

MOTHER–ADOLESCENT CONFLICT AND ADOLESCENT DEPRESSIVE SYMPTOMS: THE MODERATING ROLE OF ENVIRONMENTAL SENSITIVITY AND NEUROTICISM

Andreja Brajša-Žganec, Marija Džida, Ljiljana Kaliterna Lipovčan,
Marina Kotrla Topić, & Tamara Bolić
Institute of Social Sciences Ivo Pilar, Zagreb (Croatia)

Abstract

Adolescent depressive symptoms are shaped by both parenting experiences and individual differences in personality and sensitivity. The present study examined whether mother–adolescent conflict predicts adolescent depressive symptoms above and beyond maternal warmth, involvement, and autonomy support, and whether adolescents' environmental sensitivity and neuroticism moderate this association. Participants were 241 adolescents (M age = 16.86 years; 59% female) who completed measures of perceived conflict with their mothers, maternal parenting behaviors, environmental sensitivity, neuroticism, and depressive symptoms. Regression analyses indicated that mother–adolescent conflict significantly predicted higher depressive symptoms even after controlling for adolescents' age, gender, personality characteristics, and mothers' parenting behaviors. Furthermore, this association was moderated by environmental sensitivity: highly sensitive adolescents reported greater depressive symptoms under conditions of high conflict, whereas less sensitive adolescents were relatively unaffected. In contrast, neuroticism did not moderate this link. These findings are consistent with a diathesis–stress model, suggesting that environmental sensitivity functions as a vulnerability factor that heightens the emotional impact of conflict with mothers. Results underscore the importance of considering both contextual stressors and individual susceptibility when examining risk for adolescent depression.

Keywords: *Depressive symptoms, environmental sensitivity, neuroticism, parenting behaviors.*

1. Introduction

As the prevalence of depressive symptoms in adolescence increases globally (Shorey, Ng, & Wong, 2021), exploring potential contextual and personal factors that may contribute to their development and upkeep is constantly important. Issues in the adolescent's immediate social environment could pose a risk to their mental health. Specifically, a lack of a harmonious relationship between teens and their parents characterized by conflict and disagreement has been related with higher rates of depressive symptoms in multiple studies (Wang & Tang, 2025). Although increased conflict is common and even normative for this developmental period (Laursen, Coy, & Collins, 1998), frequent fighting may reduce the perceived parental social support adolescents still rely on undermining healthy development. Besides the contexts they grow up in, adolescents differ in how they perceive and process those contexts. Some may be more vulnerable than others to effects of their environment. Namely, according to the diathesis–stress model (Monroe & Simons, 1991), certain individuals possess traits which make them more susceptible to external stressors than other individuals. Going along with this logic, inherently more vulnerable adolescents who are in conflictual environments may be more likely to experience depressive symptoms than adolescents who aren't as vulnerable. Vulnerabilities can come in many forms. Certain personality traits, physiology markers or genes could act as predispositions for depressive symptoms in stressful environments. For example, high neuroticism which is characterized by a tendency to experience negative affect, respond poorly to environmental stress and experience minor frustrations as overwhelming (Widiger & Oltmanns, 2017), has been found to moderate the link between some stressful situations and various outcomes such as internet gaming disorder (Li et al., 2022) and depressive symptoms (Hutchinson & Williams, 2007). On the other hand, in some research neuroticism did not moderate the relationship between negative life events and life satisfaction in adolescents (Jovanović, 2019). Another potential source of personal vulnerability might be levels of the adolescent's environmental sensitivity (Pluess, 2015). While the environmental sensitivity framework postulates that highly sensitive individuals are more affected by negative environments, it also assumes that the same highly sensitive individuals may benefit disproportionately

from supportive environments (Pluess & Belsky, 2013). It has been proposed that sensitive individuals may suffer more from mental health issues due to feeling more easily overstimulated by both external and internal factors (Brindle, Moulding, Bakker, & Nedeljkovic, 2015), and due to their deeper cognitive processing of stimuli (Lionetti et al., 2022). A recent meta-analysis revealed a relationship between sensitivity and mental health problems such as depression, anxiety, psychosomatic symptoms, OCD and others (Falkenstein, Sartori, Malanchini, Hadfield, & Pluess, 2025). This type of sensitivity is related to personality traits but distinct from them (Lionetti et al., 2019) so it is important to explore its unique contribution to mental health outcomes in adolescence.

