



OPEN The mediating role of anxiety between child abuse and pain among a sample of Lebanese adults

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Pain is defined as an unpleasant sensory and emotional experience in response to a noxious stimulus. Nowadays, it is increasingly prevalent among adults and may be influenced by past experiences such as child abuse, trauma or psychiatric conditions like anxiety. Thus, this study aims to evaluate the mediating effect of anxiety between child abuse and pain among a sample of Lebanese adults. This cross-sectional study was conducted between March and April 2024. Participants were selected using a snowball sampling method from various Lebanese governorates, and completed a self-administered online questionnaire via Google Forms. All adults over the age of 18 were eligible to participate. The questionnaire included sociodemographic questions, the short form of McGill pain questionnaire, the generalized anxiety disorder-7 (GAD-7), and the child abuse self report scale (CASRS-12). A total of 507 Lebanese adults completed the questionnaire. The mean age was 26.80 ± 10.29 years and 73.2% were female. The results showed that anxiety partially mediated the association between child abuse and pain. Higher levels of child abuse were significantly associated with greater anxiety, which in turn was significantly associated with increased pain. Child abuse was directly associated with higher pain levels. The study highlights the relationship that child abuse has on pain in adults and its relationship with anxiety. Future research delving into the relationship between child abuse and chronic pain in adulthood is essential to better understand the underlying pathways and support effective prevention and intervention strategies.

Keywords Child abuse, Anxiety, Pain

Pain in adults is a common complaint in clinical settings¹. It is defined as an unpleasant sensory and emotional experience, and is typically classified as either acute or chronic. Acute pain is characterized by a sudden onset (< 1 month) and a limited duration, often resulting from a normal physiological response to injury, trauma or surgery. In contrast, chronic pain persists for longer than three months or beyond the body's usual healing time, and may arise from an illness, injury, or sometimes an unknown cause¹. Pain can diminish an individual's quality of life, resulting in social isolation, emotional discomfort, and physical restrictions². Pain is categorized into six types: neuropathic, nociceptive, musculoskeletal, inflammatory, psychogenic, or mechanical³.

The prevalence of pain is more prevalent worldwide⁴. A study in 2021 showed that 20.9% of adults in the United States experience chronic pain⁵. Similarly, a systematic review in the United Kingdom revealed that the prevalence of chronic pain is approximately 43%, which rises with increasing age⁶. Even though pain commonly

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follows illness or injury, it is increasingly recognized as a distinct medical condition with its own diagnostic and therapeutic considerations.

Child abuse and pain

Notably, pain in adulthood can be related to a history of child abuse. The World Health Organization (WHO) defines child abuse as any form of sexual, physical or emotional abuse or exploitation that may harm a child's development, health, or dignity⁴. This includes behaviors such as bruising, scarring, intimidation, criticism, bullying and coercing a child into actions for another person's benefit. It is a violation of human rights, with estimates suggesting that at least one in seven children experiences a form of abuse each year⁷. Beyond its psychological toll, child abuse also imposes significant social and economic burden⁸. Other studies have revealed that child abuse is associated with a range of long-term consequences, including mood disorders^{9–13}, memory impairment¹⁴, physical disability^{15,16}, early death¹⁷ and suicide attempts^{9,17,18}.

Studies have demonstrated a strong correlation between maltreatment throughout childhood and persistent pain during adulthood¹⁹. This may be due to an altered pain sensitivity resulting from long-term dysregulation of the body's stress-response systems and neurobiological changes in pain-processing pathways⁹. A meta-analytic review found that individuals who reported childhood abuse or neglect were significantly more likely to experience pain symptoms and related conditions later in life compared to those without such histories¹⁹. In addition, individuals with chronic pain were more likely to report having been abused or neglected as children than healthy controls¹⁹. This suggests that individuals who experienced physical, emotional, or sexual abuse or neglect during childhood are at heightened risk not only for chronic pain but also for comorbid mood disorders and functional impairments^{9,19}.

