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ADVERSE CHILDHOOD EXPERIENCES AND THEIR IMPACT ON ADULT POPULATION IN NORTH MACEDONIA: RESULTS FROM PILOT STUDY

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Abstract

Background: Adverse childhood experiences (ACEs), including abuse, neglect, and family dysfunction, are a global public health concern due to their profound effects on physical and mental health. Population in North Macedonia face unique challenges from economic deprivation, stigma, and limited mental health services, yet region-specific data on ACEs remain scarce.
Objective: The study's main objective is to assess the prevalence of ACEs in childhood and their association with the health status and the risk of unhealthy behaviors in adulthood, aimed at informing culturally sensitive interventions and policy.
Methods: Cross-sectional study was conducted, on a sample of 741 adults 18+, registered by family doctors in 10 primary healthcare practices in Skopje region, in the period January – June 2023. ACE-IQ instrument was used, structured in 9 groups of questions, including demographic data.
Results: 10.2% respondents reported experiencing 5 or more ACEs in childhood. Men exposed to some types of ACE are significantly more likely to suffer from health problems later in life (general problems, mental health problems, psychological problems, gastrointestinal and bronchopulmonary difficulties) than women. Higher education appears as protective, with respondents with incomplete or completed primary school exposed to ACEs significantly more likely to have health difficulties than those with higher levels of education (secondary and higher).
Conclusions: This review highlights the urgent need for targeted interventions to mitigate ACEs' impact on adolescent mental health in North Macedonia. Findings open possibilities for future targeted research that should guide policy to enhance community-based services and reduce stigma, addressing critical research gaps in this understudied region.

Keywords: Adverse childhood experiences, violence, neglect, North Macedonia, social stigma, mental health.

Introduction

Adverse childhood experiences (ACEs), encompassing abuse, neglect, and household dysfunction, represent a significant public health challenge due to their profound and lasting impacts on children's health and well-being [Shonkoff & Garner, 2012, Bellis and al., 2019]. Defined initially by Felitti et al. (1998), ACEs include physical, emotional, or sexual abuse; physical or emotional neglect; and household stressors such as parental substance abuse, mental illness, incarceration, domestic violence, or separation [3]. Globally, ACEs are prevalent, with studies estimating that over half of children experience at least one adverse event before age 18 (WHO, 2024), with higher rates in low- and middle-income countries where socioeconomic stressors and systemic inequities exacerbate exposure [Bellis and al., 2019; Kidman, Piccolo & Kohler, 2020).

The consequences of ACEs are multifaceted, affecting physical, mental, and developmental health across the lifespan. In childhood, ACEs are associated with increased risks of developmental delays, behavioral disorders, and chronic health conditions such as obesity and asthma [Shonkoff & Garner, 2012; Oh et al. 2018). These effects are mediated by toxic stress, which disrupts neurodevelopment, immune function, and epigenetic regulation, leading to heightened vulnerability to disease [McEwen & Gianaros, 2010). Long-term, individuals with

multiple ACEs face elevated risks of mental health disorders (e.g., depression, anxiety, suicidality), substance abuse, cardiovascular disease, and premature mortality [Felitti, 1998, Hughes et al., 2017]. The dose-response relationship between ACEs and adverse outcomes underscores the urgency of early intervention, as each additional ACE exponentially increases health risks [Bellis and al., 2019]. Socioeconomic factors, cultural stigma, and access to healthcare further modulate these impacts, necessitating context-specific research and interventions [Kidman, Piccolo & Kohler, 2020, WHO, 2024].

Despite growing awareness, significant gaps persist in understanding the mechanisms linking ACEs to health outcomes and in implementing effective prevention strategies. The pathways through which ACEs exert their influence are complex and multifaceted, involving biological, psychological, and social factors. Research continues to uncover how these early experiences affect brain development, stress response systems, and behavior, yet much remains to be learned.

Implementing effective prevention strategies is equally challenging, particularly in understudied regions like North Macedonia (WHO, 2024, Anda, Porter & Brown, 2020). These regions often lack comprehensive data on the prevalence and impact of ACEs, making it difficult to tailor interventions to local needs. Additionally, there may be cultural, economic, and political barriers that hinder the adoption of evidence-based practices. Efforts to address ACEs in these areas require a nuanced understanding of local contexts and a commitment to building capacity for research and intervention. This includes fostering supportive environments, enhancing access to mental health services, and implementing policies that protect children from harm. By bridging the gaps in knowledge and practice, we can better support individuals affected by ACEs and work towards healthier, more resilient communities. In contexts like North Macedonia, economic deprivation, social stigma, and limited mental health infrastructure may amplify the burden of ACEs, though region-specific data remain scarce (WHO, 2024). This was the main motive for this research and the main objective of the study is to assess the prevalence of the ACEs in childhood and their association with the health status and the risk of unhealthy behaviors in adulthood.