2. Objectives

Both mentioned possible frames of reference which we can view individual differences through serve as valuable lenses that we can apply when exploring the interaction between the parent-adolescent relationships and adolescent mental health outcomes. Therefore, the goal of this study was to examine the role of mother-adolescent conflict in predicting adolescent depressive symptoms and to explore the possible moderating role of neuroticism and environmental sensitivity in this relationship. We assume that mother-adolescent conflict will predict depressive symptoms above and beyond adolescents' age, gender, personality characteristics, and mothers' parenting behaviors. We also assume that neuroticism and environmental sensitivity could each serve as possible moderators in this relationship.

3. Methods

3.1. Participants and procedure

The current study was conducted with data from the pilot study within the TEEN-WELL project which is focused on measuring well-being indicators in various contexts in adolescence. Data collection took place in May of 2025. Participants completed online questionnaires which were administered in schools by their school psychologist. The final number of participants in the pilot study included 241 adolescents who were between 15 and 19 years of age ($M = 16.86$). There were 59% female participants.

3.2. Measures

All participants completed measures of depressive symptoms, environmental sensitivity, perceived parenting behavior as well as sociodemographic data (age, gender). Environmental sensitivity was measured with the extended Highly Sensitive Child Scale (Pluess et al., 2018) HCS-21 constructed by Weyn et al. (2021). The scale consists of 21 items (e.g. Loud noises make me feel uncomfortable) in which participants assessed how well each item describes them on a scale from 1 (not at all) to 7 (completely). Cronbach's alpha in the current study for this scale was .86. Depressive symptoms in the current study were measured with the Patient Health Questionnaire (PHQ-9; Kroenke, Spitzer, & Williams, 2001) which is a multipurpose instrument for evaluating the severity of depressive symptoms. On a scale from 0 (not at all) to 3 (almost every day) participants reported which symptoms experienced and their severity. In the current study, the last item (evaluates suicidality symptoms), was omitted from the questionnaire. Internal consistency of the questionnaire was .85. Positive maternal parenting behaviors were evaluated by a composite of participant's estimations of their mother's warmth, autonomy support and involvement. These evaluations were collected with the Perceptions of Parents Scales (POPS; Grolnick, Deci, & Ryan, 1997) in which participants estimate how accurately each statement describes their parent on a scale from 1 (not true at all), to 7 (completely true). The scale consists of 21 items and the internal consistency for each of the subscales was 0.86 for involvement, 0.89 for warmth and 0.85 for autonomy. Subscale means were computed and summed to create a composite score, which was used in all analyses. Negative maternal parenting behaviors were evaluated by participant's estimations of conflict with their mother. Using items from Bülow, van Roekel, Boele, Denissen and Keijsers (2022) participants filled out 4 items in which they estimated how much they agree with each statement from 1 (completely disagree) to 5 (completely agree). Internal consistency of the scale in the current study was .85. Neuroticism was measured with the neuroticism subscale of the 15-item version International Personality Item Pool (Goldberg, 1999). On three items participants estimated how accurately each statement represents them from 1 (completely inaccurate) to 5 (completely accurate). Internal consistency was .65.

4. Results

Analyses were conducted in IBM SPSS and the PROCESS Macro extension by Hayes (2017). Descriptive statistics (M , SD , range) as well as skewness and kurtosis measures of all used variables are shown in Table 1.

Table 1. Descriptive statistics of variables use in the current study. (N=241).

	N	Mean	SD	Range	Minimum	Maximum	Skewness	SE	Kurtosis	SE
POPS	237	16.943	3.680	16.50	4.50	21.00	-1.245	0.158	0.968	0.315
Neuroticism	241	9.091	2.683	12	3	15	-0.193	0.157	-0.242	0.312
HCS-21	241	89.004	19.483	123.00	22.00	145.00	0.187	0.157	0.283	0.312
Conflict	239	2.051	0.911	4.00	1.00	5.00	0.658	0.157	-0.243	0.314
Depressive symptoms	241	0.961	0.666	2.88	0.00	2.88	0.518	0.157	-0.509	0.312

Table 2. Correlations of variables used in the study. (N=230).