Anxiety and pain

Pain, often associated with a history of child abuse^{10,19}, is frequently accompanied by anxiety^{9,10}, further increasing the overall burden on affected individuals. Anxiety is a physiological state characterized by persistent fear and worry, involving cognitive, physical, emotional, and behavioral components that persist and become more intense, interfering with daily activities²⁰. Physical symptoms may include breathlessness and palpitations, whereas the cognitive aspect involves anticipating vague but realistic threats²⁰. The Diagnostic and Statistical Manual of Mental Disorders–Fifth edition (DSM-5) classifies anxiety disorders into several subtypes, including panic disorder, phobias, and Generalized Anxiety Disorder (GAD)²⁰. The prevalence of anxiety is on the rise globally; according to the World Health Organization (WHO) report²¹, an estimated 4% of the global population currently experiences an anxiety disorder. In 2019, 301 million people in the world had an anxiety disorder, making it the most common category of mental health disorders^{21,22}.

Pain, child abuse and anxiety

Anxiety has been showed to act as a mediator in various health conditions, like heart failure, coronary artery disease, suicidal ideation, mood disorders^{23–25}. It is therefore not surprising that anxiety and chronic pain frequently coexist^{23,26}. Moreover, researchers have gained a deeper understanding of the brain's functions and how the nervous system interacts with other parts of the body. They have discovered that pain shares several biological mechanisms with anxiety and depression. Specifically, the somatosensory cortex, which interprets sensations such as touch and pain, also plays a role in anxiety and depression^{23,26}. In addition, two neurotransmitters, serotonin and norepinephrine, contribute to pain signaling in the brain and nervous system^{23,26–28}. Consequently, the experience of childhood trauma is highly associated with anxiety from the perspective of disruption of emotion regulation as well as more negative emotional states and interpersonal problems. These psychological effects can predispose individuals to higher pain sensitivity and thus, sensation of pain^{10,28,29}.

The present study

In the past decades, children were more exposed to different forms of abuse, due to a lack of parenting skills, discipline strategies and child protection measures³⁰. However, its consequences are evident and more prominent in today's adult population. Child abuse remains a sensitive and underreported issue in Lebanon, making its true prevalence difficult to determine. A study using data between 2017 and 2019 estimated child maltreatment at 3.2%³¹, although this number likely underrepresents the actual rate due to cultural norms that emphasize endurance and discourage disclosure³¹. Another national study reported that 27.9% of individuals experienced at least one childhood adversity, with 4.9% reporting two adversities and 2.6% reporting three or more³². Additionally, adults with a history of physical abuse or mental illness are more likely to mistreat their children³³. Cultural acceptance of physical punishment as a disciplinary method remains prevalent in Arab societies. For instance, a study in Kuwait showed that the majority of parents endorse physical punishment for child misbehavior³⁴, a practice often unchallenged by law and still present today despite growing awareness of its psychological consequences. However, this method was deemed natural and persisted in modern times, albeit to a lesser extent, considering the spread of parental education and despite the negative repercussions it has on adult life, ranging from pain to psychiatric disorders³⁴. Furthermore, one study showed the prevalence of chronic pain to be higher in elderly populations³⁵. Not to forget the role of anxiety that could arise, later in life, from maltreatment of children³⁶. This added factor could potentially aggravate the pain perceived by adults in the future²⁷. As well, although anxiety has been shown to favor the development of pain, the latter could still manifest as an independent complaint³⁵. Likewise, studies focused on the effect of household overcrowding suggest a 23 to 46% increased risk of child abuse, reflected in urban and poor children^{37,38}. Besides, a Korean study conducted using the data from the 2020 Korean Children and Youth Rights Survey (KCYRS) revealed the protective role of physical activity on child abuse and the decreased negative effects of emotional abuse³⁹.

Taking into account the unique cultural dynamics of the Lebanese population and in view of the limited research regarding the negative effects of child maltreatment on adulthood, this study aims to evaluate the mediating effect of anxiety between child abuse and pain among a sample of Lebanese adults.

