Exploring Childhood Adversity, Aggression, and Self-Regulation: A Mediation Analysis

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Abstract

Childhood adversity leads to negative health outcomes, especially within low socioeconomic families. However, research involving this population is lacking; therefore, an exploratory study was conducted assessing the relationship between childhood adversity, aggression, and self-regulation while controlling for child age and sex. A questionnaire was administered to caregivers of children aged 6–18 months which used: the Beck Depression Inventory to assess adversity; the second subscale of the Child Behavior Checklist to assess aggression; and the Early Childhood Behavior Questionnaire to assess self-regulation. A mediation analysis then found that self-regulation partially mediated the association between childhood adversity and aggression—helping explain about one-third of their association. This potential identification of self-regulation as a protective factor for vulnerable children has important implications. Specifically, the development of interventions, especially arts-based ones, that promote self-regulation within schools in low socioeconomic neighbourhoods should be prioritized. However, being an exploratory study that relied on caregiver response items, more robust studies that include behavioural observations should first be conducted. Nonetheless, the findings of this paper shed light on an underserved population, which can create momentum for beneficial interventions that promote children's well-being.

Keywords: childhood adversity, aggression, self-regulation, low socioeconomic status, protective factors

Exploring Childhood Adversity, Aggression, and Self-Regulation: A Mediation Analysis

Adverse childhood experiences (ACEs), which are potentially traumatic events during childhood, are linked with negative health outcomes (Felitti et al., 1998). In fact, exposure to six or more ACEs has been linked with a reduction in life expectancy of 20 years (Felitti et al, 1998). From a public health perspective, this needs to be addressed because nearly half of all children in the United States have been exposed to ACEs (National Conference of State Legislatures, 2022). Understanding how the relationship between childhood adversity and negative health outcomes unfolds can help inform the development of effective interventions that focus on protective factors (Oh et al., 2018).

Adversity and Aggression

One of the negative health outcomes associated with childhood adversity is an increase in aggressive behaviour. For instance, Fischer et al. (2016) found that, compared to adolescents with no experience of interpersonal trauma, those who had experienced this type of trauma showed higher aggressive behaviour. Hostinar et al. (2023) proposed a biological model to explain this association, whereby children who experience adversity are theorized to have an unresolved and chronic stress response to the event, which can lead to aggressive behaviour over time. However, it is challenging to generalize across all ACEs since specific types of ACEs may lead to specific types of aggressive behaviour. To illustrate this, King (2023) found that ACEs relating to sexual and physical abuse were specifically associated with increased sexual aggression for these individuals. Moreover, children seem to engage more in aggressive behaviour during certain developmental periods, as shown by Salo et al. (2022). In their longitudinal study, Salo and colleagues (2022) reported that, out of adolescents with ACEs, 42.8% reported fighting in the last year when they were between 13–15 years old; however, this sharply decreased to only 10.4% when they were 17–20 years old. As such, the complexity of the link between childhood adversity and aggression begs for additional understanding of the developmental mechanisms

that help explain some of this connection. By doing so, identifying protective factors that help prevent aggression among at-risk children may be possible.

Self-Regulation as a Protective Factor

Self-regulation is a potential protective factor that has gathered a considerable amount of interest in relation to aggression. On a biological level, different levels of cortical thickness have been found in specific areas of the brain between individuals who have high self-regulation/low aggression and those who have low self-regulation/high aggression (Bounoua et al., 2022). Relatedly, Hsieh and Chen (2017) used self-report and behavioural measures to show that adults scoring higher on self-regulation tended to score lower on aggression. This trend seems to extend to children as well. For example, Robson et al.'s (2020) meta-analysis identified associations between higher self-regulation and subsequent lower aggression in childhood. From a developmental perspective, young children rely on caregivers as co-regulators, and gradually transition to self-regulation in later years. Disruptions in this co-regulation and transitional process—which are more likely to occur in families who experience early adversity—may lead to low self-regulation, and subsequently, to aggression (Gartner et el., 2018). Nonetheless, much remains to be explored in identifying the role of self-regulation in explaining the link between adversity and aggression in early childhood.

Present Study

The present study aims to solidify our understanding of the association between childhood adversity and aggression by exploring the potential mediating role of self-regulation for children aged 6–18 months from low socioeconomic families. This will help explain how exposure to adversity can affect pathways of kindness. Being an exploratory study, the methodology used has been designed to be as minimal as possible. Any noteworthy findings can inform more robust, comprehensive studies that can use this exploratory work as support. Childhood adversity was indexed using caregiver depression given that conceptualizations of ACEs include parental mental illness as a key indicator of early adversity

(Felitti et al, 1998). For aggression, an externalizing behaviour subscale was used due to its robustness within multiple studies (e.g., Biederman et al., 2020; Mazefsky et al., 2011). As for self-regulation, it was indexed using inhibitory control given the rapid development of this self-regulatory capacity during the developmental period (Bounoua et al., 2022; Hsieh & Chen, 2017) that is the focus of the current study. Finally, child age and sex were used as control variables.

