desistance in juvenile delinquents: A systematic review of longitudinal studies. *Aggression and Violent Behavior*, 50, 101338. https://doi.org/10.1016/j.avb.2019.101338
- Chan, K. L., & Yeung, J. W. (2009). Children living with violence within the family and its sequel: A meta-analysis from 1995–2006. *Aggression and Violent Behavior*, 14(5), 313–322. https://doi.org/10.1016/j.avb.2009.04.001
- Chung, E. K., Mathew, L., Rothkopf, A. C., Elo, I. T., Coyne, J. C., & Culhane, J. F. (2010). Parenting attitudes and infant spanking: The influence of childhood experiences. *Pediatrics*, 125(3), e376-e384. https://doi.org/10.1542/peds.2008-3247
- Clark, C., Caldwell, T., Power, C., & Stansfeld, S. A. (2010). Does the influence of childhood adversity on health persist across the life course? An analysis of prospective data. *Journal of Epidemiology & Community Health*, 64(4), 340-348. https://doi.org/10.1136/jech.2008.081225
- Dube, S. R., Anda, R. F., Felitti, V. J., Chapman, D. P., Williamson, D. F., & Giles, W. H. (2001). Childhood abuse, household dysfunction, and the risk of attempted suicide throughout the life span: Findings from the Adverse Childhood Experiences Study. *JAMA*, 286(24), 3089-3096. https://doi.org/10.1001/jama.286.24.3089
- Dube, S. R., Felitti, V. J., Dong, M., Chapman, D. P., Giles, W. H., & Anda, R. F. (2003). The impact of adverse childhood experiences on health problems: Evidence from four birth cohorts dating back to 1900. *Preventive Medicine*, *37*(3), 268-277. https://doi.org/10.1016/S0091-7435(03)00123-3
- Fergusson, D. M., Horwood, L. J., & Lynskey, M. T. (1997). Childhood sexual abuse, adolescent sexual behaviors, and sexual revictimization. *Child Abuse & Neglect*, 21(8), 789-803. https://doi.org/10.1016/S0145-2134(97)00039-2
- Felitti, V. J., Anda, R. F., Nordenberg, D., Williamson, D. F., Spitz, A. M., Edwards, V., ... & Marks, J. S. (1998). Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults: The Adverse Childhood Experiences (ACE) Study. *American Journal of Preventive Medicine*, 14(4), 245-258. https://doi.org/10.1016/S0749-3797(98)00017-8
- Gunn, J. F., & Canada, K. E. (2015). Adverse childhood experiences and suicidality: The role of self-compassion and hope. *Journal of Interpersonal Violence*, 30(6), 994-1010. https://doi.org/10.1177/0886260514539752
- Jackson, D. N. (1971). The dynamics of structured personality tests: 1971. *Psychological Review*, 78(3), 229-248. https://doi.org/10.1037/h0030879

- Leban, L., & Gibson, C. L. (2020). The role of gender in the relationship between adverse childhood experiences and delinquency: A multilevel path analysis. *Youth & Society*, 52(3), 411-435. https://doi.org/10.1177/0044118X18758840
- Maughan, B., & McCarthy, G. (1997). Childhood adversities and psychosocial disorders. British Medical Bulletin, 53(2), 156-169. https://doi.org/10.1093/oxfordjournals.bmb.a011606
- McMurran, M. (2009). The psychology of antisocial behavior. Wiley-Blackwell.
- Mills, J. F., & Kroner, D. G. (2001). The Criminal Sentiments Scale-Modified and Pride in Delinquency Scale: Psychometric properties and construct validity of two measures of criminal attitudes. *Criminal Justice and Behavior*, 28(4), 457-469. https://doi.org/10.1177/009385480102800404
- Mock, S. E., & Arai, S. M. (2011). Childhood trauma and chronic illness in adulthood: Mental health and socioeconomic status as explanatory factors and buffers. *Frontiers in Psychology*, *2*, 28. https://doi.org/10.3389/fpsyg.2011.00028
- Ngoo, Y. T., & Tey, N. P. (2019). Human development and life satisfaction in developing countries. *International Journal of Happiness and Development*, 5(2), 124-140. https://doi.org/10.1504/IJHD.2019.101523
- Noll, J. G., Trickett, P. K., Harris, W. W., & Putnam, F. W. (2009). The cumulative burden borne by offspring whose mothers were sexually abused as children: Descriptive results from a multigenerational study. *Journal of Interpersonal Violence*, 24(3), 424-449. https://doi.org/10.1177/0886260508317191
- Repetti, R. L., Taylor, S. E., & Seeman, T. E. (2002). Risky families: Family social environments and the mental and physical health of offspring. *Psychological Bulletin*, 128(2), 330-366. https://doi.org/10.1037/0033-2909.128.2.330
- Sykes, G. M., & Matza, D. (1957). Techniques of neutralization: A theory of delinquency. *American Sociological Review*, 22(6), 664-670. https://doi.org/10.2307/2089195
- Swogger, M. T., Walsh, Z., Homaifar, B., Caine, E. D., Conner, K. R., & Maisto, S. A. (2010). Predicting self- and other-directed violence among discharged psychiatric patients: The roles of anger and psychopathic traits. *Psychological Medicine*, 40(5), 789-799. https://doi.org/10.1017/S0033291709990977
- Valkenburg, P. M., & Peter, J. (2009). Social consequences of the internet for adolescents: A decade of research. *Current Directions in Psychological Science*, 18(1), 1-5. https://doi.org/10.1111/j.1467-8721.2009.01595.x
- Walters, G. D. (1995). The Psychological Inventory of Criminal Thinking Styles: Part I. Reliability and preliminary validity. *Criminal Justice and Behavior*, 22(3), 307-325. https://doi.org/10.1177/0093854895022003006
- Walters, G. D. (2002). The Psychological Inventory of Criminal Thinking Styles: Part III. Predictive validity. *International Journal of Offender Therapy and Comparative Criminology*, 46(3), 229-243. https://doi.org/10.1177/0306624X02463003
- Walters, G. D. (2006). Appraising, researching and conceptualizing criminal thinking: A personal view. *Criminal Behaviour and Mental Health*, 16(2), 87-99. https://doi.org/10.1002/cbm.619

- Widom, C. S., & Maxfield, M. G. (2001). An update on the "cycle of violence". *National Institute of Justice Research in Brief*, 1-8. https://www.ncjrs.gov/pdffiles1/nij/184894.pdf
- Widom, C. S., & Maxfield, M. G. (2012). Revisiting the cycle of violence: Findings from the National Institute of Justice. *Violence and Victims*, 27(3), 331-339. https://doi.org/10.1891/0886-6708.27.3.331
- Wickrama, K. A. S., & Noh, S. (2010). The long arm of community: Influence of childhood neighborhood disadvantage on adult health. *Journal of Health and Social Behavior*, 51(3), 291-306. https://doi.org/10.1177/0022146510378232
- Yochelson, S., & Samenow, S. E. (1976). *The criminal personality: A profile for change*. Jason Aronson.
- Yun, M., Kim, D., & Chung, S. (2022). The impact of trauma and school problems on offending behaviors among LGBTQ youth: A longitudinal analysis. *Journal of Interpersonal Violence*, 37(5-6), NP2845-NP2869.