	Depressive symptoms	Age	Sex	Neuroticism	POPS	HCS-21	Conflict
Depressive symptoms	1,000						
Age	-,046	1,000					
Sex	,397*	-,011	1,000				
Neuroticism	,492*	-,037	,350*	1,000			
POPS	-,346*	-,040	-,093	-,236*	1,000		
HCS-21	,471*	-,111	,319*	,503*	-,287*	1,000	
Conflict	,493*	-,075	,246*	,358*	-,710*	,286*	1,000

Note. * $p < .001$

Correlation analyses vary between -0.71 and $.50$. Depressive symptoms measured by the PHQ are moderately positively related to neuroticism, environmental sensitivity and maternal conflict, as well as gender. Environmental sensitivity (HCS-21) was positively related to neuroticism, depressive symptoms and gender as well as negatively correlated with maternal warmth, involvement and autonomy measured by POPS. POPS was strongly negatively related to maternal conflict, as well as moderately negatively correlated with depressive symptoms, environmental sensitivity and neuroticism. Hierarchical multiple linear regression in 4 steps was performed to examine the role of parental environment and personality in relation with depressive symptoms. The model explained 43% ($F(6, 223) = 28.13, p < .001$). of the variance in depressive symptoms. Age and sex alone explained 15.9% of the variance in depressive symptoms. Namely, sex was a significant predictor ($\beta = .396, p < .001$) while age was not ($\beta = -.042, p = .493$). Neuroticism ($\beta = .344, p < .001$) and POPS ($\beta = -.243, p < .001$) explained an additional 20% of the variance, while environmental sensitivity contributed to the model as well by explaining an additional 3% of the variance ($\beta = .209, p = .001$). On top of this, maternal conflict explained an additional 5% of the variance ($\beta = .322, p < .001$). In the final model, significant predictors of depressive symptoms were maternal conflict ($\beta = .322, p < .001$), environmental sensitivity ($\beta = .225, p < .001$), neuroticism ($\beta = .205, p = .001$) and sex ($\beta = .175, p = .002$).

Moderation analyses were performed using PROCESS macro (Hayes, 2017) to examine whether neuroticism and environmental sensitivity moderate the relationship between maternal conflict and depressive symptoms. In the neuroticism model, age, sex, POPS as well as environmental sensitivity were included as covariates. The interaction between maternal conflict and neuroticism was not significant ($b = 0.0075, SE = 0.0138, t = 0.54, p = .588, 95\% CI [-0.02, 0.03]$). A second moderation analysis was conducted to examine the role of environmental sensitivity as a moderator. In this model, age, sex, POPS and neuroticism were included as covariates. Interaction between maternal conflict and environmental sensitivity was significant ($b = 0.0046, SE = 0.0020, t = 2.33, p = .021, 95\% CI [0.0007, 0.0085], \Delta R^2 = .014$). The effect of maternal conflict on depressive symptoms was examined at low (16th percentile), medium (50th percentile), and high (84th percentile) levels of environmental sensitivity. As environmental sensitivity increases, the relationship between maternal conflict and depressive symptoms becomes stronger (Table 3).

Table 3. Effects of maternal conflict on depressive symptoms, at different leveles of environmental sensitivity.

	Estimate	SE	95% Confidence Interval		p
			Lower	Upper	
16th percentile	0.135	0.070	-0.003	0.273	.0563
50th percentile	0.204	0.057	0.091	0.316	.0004
84th percentile	0.301	0.062	0.178	0.423	<.0001

5. Discussion & conclusion

The current study underpins the importance of considering individual differences in the relationship between parent-adolescent conflict and depressive symptoms in adolescence. Namely, conflict predicted depressive symptoms in adolescence when controlling for other predictors. This is in line with previous studies which clearly demonstrate the impact of adverse familial environments on adolescent mental health. Although in adolescence independence and autonomy become increasingly important, a supportive parental relationship is still of utmost importance for healthy development (Steinberg & Silk, 2002). Families represent key microsystems in adolescent development (Bronfenbrenner & Morris, 1998) which makes their influence immediate and undeniable. For example, emotional security theory assumes that teens are placed in a state of constant psychological vigilance when they are in conflict with their parents which prolongs emotional distress and could elevate the likelihood of depression (Cummings & Miller-Graff, 2015). Moreover, the current study found environmental sensitivity to be a significant moderator in the mentioned relationship. This finding supports the well-established diathesis-stress model which posits that certain vulnerabilities make individuals more likely to develop mental health issues when experiencing stressful situations. A possible explanation of the role of environmental sensitivity could be through the assumed deeper processing of stimuli sensitive individuals may possess. Depth of processing in sensitive adolescents could facilitate rumination (Lionetti et al., 2022) and make an already adverse environment seem more detrimental. Along with this, higher emotional reactivity and lower self-efficacy when trying to augment intense negative emotions (Brindle et al., 2015) could also serve as a venue for the development of depressive symptoms. On the other hand, neuroticism was not found to be a significant moderator. This is in line with some other research. For example, Boele et al. (2023) found no moderating effect of neuroticism between lower perceived parental support and depressive symptoms at the within family level, and Jovanović (2019) found no moderating effect between stressful events and adolescents' life satisfaction. It could be the case that conflict predicts depressive symptoms independently of personality traits.

