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# Factors affecting resilience in pregnant Lebanese women exposed to overlapping crises

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## Abstract

**Background** Resilience is a critical determinant of individuals' psychological well-being and their ability to cope with adversity. Resilience has emerged as a point of clinical relevance when addressing the effects of extreme environmental adversity on vulnerable populations. Lebanon experienced an economic collapse, the COVID-19 pandemic and the Beirut Blast within the span of a single year, causing significant lasting damage. Pregnant women were particularly vulnerable during this period of time. This study aims to measure the resilience of pregnant women in Lebanon after exposure to multiple, large-scale traumatic events. It also examines the potential effect of obstetrical factors, perceived stress, perceived social support, and childhood experiences on resilience scores.

**Methods** We conducted a cross-sectional study among Lebanese pregnant women. A total of 257 pregnant Lebanese women who resided in Lebanon during all three crises were recruited to participate. Resilience, adverse and benevolent childhood experiences, and perceived social support were measured using validated scales: the Connor-Davidson Resilience Scale, the Adverse Childhood Experiences questionnaire, the Benevolent Childhood experiences scale, and the Multidimensional Scale of Perceived Social Support respectively. We also included a section on perceived stress, which included questions about the impact of the COVID-19 pandemic, the economic crisis, and the Beirut blast.

**Results** Our findings revealed a significant negative correlation between resilience and perceived stress ( $b = -0.157$ ), suggesting resilience's protective role against the negative impact of stress during pregnancy. Furthermore, a positive correlation was demonstrated between perceived social support and resilience ( $b = 0.19$ ), underscoring the importance of supportive networks in boosting resilience.

**Conclusion** This research contributes vital knowledge to the understanding of resilience during the perinatal period. It emphasizes the need for comprehensive prenatal care that incorporates social and psychological support, thereby enhancing resilience and overall well-being in pregnant women amidst the multifaceted challenges faced in Lebanon.

**Keywords** Resilience, Perinatal period, Adverse childhood experiences, Connor-Davidson resilience scale, Adversity, Pregnancy

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## Background

Resilience has become a focal point in understanding an individual's susceptibility to adverse outcomes in the face of challenges [1], with initial investigative efforts dating back to 1985 [2, 3]. Resilience can be considered as a protective factor empowering individuals to adapt to and triumph over adversity and trauma, and includes the personal resources utilized to shield oneself against the negative effects of stressors [2–5]. A comprehensive review of the empirical literature on resilience by Aburn et al. [6] identified five key concepts that characterize resilience: the ability to overcome adversity, adapting and adjusting in the face of trauma, the presence of “ordinary magic” which is ground in ordinary yet meaningful familial and non-familial relationships, good mental health (more specifically, the absence of mental illnesses), and the ability to bounce back after experiencing adversity [6]. Multiple studies have identified different sources of resilience, including personal (e.g. personality traits), biological, genetic, and environmental factors [5, 7, 8]. Furthermore, studies have demonstrated resilience to be amenable to change with one's experiences and environment [9].

Resilience has become an essential concept in understanding the impact of persistent adversity, particularly in Lebanon, where a combination of long history of armed conflict, sectarian disputes, and multiple socio-economic and health crises has deeply affected the population's mental and physical well-being over the years. In recent years, Lebanon has faced multiple, overlapping crises over the span of several months. In October of 2019, a brutal economic collapse began where the value of the Lebanese currency plummeted, placing the country on the precipice of bankruptcy [10]. This was followed closely by the start of the COVID-19 pandemic in 2020 which exacerbated pre-existing economic troubles by establishing a state of health emergency, leading to increased unemployment rates, and forcing small local businesses to shut down [10]. Results from a study by Salameh et al. [11] showed that the combined presence of pandemic-related fears and financial hardship further increased stress and anxiety beyond the impact of each hardship separately, and higher stress and anxiety levels were associated with female gender. Another study examining mental health in Lebanese pregnant women during the COVID-19 pandemic reported higher rates of depression and anxiety compared to the existing literature [12]. The crisis was further compounded by the 4th of August 2020 Beirut blast, the world's most powerful non-nuclear explosion of the 21st century, killing an estimated 218 people, injuring over 6,000, and destroying several hospitals and arresting city services [13, 14]. Following the Beirut explosion, the Lebanese NGO ‘Embrace’ surveyed 903 individuals; the findings indicated that over 84% of respondents became more sensitive to perceived dangers,

83% reported feeling sad almost every day and losing interest in activities they once enjoyed, while 78% experienced high levels of daily anxiety and worry [15].