Methods

Study design and participants

This cross-sectional study was accomplished between March and April 2024, employing a snowball sampling method, where existing participants recruits future participants from social work and acquaintances⁴⁰. We designed a survey using Google Forms and distributed it to Lebanese adults from diverse background including university students, non-institutionalized individuals and other community members through various messaging platforms and social media channels, including WhatsApp, Instagram, and Messenger. All respondents voluntarily participated in the survey, with no compensation for their participation. All adults over the age of 18 years were eligible to partake in the study. Exclusion criteria were respondents that completely declined participation and those under 18 years.

Minimal sample size calculation

A minimum sample size of 406 was deemed necessary to ensure sufficient statistical power using the formula suggested by Fritz and MacKinnon⁴¹ $n = \frac{L}{f^2} + k + 1$, where $f=0.14$ for small effect size, $L=7.85$ for an α error = 5% and power $\beta = 80\%$, and $k=5$ variables that will be included to the mediation model.

Questionnaire

The Arabic questionnaire took an average of 10 min to be completed. The first section gathered sociodemographic information such as sex, age, marital status, and the Household Crowding Index (HCI), which is calculated by dividing the number of people living in the household, excluding newborns, by the total number of rooms, excluding the kitchen and bathrooms⁴²; the higher the household crowding index, the lower the socioeconomic status of the family. The strength, frequency, and duration of physical activity were multiplied to create the physical activity index⁴³.

Short form of McGill pain questionnaire

The short form of McGill pain questionnaire consists of 15 descriptors: 11 sensory items (throbbing, shooting, stabbing, sharp, cramping, gnawing, hot-burning, aching, heavy, tender, and splitting), and 4 affective items (tiring-exhausting, sickening, fearful, and punishing-cruel); rated on a four-point intensity scale: 0 = none, 1 = mild, 2 = moderate or 3 = severe. In addition to the 15-item checklist, two items assess the overall pain experience; patients were asked to rate the level of their current pain on the Present Pain Intensity (PPI) index where 1 = no pain, 2 = mild, 3 = discomfort, 4 = distressing, 5 = horrible, and 6 = excruciating, and described whether their pain was brief, intermittent, or continuous. Also, the SF-MPQ includes a visual analog scale⁴⁴. It is a reliable qualitative and quantitative assessment tool for pain and has been translated for use among Arabic-speaking patients, with a Cronbach's α of 0.85⁴⁵ (Cronbach's α in this study = 0.92).

Generalized anxiety disorder (GAD-7)

The GAD-7 is a self-administered, 7-item scale, used for identifying likely cases of Generalized Anxiety Disorder over the past 2 weeks. Items are rated on a 4-point Likert-type scale (0 = not at all, 1 = several days, 2 = more than half the days, 3 = nearly every day)^{46,47}. Higher scores indicate a greater risk of anxiety. The scale has been validated in Arabic among adults and adolescents and has demonstrated great psychometric properties^{46,47}. It is short and easy to administer with an internal consistency Cronbach's α from 0.79–0.91⁴⁷ (Cronbach's α in this study = 0.88).

Child abuse self-report scale (CASRS-12)

This scale was developed by Fekih-Romdhane et al.⁴⁸ and assesses four dimensions of child abuse: physical, psychological and sexual abuse, and neglect using only 12 items. Items are scored on a scale from 0 to 3 (never ~ always). A higher total score indicates more severe childhood abuse. The scale has been validated in Lebanon, with a McDonald's ω values ranging from 0.87 to 0.93 for the four subscales⁴⁸ (Cronbach's α in this study = 0.86).