Methods

Cross-sectional study was conducted, on a sample of 741 adults 18+, registered with family doctors in 10 primary healthcare practices in Skopje region, in the period January – June 2023. Given the sensitivity of the topic, the only criterion for inclusion was that respondent signs informed consent.

We have used the international questionnaire (ACE-IQ), developed and approved by public health experts in collaboration with WHO and CDC (WHO, 2014). The instrument is structured in 9 groups of questions for adverse childhood experiences (experiences before the age of 18) and includes: demographic data, marital status, relationship with parents/caregivers, family, childhood abuse (psychological, physical, sexual and neglect), peer violence, community violence and experience of war or conflict. The questionnaire also asks about the health status of the respondent and assessment of his/her physical health.

ACE-IQ asks for experiences related to:

1. Negative events in the family environment include negative parenting, early loss of a parent, parental divorce;
2. Living with a family member who suffered from mental illness, who consumed alcohol/drugs, was in prison, exposed to domestic violence;
3. Experiences of violence that include exposure to physical violence;
4. Exposure to emotional violence,
5. Exposure to sexual violence;

6. Exposure to neglect;
7. Experiences of peer violence;
8. Experiences of violence in the community;
9. Experiences of collective violence (i.e. war).

Results

The total number of respondents is 741, 45.2% men and 54.8% women. The average age of respondents is 43.9 years (±12 SD). By ethnicity, majority are Macedonians (76%), followed by Albanians (12,3%), Turks (3.6%), Serbian (2.6%) and Roma (1.9%). Slightly over half respondents (52%) have completed high school, 36% have university degree and only 1.2% are with incomplete primary school. Most are employed in state institutions (63%), in the private sector (10.4%) and 13% are unemployed. 50% did not disclose their marital status.

Questions on behaviors reveal that one third of the respondents (33%) are active smokers who smoke 10-30 cigarettes a day. Active alcohol consumers are 12%, and 0.5% consume some kind of opiates. More than one third (42%) do not wear a seatbelt while driving.

Stress exposure and mental health. Questions on perceptions of respondents on their stress exposure and mental health show that 84% respondents reported poor mental health status associating it with stress, and 60% have psychological problems (manifest as anxiety – 48%, chronic fatigue – 43%, sleeping deprivation – 41% and depression 40%). 59% have emotional and behavioral problems, resulting in panic behavior or uncontrolled anger (41% in each group), worry that have some disease – 39% and oversensitive - 38%.

Physical health. The health status of the respondents appears to be affected differently in relation to the different organs. The most common are general health problems related to headaches and dizziness (55.3%), neck and joint pain (60.3%). Cardiovascular system is among the most affected body systems, with 39% respondents with hypertension, high cholesterol and chest pain. 29% suffer from constipation, abdominal pain , indigestion and heartburn, diarrhea and irritable intestines. Most common difficulties of the respiratory system reported are allergies - 30%, runny or clogged nose - 28%, cough without reason - 28% and difficulty breathing with 2 8 %.

ACEs. Overall exposure to adverse experiences in childhood was reported by 535 (72%) respondents who have experienced some type of violence. Of them, 67% were exposed to mild levels of violence, and 5% to serious levels of violence. In terms of the family environment and the problems arising from it, it was found that almost a quarter of the respondents (183) were exposed to negative family events due to the loss of a parent, parental divorce, and negative parenting. Living in a dysfunctional family environment (living with member on family who suffered from mental illness, a family member who consumed alcohol drugs, or was imprisoned) and exposure of family violence is found in half (51%) of the respondents.

Experiences of violence during childhood are reported by the largest number of respondents for psychological violence (26%), followed by neglect (13%), physical violence (11%), and sexual violence (5%). 21.2% had experience of peer violence, 42% have witnessed violence in the community, and almost 10% had experience of collective violence.

Only 24.4% of the respondents have reported not experiencing ACE in childhood, 22% had 1 experience, 18% have had 2 experiences, 14% have had three, almost 11% have had 4, and 10.2% have had 5 or more negative experiences. The summary of points for each item in the questionnaire shows that the average ACEs score for the total population is 2.04 (± 1.82SD). The average score for health problems is higher and amounts to 6.26 ± 2.8SD – Table 1.