This study underscores the importance of individual differences when considering adolescent mental health. It extends previous research not only by confirming the diathesis-stress model but by offering another frame of reference which we can view vulnerabilities through. Namely, focusing on the disproportional impact conflict has on sensitive children could help steer mental health interventions towards creating more individualized programs which target sensitive children differently. By distinguishing environmental sensitivity from neuroticism as separate vulnerability factors we gain a more precise understanding of the interplay between contexts and outcomes in adolescence. Along with that, considering that the current sample includes Croatian adolescents, future research could extend this finding across different contexts. This research was cross-sectional and used self-report measures, and reliability of neuroticism was low. Inferences about causal relationships are limited and future research could use longitudinal methods as well as limit socially desirable responding by relying on reports from multiple informants.

Acknowledgments

The study was developed in the context of the TEEN-WELL project (Adolescents' Well-Being in Key Contexts). The TEEN-WELL project is financed by the European Union – NextGenerationEU and is carried out by the Ivo Pilar Institute of Social Sciences, Zagreb, Croatia, as part of the Institute's program funding for the period 1/1/2024–12/31/2027.

References

- Boele, S., Nelemans, S. A., Denissen, J. J. A., Prinzie, P., Bülow, A., & Keijsers, L. (2023). Testing transactional processes between parental support and adolescent depressive symptoms: From a daily to a biennial timescale. *Development and psychopathology*, 35(4), 1656–1670. <https://doi.org/10.1017/S0954579422000360>
- Brindle, K., Moulding, R., Bakker, K., & Nedeljkovic, M. (2015). Is the relationship between sensory-processing sensitivity and negative affect mediated by emotional regulation? *Australian Journal of Psychology*, 67(4), 214–221. <https://doi.org/10.1111/ajpy.12084>
- Bronfenbrenner, U., & Morris, P. A. (1998). The ecology of developmental processes. In W. Damon & R. M. Lerner (Eds.), *Handbook of child psychology: Theoretical models of human development* (5th ed., pp. 993–1028). John Wiley & Sons.
- Bülow, A., van Roekel, E., Boele, S., Denissen, J. J. A. I., & Keijsers, L. (2022). Parent–adolescent interaction quality and adolescent affect—An experience sampling study on effect heterogeneity. *Child Development*, 93(3), e315–e331. <https://doi.org/10.1111/cdev.13733>