Statistical analyses

Data analysis was performed using the SPSS software version 26. There was no missing data in our database since all questions were required in the Google Forms. Reliability of the scales was checked using Cronbach's alpha values. The anxiety score had a normal distribution as shown by the skewness (= 0.459) and kurtosis (= -0.242) values varying between ± 1 . The student t-test was used to compare continuous variables between two groups, and Pearson correlation was used for linear correlation between continuous variables. The mediation analysis was conducted using the PROCESS SPSS Macro version 4.2, model 4 for SPSS, a regression-based approach for testing mediation effects. All exposure, mediator, and outcome variables were treated as continuous in the mediation model. Four pathways were generated; Pathway A determined the effect of the child abuse on anxiety (the mediator); Pathway B examined the association between anxiety and pain, and Pathways C and C' estimated the total and direct effects of child abuse on pain. Mediation significance was determined using Bootstrapped confidence intervals, where an effect was considered significant if the interval did not include zero. The effect ratio was calculated (indirect effect / total effect), which would help quantify how much of the association is shared across variables. Covariates for adjustment in the mediation analysis were selected based on a p value

Sex	
Males	136 (26.8%)
Females	371 (73.2%)
Marital status	
Single	369 (72.8%)
Married	138 (27.2%)
Age (years)	26.80 ± 10.29
Household crowding index (person/room)	1.14 ± .55
Physical activity	23.07 ± 19.86
Pain	12.08 ± 9.84
Anxiety	7.52 ± 4.93
Child abuse	8.05 ± 6.61

Table 1. Sociodemographic and other characteristics of the participants (n = 507).

	Mean ± SD	t	df	p
Sex		−0.35	505	0.729
Males	11.83 ± 9.16			
Females	12.17 ± 10.09			
Marital status		−3.13	505	0.002
Single	11.20 ± 9.32			
Married	14.45 ± 10.79			

Table 2. Factors associated with pain. Numbers in bold indicate significant *p* values.

	1	2	3	4	5
1. Pain	1				
2. Age	0.13**	1			
3. Household crowding index	0.03	−0.08	1		
4. Physical activity	−0.001	−0.14**	−0.04	1	
5. Anxiety	0.53***	−0.03	0.01	0.08	1
6. Child abuse	0.43***	0.08	0.12**	0.04	0.30***

Table 3. Pearson correlation matrix. **p* < .05; ***p* < .01; ****p* < .001.

threshold of < 0.25 in the bivariate analyses⁴⁹. Nagelkerke *R*² values were calculated for each model, with values between 0.02–0.13 reflect small effect, whereas values between 0.13–0.26 and ≥ 0.26 indicate medium and large effect respectively⁵⁰. For all statistical tests, significance was set at *p* < 0.05.

Results

Five hundred seven adults completed the survey, with a mean age of 26.80 ± 10.29 years [min = 18; max = 70] and 73.2% females. Other description of the sample can be found in (Table 1).

Bivariate analysis

Higher mean pain scores were significantly found in married compared to single participants (Table 2), whereas older age, higher anxiety and child abuse were significantly associated with more pain (Table 3).

Mediation analysis

The results of the mediation analysis were adjusted over age and marital status. Excluded from the analysis were the following variables: sex, household crowding index and physical activity. Anxiety partially mediated the association between child abuse and pain (indirect effect: Beta = 0.20; Boot SE = 0.03; Boot CI 0.14; 0.27). Higher child abuse was significantly associated with more anxiety and directly associated with more pain. Finally, higher anxiety was significantly associated with more pain (Fig. 1). The overall model *R*² of 0.201, indicates that 20.1% of the variance in pain is accounted for by anxiety (medium effect size). The effect ratio value was 0.203/0.629 = 0.323 [95% CI 0.322; 0.326].