Literature indicates that women of childbearing age are significantly impacted during crises, particularly in the context of their reproductive health outcomes due to decreased or impaired access to quality healthcare, reduced availability of supplies, and gaps in health system capacity [16]. This is troubling, given that pregnancy and the post-partum period, collectively defined as the perinatal period, are known to be associated with extensive physiological and psychological changes, marked by hormonal fluctuations, inflammatory changes, and heightened stress levels [7]. Perinatal stress has been linked to adverse prenatal and postnatal medical and psychiatric outcomes for both mothers and children. Mothers' risk for gestational diabetes, pre-eclampsia, premature labor, and prenatal and post-partum depression increases with stress [17]. Major consequences of chronic perinatal stress on the offspring include low-birth weight and neurodevelopmental pathologies, such as lower cephalic circumference, worse cognitive development, and behavioral disturbances [17–19], as well as predisposition to schizophrenia and personality disorders [20, 21]. Moreover, resilience has been found to be inversely linked to depression, anxiety, and perceived stress in pregnant populations [22]. Higher levels of resilience have also been significantly associated with improved sleep quality in pregnant women [23] and were considered protective factors against stress [24]. Thus, strategies and interventions designed to promote resilience as a way to mitigate stress are essential for minimizing the negative consequences of stressors during pregnancy.

Multiple factors, including adverse childhood experiences (ACEs), benevolent childhood experiences (BCEs), perceived stress and social support, can contribute to resilience in the general population. ACEs, encompassing a range of distressing childhood events such as abuse and family dysfunction [25], are shown to substantially correlate with persisting mental health difficulties and reduced resilience throughout life [26]. Women who have experienced a high number of ACEs have been shown to face an increased risk of encountering mental health challenges compared to those without such experiences [27–30]. Contrary to ACEs, BCEs represent the positive experiences encountered before the age of 18 years. BCEs might prevent and moderate the effects of ACEs through the promotion of mental wellness and resilience [31] and have been proven to neutralize the negative impact of ACEs on prenatal stress and psychopathology [32]. Similarly, social support systems have been found to be incredibly important in developing resilience since they act as protective factors against risky behavior, poor mental health, and negative responses to stress [9, 33]. On the

other hand, individuals who are lacking such connections are found to have heightened sensitivity to stress, compromised physical health, and comparable all-cause mortality to obesity and cigarette smoking [33].

Mental health research in Lebanon has focused heavily on the psychiatric outcomes associated with the consequences of war and political instability, including depression, anxiety, and post-traumatic stress syndromes. Studies on resilience within the Lebanese population before the COVID-19 pandemic were scarce, and mostly focused on resilience in relation to trauma from war [34]. Since then, studies exploring resilience primarily targeted healthcare professionals during the peak of the pandemic [35, 36], with few studies also examining resilience and mental health in the Lebanese population after the Beirut Blast [14, 37, 38]. Research on maternal mental health in Lebanon is scarce, and limited to studying depression and anxiety [12, 39, 40]; research specifically surrounding resilience in Lebanese pregnant women is lacking. Our study aims to address this gap by measuring the resilience of pregnant women in Lebanon after exposure to multiple, large-scale traumatic events via validated scales. It also examined the effect of various obstetrical and environmental (ACEs, BCEs, perceived social support and perceived stress) factors on the resulting resilience scores.

## Methods

### Aim, design and setting of the study

This research aims to evaluate resilience in pregnant Lebanese women, shedding light on factors that may influence their ability to navigate adversity during this critical period. We assessed the resilience of pregnant women in Lebanon using the Connor-Davidson Resilience Scale (CD-RISC) and correlated their resilience scores with various obstetrical factors. We also measured subjects' perceived social support via the Multidimensional Scale of Perceived Social Support (MSPSS), ACEs via the Adverse Childhood Experiences questionnaire (ACE-Q), and BCEs via the Benevolent Childhood experiences (BCEs) scale in an effort to account for each's effect on individuals' resilience scores. The final section of the questionnaire included questions about the COVID-19 pandemic, the economic crisis, and the Beirut blast to gauge the participants' perceived stress during Lebanon's crises.

Subjects were recruited through online advertising on the principal investigator's and American University of Beirut Medical Center's (AUBMC) social media platforms, in addition to recruitment through the AUBMC Health EPIC system.

### Participants

A sample of 320 pregnant Lebanese women were recruited to participate in the study. We included women with a Lebanese nationality, aged 18 through 40, who experienced the three Lebanese crises of 2020. Non-Lebanese women, women not residing in Lebanon during 2020, and women undergoing active treatment for a malignancy were excluded. Of the original 320 recruited, 257 subjects completed the survey while the remaining 63 subjects did not. Only complete survey responses were included in the analysis.