Out of the many studies discussed above, few involved low socioeconomic participants; this study aims to fill this gap. Calls for fair representation of psychological research participants has been at the forefront of the "WEIRD" problem; where it was found that most participants tended to be from societies that were Western, educated, industrialized, rich, and democratic (Henrich et al., 2010). Additionally, not many seem to involve early years participants, which will also be addressed within this paper. This is crucial because our knowledge of the origins and early antecedents of kindness is limited. Identifying developmental mechanism variables (e.g., early social-emotional capacities, self-regulation skills) that explain links between adversity and aggression will inform developmentally sensitive avenues for intervention that will nurture kindness in children with diverse needs. Although not many studies regarding childhood adversity and aggression have incorporated low socioeconomic families who have young children aged 6–18 months, I predict that self-regulation will still partially mediate the relationship between childhood adversity and aggression. This is due in large part to the strong interactive links between adversity, aggression, and self-regulation in other types of participants that were described in the literature above.

Method

Participants

To be included in this study, participants had to: a) be a caregiver for a child between 6–18 months, b) have a household income under $125,000, and c) live in the Peel Region of Ontario, Canada. This was to ensure that the population of interest, low socioeconomic status families, was represented.

There were 104 adult participants between the ages of 23–42 years (*M* = 32.19, *SD* = 3.79). The age range of their children was between 6–18 months (*M* = 12.72, *SD* = 3.69). This was a convenience sample where participants were recruited from a digital family database at the University of Toronto Mississauga campus, which contains over 50,000 families from diverse backgrounds; they were contacted using a telephone recruitment script. Additionally, families were recruited through advertisements within childcare centers and social media. After participating, they received a $10 gift card and were entered in a draw to win one of three $50 gift cards. In terms of statistical power, an a priori power analysis computed on G*Power (version 3.1) indicated that 85 participants were needed to reach the desired power of 80% for an anticipated medium effect size.

Design and Materials

Participants answered an online survey through REDCap (https://project-redcap.org) from their homes between November 2020 and November 2022. The variables of interest were childhood adversity, aggression, and self-regulation.

Childhood Adversity

Childhood adversity was measured using caregiver self-report on 12 items from Beck's Depression Inventory (BDI; Beck et al., 1961). Each item related to the caregiver's depressive symptoms in the past two weeks and was rated on a 3-point Likert scale. An example of an item included "I do not feel sad" on one end of the scale, and "I am so sad and unhappy that I can't stand it" on the other end of the scale. BDI's internal consistency was adequate (α = .88).

Aggression

Child aggression was measured via caregiver report on 24 items from the Child Behavior Checklist (CBCL; Achenbach & Rescorla, 2000). Each item related to the caregiver's child's aggressive behaviour over the past two months and was rated on a 3-point Likert scale. An example of an item

included “Hits others”, and the scale ranged from “Not true” to “Very true or often true”. CBCL’s internal consistency was adequate (α = .88).

Self-Regulation

Self-regulation was measured using caregiver report on three items from the Early Childhood Behavior Questionnaire (ECBQ; Putnam et al., 2014) relating to inhibitory control. Each item related to the caregiver’s child’s behaviour in the past two weeks and was rated on a 7-point Likert scale. An example of an item included “When asked to wait for a desirable item (such as ice cream), how often did your child wait patiently?”, and the scale ranged from “Never” to “Always”. ECBQ’s internal consistency was adequate (α = .75).

Procedure

Ethics approval was obtained from the University of Toronto’s Research Ethics Board. Participants provided consent prior to completing the online survey. The consent form advised participants that this study examined the development of children’s emotions and prosocial behaviour in their early years. After this form, caregivers answered demographic questions, followed by questions relating to the three variables of interest: childhood adversity, aggression, and self-regulation. Upon completion of the survey, participants read a debrief form that provided more details about the study, such as the focus of the questions relating to the overall development of kindness among children.

Results

Descriptive Statistics

Demographic statistics of all 104 participants can be found below in Table 1. The children’s sex was about evenly split (53% female, 47% male), but the participating caregiver sex was not (93% female, 7% male). Almost half (48%) of these caregivers were aged 30–34, and most of them were married (60%). Additionally, a fair share of caregivers were either unemployed (39%) or working full-time (37%), and almost half (40%) of their yearly household incomes were under $50,000. In terms of highest level

of education completed, most had a college diploma (32%) or a bachelor's degree (32%). As for ethnicity, the majority were Western European (24%), followed by Other (17%), and South or Southeast Asian (14%). Lastly, over one-third (37%) of caregivers indicated that they were immigrants.