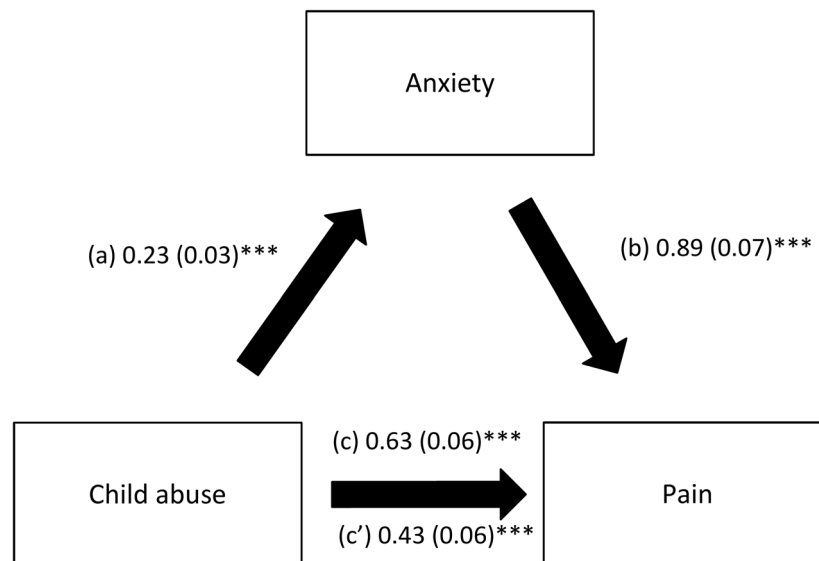


Fig. 1. (a) Relation between child abuse and anxiety ($R^2 = .094$); (b) Relation between anxiety and pain ($R^2 = .382$); (c) Total effect of child abuse on pain ($R^2 = .201$); (c') Direct effect of child abuse on pain. Numbers are displayed as regression coefficients (standard error). *** $p < 0.001$.

Discussion

The aim of the study was to explore the mediating effect of anxiety in the relationship between child abuse and pain among a sample of Lebanese adults. Anxiety was found to partially mediate the relationship between child abuse and chronic pain. Higher levels of child abuse were significantly linked to higher anxiety and directly associated with greater pain. Additionally, higher anxiety was associated with more pain.

Child abuse and anxiety

Our study results demonstrated that higher exposure to child maltreatment was significantly correlated with aspects of anxiety; findings concurrent with previous evidence^{36,51–54}. In a Lebanese study conducted on 1810 adolescents to evaluate the association between anxiety and child physical, sexual and psychological abuse, results showed psychological abuse to be a strong determinant of higher anxiety levels in adolescents⁵¹. Focusing on adult outcomes, a British cohort study found that a history of child abuse was significantly associated with higher odds of anxiety and depression in adults, which in turn mediated the development of other comorbid conditions^{33,54}. Specifically, social anxiety emerged as the most prominent form of anxiety related to many forms of childhood abuse, as emphasized in a recent meta-analysis that reviewed studies published up to October 2021 across five databases³⁶. In this meta-analysis, emotional abuse was found to be the most significant form of abuse tied with the emergence of social anxiety, while physical and sexual abuse showed milder but still significant effects on psychosocial outcomes³⁶, reinforcing findings from previous studies^{14,51}. Parallel to these outcomes, another meta-analysis conducted across three databases between 2002 and 2012, concluded that adults exposed to childhood physical and sexual abuse were associated with high levels of later anxiety, distress and depression¹², suggesting that the psychological consequences of such abuse may persist well into adulthood without a defined time frame for onset. Another article that analyzed the findings of a two-decade longitudinal study about the repercussions of child maltreatment in later life, showed that both emotional abuse and neglect were significantly linked to anxiety and other cognitive and psychosocial derangements¹⁴. A reason for the development of the apparent disordered manifestations of child maltreatment may be expressed by the underlying neurobiological consequences of childhood abuse. One study elucidated that the fundamental role of the Hypothalamic–Pituitary–Adrenal (HPA) axis in the regulation of the biological pathways of early life stress may be altered, leading to the emergence of psychiatric disorders and their perpetuation in adult life⁵⁵. Moreover, a genetic approach was observed to have a positive correlation between the HPA-axis related genes and the drawbacks of child abuse. The presence of specific genes augmented the likelihood of experiencing psychosocial disturbances⁵⁶.