Table 1: Sum of exposure to different types of violence and health problems

	Adverse childhood experiences score	Health problems score
#	741	741
Mean	2.0378	6.2572
SD	1.82362	2.80124

The correlations between the number of health problems and the score of adverse childhood experiences show a significant positive correlation (r=.165 for p <.001) , suggesting that more types of negative experiences experienced in childhood lead to more health problems in adulthood.

Table 2 shows the correlations between ACEs score and the health status of the respondents, i.e. the state of mental and physical health and their significance. Results suggest that having general problems (related to marriage, work, use of psycho-active substances) are significantly positively correlated with all forms of ACE, almost all at the p< .01 level. The state of mental health is also significantly positively correlated with all ACEs, except for family dysfunction and psychological abuse. Psychological problems and most ACEs are significantly correlated with each other (except for family problems, family dysfunction, physical and sexual violence).

In terms of physical health status, worth noting is the correlation between problems with the gastrointestinal system and neglect, family dysfunction, psychological, sexual and peer violence. Problems with the bronchopulmonary system are significantly positively correlated with neglect, sexual violence and collective violence.
Of all the ACEs, the most common positive correlation is between exposure to neglect and later manifestation of health problems – with mental health problems, general problems (in marriage and at work), with psychological problems, with cardiovascular, gastrointestinal and bronchopulmonary problems), and sexual violence with mental health problems, general problems, gastrointestinal, bronchopulmonary, CNS and urogenital problems. Collective violence is significantly correlated with mental health, general problems, psychological problems and bronchopulmonary system.

Table 2: Correlations (Phi coefficient) between negative childhood experiences and the health status of the respondents

Phi coefficient	Neglect	Family problems	Family dysfunction	Psychological	Physical	Sexual	Peer	Community	Collective
Mental health	**.134**	**.147****	.048	.005	.075 *	**.105****	**.099****	**.132****	.091 *
Under stress	-.069	-.001	,028	-.014	-.026	-.023	-.056	-.015	-.018
Problems/ marriage, work, passport	**.156**	**.212****	**.120****	**.128****	**.173****	.073 *	**.111****	**.193****	**.152****
Psychological problems	.080 *	-.010	.039	. **116****	.056	.096	**.097****	.093 *	.087 *
Behavior problems	.049	-.043	.008	.012	-.016	.060	.038	-.031	.007

Headache/ dizziness	.034	.024	.034	-.001	.062	.039	.034	.052	.033
Neck/joints	.018	.004	.085 *	.026	.037	0.55	.049	-.022	-.028
Cardiovascular	.006	-.004	.076 *	.018	.007	-.012	.050	0.36	-.020
Heart	**.102****	-.059	.022	0.50	.019	-.013	.010	.093 *	.051
Gastro	**.110****	.030	.084 *	**.101****	.016	.092 *	**.109****	.060	.030
Broncho-pulmo	**.115****	0.23	-.049	-.013	.59	.079 *	-.031	.036	.092 *
Lungs	.045	.007	-.045	.009	-.032	.014	.009	-.014	.075 *
CNS	.007	.049	-.001	.016	-.024	.091 *	.048	.039	.058
Urogenitals	.053	.016	.040	.092 *	.042	.084 *	.001	,005	.013
Endocrine	-.007	-.022	.000	-.015	-.045	-.010	-.052	-.067	-.059

** p< .01; * p< .05

Using regression analysis, we tested the predictability in terms of health effects from exposure to ACEs in childhood, related to gender, education, employment and marital status.
Men exposed to some types of ACE are significantly more likely to suffer from health problems later in life (general problems, mental health problems, psychological problems, gastrointestinal and bronchopulmonary difficulties) than women exposed to ACEs (F= 29.194**, p<0.01).
Higher education appears as protective, with respondents with incomplete or completed primary school exposed to ACEs significantly more likely to have health difficulties than those with higher levels of education (secondary and higher), (F =8.335**, p<0.01).
In terms of marital status, respondents who are not married and have been exposed to ACEs are more likely to suffer from health problems than respondents who are married (F =11.387**) also exposed to NID. Employment status and income show that respondents who do not earn an income are significantly more likely to develop health problems (F =7.066**).