Table 1

Demographic Characteristics of Participants

Baseline characteristics	*n*	%
Sex of Child		
Female	55	53
Male	49	47
Age of Child (months)		
6–8	24	23
9–11	21	20
12–14	25	24
15–18	34	33
Sex of Caregiver		
Female	97	93
Male	7	7
Age of Caregiver (years)		
20–24	3	3
25–29	22	21
30–34	50	48
35–39	25	24
40–44	4	4
Marital Status		
Single	19	18
Married	62	60
Common-law	21	20

Baseline characteristics	n	%
Separated	1	1
No Answer	1	1
Yearly Household Income		
Less than $9,999	5	5
$10,000–19,999	4	4
$20,000–29,999	8	8
$30,000–39,999	10	10
$40,000–49,999	13	13
$50,000–59,999	8	8
$60,000–69,999	8	8
$70,000–79,999	21	20
$80,000–124,999	20	19
No Answer	7	7
Employment Status		
Full-time	38	37
Part-time	24	23
Not Employed	41	39
No Answer	1	1
Highest Level of Education		
No Diploma	3	3
High School Diploma	17	16
Apprenticeship or Trades Diploma	2	2
College Diploma	33	32
Bachelor’s Degree	31	30
Master’s Degree	13	13
PhD Degree	4	4
No Answer	1	1
Ethnicity		

Baseline characteristics	n	%
African	3	3
Central or South American	12	12
East Asian	9	9
Eastern Europe	7	7
Indigenous	3	3
Middle Eastern	5	5
South or Southeast Asian	14	14
Western European	24	23
West or Central Asian	1	1
Other	17	16
No Answer	13	13
Immigrant		
No	66	64
Yes	37	36
No Answer	1	1

Data Checks

Before the mediation analysis was conducted, relevant assumption checks were completed. This included ensuring that the variables of interest showed a linear relationship on a scatterplot, along with a normal distribution on a histogram and a probability plot. Additionally, it was ensured that the variables did not indicate multicollinearity and that outliers were omitted (i.e., *z* scores above 3 and below -3).