Anxiety and pain

Our findings demonstrate that more anxiety is strongly linked to higher pain in adults, with anxiety accounting for 20.1% of the variance in pain- reflecting a moderate effect, consistent with a previous meta-analysis results¹³ that unveiled a moderate connection between anxiety and pain. This interrelation might be explained by certain brain processing mechanisms reflecting a significant dysregulation of certain brain areas^{57,58} leading to a perpetual aggravation of the interplay between those two components⁵⁹. Another cohort study in concordance with our findings showed that accentuation of symptoms of anxiety and/or depression were tightly related to an elevation in pain levels⁶⁰, a stable effect over time. However, even after remission of anxiety and/or depression, the pain magnitude described was still higher compared to mentally healthy individuals on the long run. This

association has been interpreted as part of a negative feedback loop, where chronic depression and anxiety increase pain perception, which in turn exacerbates anxiety and depression⁶⁰. Similarly, a national longitudinal study conducted in the United States over a four-year period found a significant increase in anxiety levels among older adults experiencing chronic pain⁶¹. This association would explain a wider observance of the interplay between the two entities, reflecting that pain might intensify anxiety levels, forming a self-perpetuating cycle where each component amplifies the other. This relationship was corroborated by a recent study carried out on a sample of 1794 adults that demonstrated increased levels of anxiety and depression with increased pain related to childhood maltreatment¹⁵. To address this matter, the use of antipsychotics could be beneficial in preventing the evolution of anxiety, thus diminishing the magnitude of pain perception⁶². Also, one study endorses the use of analgesics and appropriate interventions to restrict the occurrence of pain, which is thought to be an intensifying factor for anxiety⁶⁰. While combining the effects of analgesics and antipsychotics might modify the dynamics related to anxiety and chronic pain, further studies are needed to verify the nature of the outcome.

Lastly, the consequences of child abuse are numerous, and regarding its impact on adult pain, research has found a concurrent relationship, where a rise in childhood maltreatment is linked to higher levels of pain in adulthood^{62–64}. The latter relationship had been shown to be reinforced when implying anxiety resulting from childhood trauma as a mediating factor, likely through its amplifying effect on the dysregulation of brain pathways on the short- and long term, demonstrating the complex impact of psychological stressors on the occurrence of pain later in life^{13,58,59,61}. Furthermore, the study showed that anxiety has a partial mediating effect on child abuse and pain, explained by its exacerbating effect on stress pathway dysregulation, significantly contributing to the pathophysiology of chronic pain in adulthood^{16,63–66}. In instance, other comorbidities like depression also have a mediating effect, further emphasizing the complex interplay between child abuse, mental health, and chronic pain^{64,67–70}.

Child abuse and pain

The findings of this study revealed a significant association between higher child abuse and higher pain scores in adulthood, aligning with the results of previous research⁶², which demonstrated that physical or emotional child abuse and early life stressors can result in neurobiological changes, including alterations to the HPA axis that regulates the stress response⁶³. This dysregulation contributes to behavioral disturbances, central pain sensitization, and increased pain perception. Such mechanisms are often linked to comorbid conditions in adulthood, including fibromyalgia and migraines^{63,71,72}. In addition, the socio-economic conditions and cultural perceptions prevalent in Lebanese and Arab societies often normalize child abuse or violence as an acceptable parenting strategy, such as corporal punishment, to enforce discipline within families^{61,62,65,72–74}. Research has shown that children who grow up in low-income households are more likely to act violently^{61,62}. Aggressive inclinations can be exacerbated by the stress and challenges of poverty, including restricted access to resources and ongoing financial instability. Parents in these situations often feel overwhelmed and turn to physical punishment as a disciplinary approach, believing it to be the most effective way to establish rules and guarantee their children behave appropriately^{62,72,73}. This is seen in certain cultures, such as the Lebanese one, where corporal punishment is still a frequent and widely accepted practice in many households. However, children who get physical punishment are more likely to face mental health problems, such as chronic anxiety, and personality disorders^{62,72–74}. Children could have trouble controlling their emotions and interacting with others. Lastly, depression is another significant outcome for children exposed to physical punishment, as they may internalize feelings of worthlessness and helplessness, leading to emotional distress and long-term mental health damage^{73,74}. Moreover, these cultural attitudes, added to a decline in quality of life and stressors, serve as triggers for pain³², as they contribute to sustained stress pathway activation and heightened pain sensitivity^{63,75}.