- Cummings, E. M., & Miller-Graff, L. E. (2015). Emotional security theory: An emerging theoretical model for youths' psychological and physiological responses across multiple developmental contexts. *Current Directions in Psychological Science*, 24(3), 208-213.
- Falkenstein, T., Sartori, L., Malanchini, M., Hadfield, K., & Pluess, M. (2025). The Relationship Between Environmental Sensitivity and Common Mental-Health Problems in Adolescents and Adults: A Systematic Review and Meta-Analysis. *Clinical Psychological Science*, 21677026251348428. <https://doi.org/10.1177/21677026251348428>
- Goldberg, L. R. (1999). A broad-bandwidth, public domain, personality inventory measuring the lower-level facets of several five-factor models. *Personality psychology in Europe*, 7(1), 7-28.
- Grolnick, W. S., Deci, E. L., & Ryan, R. M. (1997). Internalization within the family: The self-determination theory perspective. In J. E. Grusec & L. Kuczynski (Eds.), *Parenting and children's internalization of values: A handbook of contemporary theory* (pp. 135-161). John Wiley & Sons.
- Hayes, A. F. (2017) *Introduction to Mediation, Moderation, and Conditional Process Analysis: A Regression-Based Approach*. New York: Guilford Press.
- Hutchinson, J. G., & Williams, P. G. (2007). Neuroticism, daily hassles, and depressive symptoms: An examination of moderating and mediating effects. *Personality and Individual Differences*, 42(7), 1367-1378. <https://doi.org/10.1016/j.paid.2006.10.014>
- Jovanović, V. (2019). Adolescent life satisfaction: The role of negative life events and the Big Five personality traits. *Personality and Individual Differences*, 151, 109548. <https://doi.org/10.1016/j.paid.2019.109548>
- Kroenke, K., Spitzer, R. L., & Williams, J. B. (2001). The PHQ-9: validity of a brief depression severity measure. *Journal of general internal medicine*, 16(9), 606-613. <https://doi.org/10.1046/j.1525-1497.2001.016009606.x>
- Laursen, B., Coy, K. C., & Collins, W. A. (1998). Reconsidering Changes in Parent-Child Conflict across Adolescence: A Meta-Analysis. *Child Development*, 69(3), 817-832.
- Li, H., Gan, X., Li, X., Zhou, T., Jin, X., & Zhu, C. (2022). Diathesis stress or differential susceptibility? Testing the relationship between stressful life events, neuroticism, and internet gaming disorder among Chinese adolescents. *PLOS ONE*, 17(1), e0263079. <https://doi.org/10.1371/journal.pone.0263079>
- Lionetti, F., Klein, D. N., Pastore, M., Aron, E. N., Aron, A., & Pluess, M. (2022). The role of environmental sensitivity in the development of rumination and depressive symptoms in childhood: A longitudinal study. *European Child & Adolescent Psychiatry*, 31(11), 1815-1825.
- Lionetti, F., Pastore, M., Moscardino, U., Nocentini, A., Pluess, K., & Pluess, M. (2019). Sensory Processing Sensitivity and its association with personality traits and affect: A meta-analysis. *Journal of Research in Personality*, 81, 138-152. <https://doi.org/10.1016/j.jrp.2019.05.013>
- Monroe, S. M., & Simons, A. D. (1991). Diathesis-stress theories in the context of life stress research: Implications for the depressive disorders. *Psychological Bulletin*, 110(3), 406-425.
- Pluess, M. (2015). Individual Differences in Environmental Sensitivity. *Child Development Perspectives*, 9(3), 138-143. <https://doi.org/10.1111/cdep.12120>
- Pluess, M., & Belsky, J. (2013). Vantage sensitivity: individual differences in response to positive experiences. *Psychological bulletin*, 139(4), 901-916. <https://doi.org/10.1037/a0030196>
- Pluess, M., Assary, E., Lionetti, F., Lester, K. J., Krapohl, E., Aron, E. N... (2018). Environmental sensitivity in children: Development of the Highly Sensitive Child Scale and identification of sensitivity groups. *Developmental psychology*, 54(1), 51-70. <https://doi.org/10.1037/dev0000406>
- Shorey, S., Ng, E. D., & Wong, C. H. J. (2021). Global prevalence of depression and elevated depressive symptoms among adolescents: A systematic review and meta-analysis. *British Journal of Clinical Psychology*, 61(2), 287-305. <https://doi.org/10.1111/bjc.12333>
- Steinberg, L., & Silk, J. S. (2002). Parenting adolescents. In M. H. Bornstein (Ed.), *Handbook of parenting: Children and parenting* (2nd ed., pp. 103-133). Lawrence Erlbaum Associates Publishers.
- Wang, Y., & Tang, W. (2025). The association between parent-adolescent conflicts and depressive mood: A systematic review and meta-analysis. *BMC Psychology*, 13(1), 1044.
- Weyn, S., van Leeuwen, K., Pluess, M., Lionetti, F., Greven, C. U., Goossens, L... (2021). Psychometric properties of the Highly Sensitive Child scale across developmental stage, gender, and country. *Current Psychology*, 40(7), 3309-3325. <https://doi.org/10.1007/s12144-019-00254-5>
- Widiger, T. A., & Oltmanns, J. R. (2017). Neuroticism is a fundamental domain of personality with enormous public health implications. *World psychiatry: official journal of the World Psychiatric Association (WPA)*, 16(2), 144-145. <https://doi.org/10.1002/wps.20411>