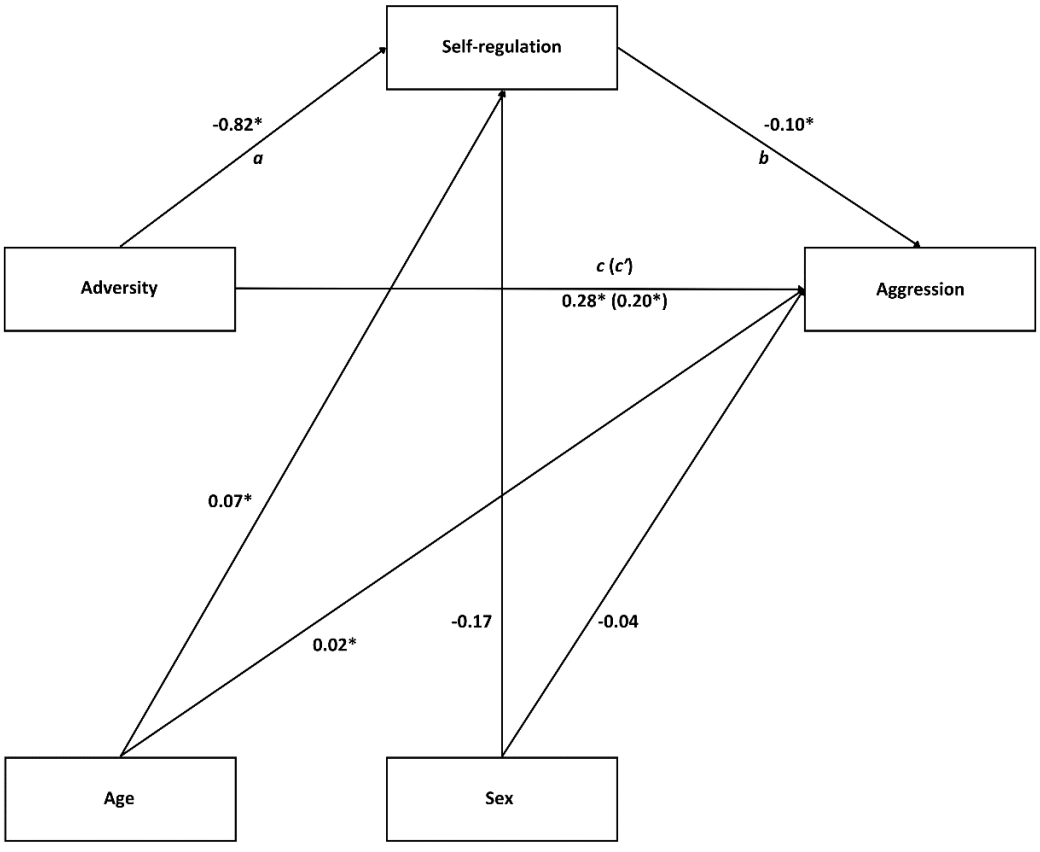
Mediation Analysis

This study assessed self-regulation as a mediator of the association between adversity and aggression among children; this was done while controlling for the child's age and sex. Based on the previously discussed literature, I hypothesized that self-regulation would partially mediate the

relationship between adversity and aggression. To this end, a mediation analysis was conducted using the PROCESS v4.2 macro (Hayes, 2022) in IBM SPSS Statistics (Version 28). The significance of the indirect effect was assessed with a bootstrap procedure (Preacher & Hayes, 2004). Specifically, 5,000 bootstrap resamples were used to estimate the indirect, direct, and total effects. The statistical significance of these effects was evaluated using 95% confidence intervals, in which any interval that did not include 0 was deemed as statistically significant.

Figure 1

Mediation Model of Adversity on Aggression through Self-regulation with Age and Sex as Covariates



Note. Computed in SPSS software. Statistically significant unstandardized coefficients are marked with an asterisk. Parenthetical value is the direct effect.

Figure 1 depicts the tested mediation model. This analysis showed that there was a statistically significant indirect effect of adversity on aggression through self-regulation (*b* = 0.08, *SE* = 0.03, 95% CI [0.03, 0.14], β = .12). Specifically, the *a* pathway of adversity on self-regulation was statistically significant (*b* = -0.82, *SE* = 0.25, 95% CI [-1.32, -0.33], β = -.31) such that higher adversity was associated with lower self-regulation. As for the *b* pathway of self-regulation on aggression, it was also statistically significant (*b* = -0.10, *SE* = 0.02, 95% CI [-0.14, -0.06], β = -.40) such that higher self-regulation was associated with lower aggression. Age as a covariate predicted self-regulation (*b* = 0.07, *SE* = 0.03, 95% CI [0.01, 0.14], β = .20) and aggression (*b* = 0.02, *SE* = 0.01, 95% CI [0.01, 0.04], β = .24). Child sex did not predict self-regulation (*b* = -0.17, *SE* = 0.25, 95% CI [-0.67, 0.33], β = -.06) or aggression (*b* = -0.04, *SE* = 0.05, 95% CI [-0.15, 0.06], β = -.07). Additionally, there was a statistically significant direct effect of adversity on aggression (*b* = 0.20, *SE* = 0.06, 95% CI [0.09, 0.31], β = .30) such that higher adversity was associated with higher aggression when considering self-regulation. However, this was a decrease from the total effect of adversity on aggression (*b* = 0.28, *SE* = 0.06, 95% CI [0.16, 0.39], β = .43). Therefore, when controlling for age and sex, self-regulation partially mediated the relationship between adversity and aggression; it accounted for 29% of that relationship. This means that, as hypothesized, more adversity is associated with more aggression when keeping child age and sex constant, and reduced self-regulation explains some of this association.