Clinical implications

Cognitive behavioral therapy (CBT) is an effective intervention for addressing the psychological impact of child abuse by helping individuals reframe negative thought patterns and develop healthier coping strategies^{76–78}. It is widely used in Lebanon, and has shown effectiveness in improving outcomes related to insomnia, anxiety and depression^{79,80}. The use of CBT in primary care patients has indicated a better outcome for treating patients with anxiety and depression^{79,80}. It reduces anxiety, pain pathways dysregulation, and improves emotional and physical well-being^{76–78,81}. Also, the incorporation of the mindfulness-based CBT for child abuse can increase the outcomes of the treatment by alleviating anxiety and cognitive triggers that exacerbate pain^{77,78,81,82}. Moreover, educating the public about children's rights and protection is essential and can be achieved through social media, local programs, and schools. This can help prevent child abuse and enhance their overall protection⁸¹. Lastly, family therapy could play a crucial role, as intrafamilial stressors often serve as triggers for child abuse, which can lead to anxiety and other comorbidities in adulthood, ultimately contributing to physical pain.

Limitations

The study has several limitations:

- 1) Design limitations (cross-sectional design). The cross-sectional design restricts the ability to infer causality, as exposures and outcomes were assessed simultaneously. This limits conclusions about temporal ordering and directionality of observed associations.
- 2) Information bias. Data were collected through self-administered questionnaires, which may be subject to misinterpretation or recall bias. Given the sensitive nature of the topic, social desirability bias may have influenced responses, potentially leading to underreporting or misclassification. The direction of this bias is uncertain, and while likely moderate, it may have affected the accuracy of the estimated associations.

- 3) Selection bias. The use of a snowball sampling approach likely resulted in a non-random sample with unknown participation and refusal rates. This method may have introduced systematic differences between the study sample and the broader target population, particularly with respect to gender and marital status. Such differences may bias associations if the over- or under-represented groups differ on key study variables.
- 4) Generalizability and effect modification. Participation was voluntary and may have attracted individuals with specific experiences or characteristics, particularly due to the sensitive nature of the study. This self-selection, combined with non-random sampling, limits the generalizability of findings. Additionally, interaction effects between sociodemographic variables and key exposures may vary across populations, further restricting external validity.
- 5) Unmeasured confounding and variable selection. While the analysis adjusted for age, marital status, and socioeconomic status, other potential confounders—such as early-life socioeconomic conditions, education level, family dynamics, and prior mental health—were not included. Moreover, covariate selection was based on a liberal p-value threshold (< 0.25) in bivariate analyses, which may have increased the risk of including non-confounding variables or excluding relevant ones. Although the resulting bias is likely small, this approach may affect the robustness of multivariable estimates.

Conclusion

Child abuse is a serious topic that is more frequent nowadays in its different types. It is potentially linked to long-term consequences that may be both psychological and physical, including chronic pain in adulthood. This relationship should be examined in the scope of longitudinal studies to establish causality. Children often develop anxiety, depression and other comorbidities that may mediate the development of pain through different pathways. Additional investigations of child abuse and pain in adulthood should improve the comprehension of these different pathways, which may lead to the treatment or prevention of pain—particularly by considering the mediating role of anxiety. Future studies should explore other potential mediators that may contribute to the development of pain.

Data availability

Because of ethical committee constraints, none of the data collected or analyzed during this study are publicly available. However, the corresponding authors may make the data available upon reasonable request.

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Author contributions

FFR, SH and SO designed the study; EK and GC drafted the manuscript; SH carried out the analysis and interpreted the results; FS and MD collected the data. DM and SEK reviewed the paper for intellectual content; all authors reviewed the final manuscript and gave their consent.

Declarations

Competing interests

The authors declare no competing interests.

Ethics approval and consent to participate

The Lebanese International University's School of Pharmacy ethics committee granted this study ethics

permission (Reference number: 2024ERC-023-LIUSOP). When filling out the online form, each participant provided written informed consent. All methods were performed in accordance with the relevant guidelines and regulations (in accordance with the Declaration of Helsinki).

Additional information

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