Discussion

Globally, it is estimated that up to 1 billion children aged 2–17 years, have experienced physical, sexual, or emotional violence or neglect in the past year (Hillis, Mercy, Amobi & Kress, 2022). Violence against women in the home is often directly linked to violence against children. This link has been observed in a variety of geographically and culturally diverse settings and countries: in China, Colombia, Egypt, India, Mexico, the Philippines and South Africa, a strong interrelationship and dependence between these two types of violence has been established (Runyan D et al, 2022).
The results of this study indicate that psychological abuse is one of the most common forms of violence in North Macedonia, reported by 26% of the respondents. The findings are similar to survey of primary and high school students conducted in 2010 (Raleva, Peshevska & Sethi, 2013), where about 30% of the surveyed population reported this type of abuse. Considering the fact that the current study includes adult respondents who retrospectively speak about their childhood experiences, it is more likely that some negative experiences are “forgotten” because they occurred earlier than when it comes to respondents who are still adolescents or young adults and who remember their experiences much more vividly.

Psychological abuse seems to be equally destructive as physical and sexual abuse, because it puts victims at equal risk of developing problems related to physical or mental health (Egeland & Erickson, 1987, O'Leary, 1999). In our study, it was significantly correlated with the manifestation of general problems in the overall life, in marriage and at work, with psychological problems and with physical health disorders, primarily affecting the gastrointestinal system and the urogenital system. Numerous other studies have also reported that people exposed to psychological abuse are more susceptible to the eventual development of physical and mental disorders, such as depression, injuries, drug addiction and alcoholism (Danese & McEwen, 2012; Hughes et al, 2017).

Neglect in our study was reported by 13% of the respondents, less than 2010 study (Raleva, Peshevska & Sethi, 2013), with reported 20%, which may be due to the recall bias. Neglect in our study is significantly correlated with mental health, with manifestation of general problems, psychological problems, and in terms of physical health it is significantly correlated with cardiovascular, gastrointestinal and broncho-pulmonary difficulties.

Physical abuse was reported by 11% of respondents compared to 11–14% in the 2010 study (Raleva, Peshevska & Sethi, 2013), depending on the form of physical abuse. Research from around the world also shows that physical abuse of children in the home is widespread in all regions, especially in low- and middle-income countries (37) .

In our study, almost 42% of respondents had witnessed violence in the community, significantly correlated with mental health disorders, manifestations of general and psychological problems and heart problems. Violence in the community is usually associated with peer violence, so about 21% of respondents had experienced this type of violence, which is also significantly correlated with mental health disorders, manifestations of general problems, psychological problems and involvement of the gastrointestinal tract. About 10% of respondents reported witnessing collective violence, which is also highly correlated with the assessment of mental health and the broncho-pulmonary system.

Assessment of the ACEs score shows high 10.2% of the respondents reporting 5 or more. The greater the number of adverse childhood experiences, the greater the likelihood that a person, in adulthood, will develop certain physical or mental disorders, such as heart disease, cancer and depression (Dong et al., 2003; Dube et al., 2002, Hillis et al., 2000, Maha et al., 2016). Our research confirmed the same finding, which showed a highly statistically significant positive correlation between negative childhood experiences and health problems.

Gender, education, marital/partnership status, and employment status has proven to be significant predictors and risk factors for poor health in adulthood for individuals being exposed to ACEs in childhood. Being male, having low educational status, unemployment, and lack of a partner relationship, increase the chances of poorer health status in the domain of mental and physical health.

Conclusion

In conclusion, Adverse Childhood Experiences (ACEs) represent a profound public health challenge with far-reaching consequences for individuals and societies. The evidence clearly demonstrates that ACEs are prevalent in our country as well, and have significant impacts on physical and mental health, and quality of life in general. The mechanisms through which ACEs affect health are complex, involving disruptions in neurodevelopment, immune function, and epigenetic regulation due to toxic stress. These disruptions lead to increased risks of chronic health conditions, mental health disorders, and premature mortality.

Despite growing awareness of the importance of addressing ACEs, significant gaps remain in understanding the precise mechanisms linking ACEs to health outcomes and in implementing effective prevention and intervention strategies. This study adds to the body of knowledge on

the situation in North Macedonia, where socioeconomic factors, cultural stigma, and limited mental health infrastructure might exacerbate the burden of ACEs.

To mitigate the lifelong consequences of early adversity, it is crucial to develop integrated, culturally sensitive approaches that address the unique needs of different populations. This includes fostering supportive environments, enhancing access to mental health services, and implementing policies that protect children from harm. By bridging the gaps in knowledge and practice, we can better support individuals affected by ACEs and work towards healthier, more resilient communities.

Ultimately, investing in early childhood development and addressing ACEs is not only a moral imperative but also a strategic investment in the future of societies. By ensuring that all children have the opportunity to develop to their fullest potential, we can build healthier, more equitable, and prosperous communities.

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