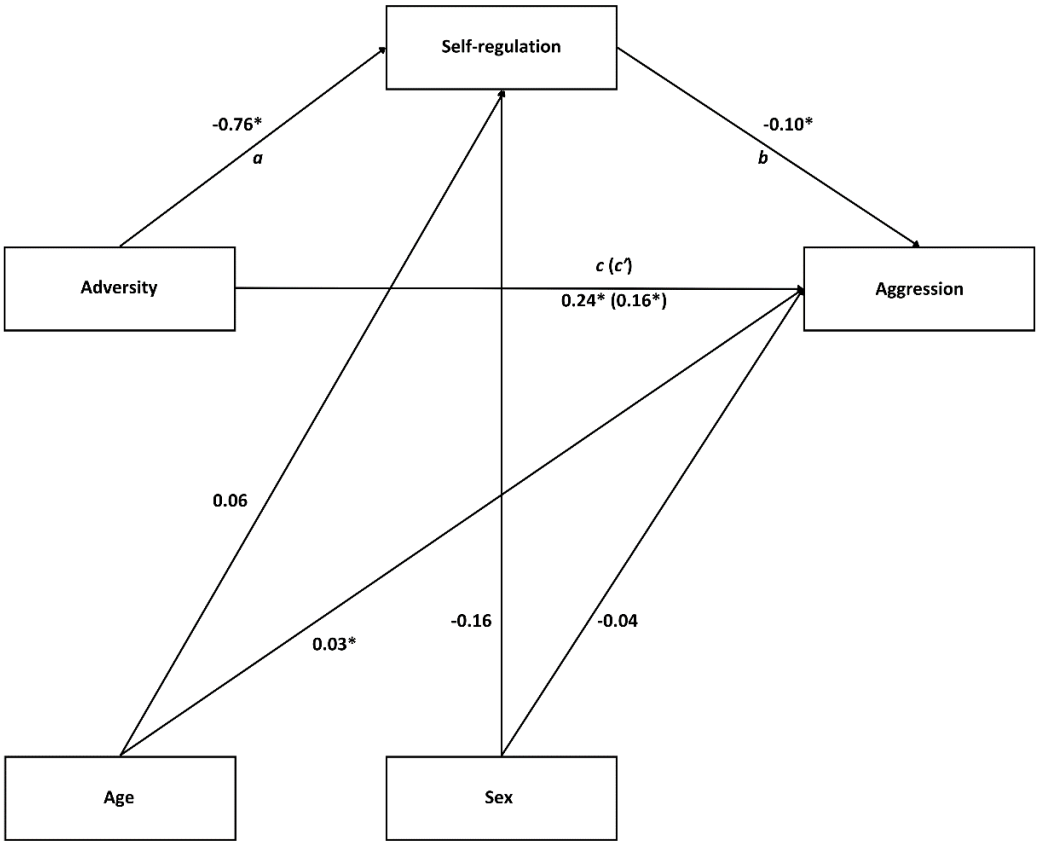
Sensitivity Analysis

To test the robustness of the results above, a sensitivity analysis was computed in Mplus (version 8.9). This was done due to the relatively high number of missing values for one of the variables of interest, self-regulation (19%); along with the subsequent statistically significant result of Little's (1988) Missing Completely at Random (MCAR) test (*p* = .04). Participants' demographic information was analyzed to detect any patterns among individuals with and without missing data; no such patterns were found.

Unlike the originally used software, IBM SPSS Statistics (Version 28), Mplus utilizes full information maximum likelihood (FIML) to estimate missing data. FIML is robust to violations of MCAR (Enders, 2010) and has also been shown to be robust with 20% (and more) missing data (Dong & Peng, 2013). Additionally, similar to SPSS, 5,000 bootstrap resamples were used to estimate the indirect, direct, and total effects. The statistical significance of these effects was also evaluated using 95% confidence intervals, in which any interval that did not include 0 was deemed as statistically significant.

Figure 2

Mediation Model of Adversity on Aggression through Self-regulation with Age and Sex as Covariates



Note. Computed in Mplus software. Statistically significant unstandardized coefficients are marked with an asterisk. Parenthetical value is the direct effect.

The mediation analysis within Mplus (Figure 2) indicated very similar results to the ones originally computed with SPSS. Due to it utilizing FIML, it was able to include 117 participants, as opposed to only 104 participants for SPSS. The Mplus analysis showed that there was a statistically significant indirect effect of adversity on aggression through self-regulation (*b* = 0.08, *SE* = 0.03, 95% CI [0.03, 0.14], β = .12). The *a* pathway of adversity on self-regulation was statistically significant (*b* = -0.76, *SE* = 0.27, 95% CI [-1.29, -0.23], β = -.29) such that higher adversity was associated with lower self-regulation. As for the *b* pathway of self-regulation on aggression, it was also statistically significant (*b* = -0.10, *SE* = 0.02, 95% CI [-0.14, -0.06], β = -.41) such that higher self-regulation was associated with lower aggression. However, unlike what was found in SPSS, age as a covariate did not predict self-regulation (*b* = 0.06, *SE* = 0.04, 95% CI [-0.01, 0.13], β = .19); but, similar to the SPSS results, it did predict aggression (*b* = 0.03, *SE* = 0.01, 95% CI [0.01, 0.04], β = .30). As for the covariate of sex, it did not predict self-regulation (*b* = -0.16, *SE* = 0.26, 95% CI [-0.66, 0.33], β = -.06) or aggression (*b* = -0.04, *SE* = 0.05, 95% CI [-0.14, 0.06], β = -.07). Additionally, there was a statistically significant direct effect of adversity on aggression (*b* = 0.16, *SE* = 0.06, 95% CI [0.05, 0.27], β = .25) such that higher adversity was still linked to higher aggression when considering self-regulation. However, this was a decrease from the total effect of adversity on aggression (*b* = 0.24, *SE* = 0.06, 95% CI [0.11, 0.36], β = .37). Therefore, when controlling for age and sex, self-regulation still partially mediated the relationship between adversity and aggression; it accounted for a slightly larger value than what was found in SPSS, explaining 33% of the association between adversity and aggression.

Discussion

This study explored the role of self-regulation as a mediator of the association between childhood adversity and aggression. The goal was to see to what extent self-regulation serves as a mechanism variable that explains the link between adversity and aggression. As predicted, self-

regulation did in fact partially mediate the association between adversity and aggression; helping explain nearly one-third of this relationship.

Limitations

Before analyzing these promising results further, several limitations of this study must be addressed. To start, this was simply an exploratory study; adversity was only operationalized in a cross-sectional design with BDI; self-regulation with the inhibitory control items of the ECBQ; and aggression with a subscale of the CBCL. Future work should strive to reexamine these associations using a longitudinal design and a multi-method and multi-informant approach. Therefore, generalizing these results should be approached with caution. However, the outcome of this mediation analysis has opened the door for future exciting work, which will be discussed shortly. Another limitation of this study involves potential response bias found within the caregiver report items used; this has been an issue in research that many have attempted to address (Rosenman et al., 2011). However, counterarguments defending caregiver report measures due to their ecological validity should also be considered (Geeraerts et al., 2021). Additionally, recruitment used a convenience sampling approach, so even within the population of interest (i.e., low socioeconomic families), generalizability may be challenging. Finally, the data was obtained during the beginning of the COVID-19 pandemic. Therefore, the potential confounding effects of the pandemic on factors such as adversity, aggression, or self-regulation, may have influenced the results above.

Implications

Aligning with the initially discussed literature, my results revealed a strong link between adversity and aggression; and similar to the self-regulation studies discussed earlier, my results identified associations between adversity and self-regulation, and self-regulation and aggression. Prior to this mediation analysis, the anticipated nature of this relationship was uncertain due to the low number of past studies involving low socioeconomic families and very young children. However, the

resounding 29% explanation of the association of adversity on aggression by self-regulation highlights the potential need for developing interventions that target self-regulation for children within schools, daycares, and residences within low socioeconomic neighborhoods.

This seems to make the earlier discussed public health concern involving childhood adversity and negative health outcomes even more pressing for low socioeconomic families. In fact, low socioeconomic families generally experience more adversity than higher-income families (Suglia et al., 2022; Walsh et al., 2019). As discussed earlier, this change appears to be occurring at the biological level as well in terms of the brain's cortical thickness (Bounoua et al., 2022). However, promising findings involving brain plasticity and arts-based interventions (Konopka, 2014; Sowden et al., 2015) give hope to these communities. A full-scale implementation of arts-based interventions that target self-regulation could be of great value for the development of these at-risk children.

Future Directions

Due to the exploratory nature of this study, the findings discussed should be elaborated upon within a more rigorous setting. Importantly, child behavioural assessments should be implemented in future research. This could then be compared to the caregiver's self-reported data from questionnaires to make any conclusions stronger. Taking this step is especially important since there can be discrepancies between caregivers' self-report and the actual experiences of their children (Caqueo-Urizar, 2022). Relatedly, multiple types of questionnaires should be used to measure adversity, aggression, and self-regulation.

This study used inhibitory control as an index of self-regulation, however, inhibitory control is only one part of self-regulation. Whereas inhibitory control focuses on the successful suppression of unwanted thoughts and behaviours (Rothbart et al., 2001), self-regulation involves various components such as planning, error correction, and working memory (Roberts et al., 1998; Stuss & Benson, 1986). Therefore, future studies should consider various ways of measuring self-regulation.

Finally, after future research corroborates this exploratory study, translational research that develops interventions promoting self-regulation should be prioritized. Since self-regulation was found to account about one-third of the association between adversity and aggression, it would be beneficial to conduct a longitudinal, independent-measures study that assigns one group of participants with a self-regulation intervention, and another with a standard practice intervention. Additionally, comparing these groups to a control group of higher-income families might clarify the urgency needed to help low socioeconomic families. These results, over time, could help further elucidate the role of self-regulation on aggression for children who experience adversity. For instance, comedic improvisation has shown promising evidence of supporting the development of self-regulation for individuals; DeMichele and Kuenneke (2021) found it to especially help adolescents with ACEs. Therefore, as discussed previously, arts-based interventions may especially be of interest for future researchers.

Conclusion

As shown, self-regulation accounted for one-third of the association between childhood adversity and aggression within low socioeconomic families who had young children aged 6 –18 months. Due to the gap in the literature focusing on this population, translational research is less likely to occur and they are less likely to be the recipients of beneficial interventions. This exploratory study aimed to counter this by shedding light on the needs of these families. It has done so by highlighting the mediating role of self-regulation and its potential identification as a protective factor for at-risk children. Future research should focus on advocating for the rights of children from low-income backgrounds so that they can avoid negative health outcomes. As discussed, the pervasive nature of ACEs on child development have been well-documented, but low socioeconomic families seemed to have been neglected; I hope that my study inspires future interventions that helps these families. Many types of interventions promoting self-regulation among children are possible, especially arts-based ones, and

action should urgently be taken to mobilize these potential remedies to the families that need them the most.

References

Achenbach, T. M., & Rescorla, L. A. (2000). *Manual for the ASEBA preschool forms & profiles: An integrated system of multi-informant assessment.* ASEBA.

Beck, A. T., Ward, C. H., Mendelson, M., Mock, J., & Erbaugh, J. (1961). An inventory for measuring depression. *Archives of General Psychiatry, 4*, 561–571. https://doi.org/10.1001/archpsyc.1961.01710120031004

Biederman, J., DiSalvo, M., Vaudreuil, C., Wozniak, J., Uchida, M., Yvonne Woodworth, K., Green, A., & Faraone, S. V. (2020). Can the Child Behavior Checklist (CBCL) help characterize the types of psychopathologic conditions driving child psychiatry referrals? *Scandinavian Journal of Child and Adolescent Psychiatry and Psychology*, *8*, 157–165. https://doi.org/10.21307/sjcapp-2020-016

Bounoua, N., Spielberg, J. M., & Sadeh, N. (2022). Clarifying the synergistic effects of emotion dysregulation and inhibitory control on physical aggression. *Human Brain Mapping, 43*(17), 5358–5369. https://doi.org/10.1002/hbm.26012

Caqueo-Urizar, A., Urzua, A., Villalonga-Olives, E., Atencio-Quevedo, D., Irarrazaval, M., Flores, J., & Ramirez, C. (2022). Children's mental health: Discrepancy between child self-reporting and parental reporting. *Behavioral Sciences*, *12*(10), 401. https://doi.org/10.3390/bs12100401

DeMichele, M. & Kuenneke, S. (2021). Short-form, comedy improv affects the functional connectivity in the brain of adolescents with complex developmental trauma as measured by qEEG: A single group pilot study. *Neuroregulation*, *8*(1), 2–13. https://doi.org/10.15540/nr.8.1.2

Dong, Y., & Peng, C. Y. (2013). Principled missing data methods for researchers. *SpringerPlus*, *2*(1), Article 222. https://doi.org/10.1186/2193-1801-2-222

Enders, C. K. (2010). *Applied missing data analysis.* Guilford Press.

Felitti, V. J., Anda, R. F., Nordenberg, D., Williamson, D. F., Spitz, A. M., Edwards, V., Koss, M. P., & 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

Fischer, S., Dolitzsch, C., Schmeck, K., Fegert, J. M., & Schmid, M. (2016). Interpersonal trauma and associated psychopathology in girls and boys living in residential care. *Children and Youth Services Review, 67,* 203–211. https://doi.org/10.1016/j.childyouth.2016.06.013

Gartner, K. A., Vetter, V. C., Schaferling, M., Reuner, G., & Hertel, S. (2018). Inhibitory control in toddlerhood—The role of parental co-regulation and self-efficacy beliefs. *Metacognition and Learning, 13*(3), 241–264. https://doi.org/10.1007/s11409-018-9184-7

Geeraerts, S. B., Endendijk, J. J., Deković, M., Huijding, J., Deater-Deckard, K., & Mesman, J. (2021). Inhibitory control across the preschool years: Developmental changes and associations with parenting. *Child Development*, *92*(1), 335–350. https://doi.org/10.1111/cdev.13426

Hayes, A. F. (2022). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach* (3rd ed.). The Guilford Press.

Henrich, J., Heine, S. J., & Norenzayan, A. (2010). The weirdest people in the world? *The Behavioral and brain sciences*, *33*(2-3), 61–135. https://doi.org/10.1017/S0140525X0999152X

Hostinar, C. E., Swartz, J. R., Alen, N. V., Guyer, A. E., & Hastings, P. D. (2023). The role of stress phenotypes in understanding childhood adversity as a transdiagnostic risk factor for psychopathology. *Journal of Psychopathology and Clinical Science, 132*(3), 277–286. https://doi.org/10.1037/abn0000619

Hsieh, I. J., & Chen, Y. Y. (2017). Determinants of aggressive behavior: Interactive effects of emotional regulation and inhibitory control. *PLOS ONE*, *12*(4), Article e0175651. https://doi.org/10.1371/journal.pone.0175651

King, A. R. (2023). Childhood adversity associations with sexual assault perpetration. *Journal of Family Trauma, Child Custody & Child Development, 20*(2), 135-156. https://doi.org/10.1080/26904586.2022.2112356

Konopka, L. M. (2014). Where art meets neuroscience: A new horizon of art therapy. *Croatian Medical Journal*, *55*(1), 73–74. https://doi.org/10.3325/cmj.2014.55.73

Little, R. J. A. (1986). A test of missing completely at random for multivariate data with missing values. *Journal of the American Statistical Association*, *83*(404), 1198–1202. https://doi.org/10.2307/2290157

Mazefsky, C. A., Anderson, R., Conner, C. M., & Minshew, N. (2011). Child Behavior Checklist scores for school-aged children with autism: Preliminary evidence of patterns suggesting the need for referral. *Journal of Psychopathology and Behavioral Assessment*, *33*(1), 31–37. https://doi.org/10.1007/s10862-010-9198-1

National Conference of State Legislatures. (2022, August 23). *Adverse childhood experiences*. https://www.ncsl.org/health/adverse-childhood-experiences

Oh, D. L., Jerman, P., Silverio Marques, S., Koita, K., Purewal Boparai, S. K., Burke Harris, N., & Bucci, M. (2018). Systematic review of pediatric health outcomes associated with childhood adversity. *BMC Pediatrics, 18*(1), 83. https://doi.org/10.1186/s12887-018-1037-7

Preacher, K. J., & Hayes, A. F. (2004). SPSS and SAS procedures for estimating indirect effects in simple mediation models. *Behavior Research Methods, Instruments, & Computers, 36*(4), 717-731. https://doi.org/10.3758/BF03206553

Putnam, S. P., Helbig, A. L., Gartstein, M. A., Rothbart, M. K., & Leerkes, E. (2014). Development and assessment of short and very short forms of the infant behavior questionnaire-revised. *Journal of Personality Assessment, 96*(4), 445–458. https://doi.org/10.1080/00223891.2013.841171

Roberts, A. C., Robbins, T. W., & Weiskrantz, L. (Eds.). (1998). *The prefrontal cortex: Executive and cognitive functions.* Oxford University Press. https://doi.org/10.1093/acprof:oso/9780198524410.001.0001

Robson, D. A., Allen, M. S., & Howard, S. J. (2020). Self-regulation in childhood as a predictor of future outcomes: A meta-analytic review. *Psychological Bulletin, 146*(4), 324–354. https://doi.org/10.1037/bul0000227

Rosenman, R., Tennekoon, V., & Hill, L. G. (2011). Measuring bias in self-reported data. *International Journal of Behavioural & Healthcare Research*, *2*(4), 320–332. https://doi.org/10.1504/IJBHR.2011.043414

Rothbart, M. K., Ahadi, S. A., Hershey, K. L., & Fisher, P. (2001). Investigations of temperament at three to seven years: The Children's Behavior Questionnaire. *Child Development*, *72*(5), 1394–1408. https://doi.org/10.1111/1467-8624.00355

Salo, M., Appleton, A. A., & Tracy, M. (2022). Childhood adversity trajectories and violent behaviors in adolescence and early adulthood. *Journal of Interpersonal Violence*, *37*(15-16), NP13978–NP14007. https://doi.org/10.1177/08862605211006366

Sowden, P. T., Clements, L., Redlich, C., & Lewis, C. (2015). Improvisation facilitates divergent thinking and creativity: Realizing a benefit of primary school arts education. *Psychology of Aesthetics, Creativity, and the Arts, 9*(2), 128–138. https://doi.org/10.1037/aca0000018

Suglia, S. F., Saelee, R., Guzmán, I. A., Elsenburg, L. K., Clark, C. J., Link, B. G., & Koenen, K. C. (2022). Child socioeconomic status, childhood adversity and adult socioeconomic status in a nationally representative sample of young adults. *SSM - Population Health*, *18*, Article 101094. https://doi.org/10.1016/j.ssmph.2022.101094

Stuss, D. T., & Benson, F. D. (1986). *The frontal lobes*. Raven Press.

Walsh, D., McCartney, G., Smith, M., & Armour, G. (2019). Relationship between childhood socioeconomic position and adverse childhood experiences (ACEs): A systematic review. *Journal of Epidemiology and Community Health*, *73*(12), 1087–1093. https://doi.org/10.1136/jech-2019-212738