### Procedure

Our study was approved by the Institutional Review Board (IRB) of the American University of Beirut (ID SBS-2021-0377). Between January of 2022 and December of 2022, we invited participants to fill in an online self-administered questionnaire via Lime Survey. The invitation script and survey link were posted in English and Arabic on the principal investigator's and AUBMC's social media platforms to reach the maximum number of Lebanese women from different backgrounds and socioeconomic levels, to generalize the study's results. Participants were also recruited through the AUBMC Health EPIC system by the research co-investigators. An invitation script describing the study, its purpose, and inclusion criteria was sent to patients via "WhatsApp" mobile application. A reminder message of the invitation was sent three times, each set one week apart. Phone numbers and emails were deleted after the third reminder. Participants who expressed interest in participating were provided with the consent form and the survey link. Those willing to participate were required to sign an online consent form before being redirected to the questionnaire. The eligibility of participants was maintained by restricting the age group at the beginning of the survey.

### Measures

A questionnaire was designed and validated for the study, which consisted of a demographics survey and multiple scales: the Connor-Davidson Resilience Scale (CD-RISC), the Adverse Childhood Experiences questionnaire (ACE-Q), the Benevolent Childhood experiences (BCEs) scale, and a Multidimensional Scale of Perceived Social Support (MSPSS). We also included several questions surrounding the effect of ongoing stressful events in Lebanon on the participant's mental health; this section was considered to reflect subjects' perceived stress (PS).

The CD-RISC questionnaire [41] consists of 25 items that are rated from 0 to 4 on a 5-point Likert scale, where higher scores indicated higher resilience. Permission to use the CD-RISC was obtained from the original copyright owner. The validated CD-RISC in Arabic [42] and

English were available for participants to select their preferred language.

The ACE- Q [43] is a ten item self-report measure used to measure childhood trauma. The questionnaire assesses ten types of childhood trauma: five are personal and the other five are related to other family members. Personal factors include being a victim of physical, verbal, or sexual abuse, and the presence of physical and emotional neglect. The factors related to other family members include the presence of an alcoholic parent, domestic violence specifically targeting the mother, an incarcerated family member, a family member diagnosed with a mental illness, and the disappearance of a parent through divorce, death, or abandonment. The individual responds with a Yes or No answer. Each “Yes” answer was given one point and then the points were tallied to determine the individual’s ACE Score. The ACE questionnaire has successfully been utilized in Arabic-speaking populations [44], thus rendering the use of a translated Arabic version feasible in this study.

The BCEs scale [32] consists of ten questions which assess favorable childhood experiences characterized by safety and security (e.g., ‘at least one caregiver with whom you felt safe’, ‘beliefs that gave you comfort’), pleasurable and predictable quality of life (e.g., ‘opportunities to have a good time’, ‘predictable home routine’), positive self-perceptions (e.g., ‘like yourself or feel comfortable with yourself’) and support external to the family (e.g., ‘good neighbors’, ‘at least one teacher that cared’, ‘adult who could provide support or advice’). The individual responds with a Yes or No answer. Each “Yes” answer was given one point and then the points were tallied to determine the individual’s BCE Score. The BCE scale has been found to be a culturally sensitive scale across different ethnic groups [32], thus rendering it feasible for translation and use in this study. The MSPSS scale [45] is a short instrument designed to measure an individual’s perception of support from 3 sources: family, friends, and a significant other. It consisted of 12 questions rated from 1 to 7, with higher scores indicating higher perceived support. The validated Arabic version was developed by Merhi and Kazarian [46]; this version was utilized for the Arabic version of our questionnaire.

The final section of the questionnaire, namely perceived stress, included questions about the effect of the COVID-19 pandemic and its vaccination controversy, the economic crisis, the Beirut blast, and domestic violence on patients’ mental health and wellbeing. This allowed us to gauge the participants’ perceived stress during Lebanon’s crises; higher scores indicated higher levels of perceived stress. This portion of the questionnaire was not extracted from a validated scale.

To assess the internal consistency of the scales used in this study, reliability analyses were conducted. For the

CD-RISC scale, Cronbach’s Alpha was 0.885, indicating excellent internal consistency. The MSPSS also demonstrated excellent reliability, with a Cronbach’s Alpha of 0.907 across its 12 items.

For the ACE and BCE questionnaires, which are composed of binary (Yes/No) items, the Kuder-Richardson Formula 20 (KR-20) was used to assess internal consistency. The KR-20 coefficient for the ACE scale was 0.676, and for the BCE scale 0.658, both indicating acceptable reliability for instruments consisting of dichotomous items. These results support the internal reliability of the measures used in this study for assessing resilience, childhood experiences, and perceived social support.

### Statistical analysis and sample size calculation

The sample size was calculated for 80% power and significance level of 0.05 using Cochran’s formula  $n = Z^2 \cdot p^* (1-p) / d^2$ , where the confidence interval was 95% ( $Z = 1.96$ ), the margin of error was considered to be 5.66% ( $d = 0.0566$ ) and an assumed probability of 0.5 designed to obtain maximum sample size ( $p = 0.5$ ). Thus, the sample size needed was 300 subjects. Due to response limitations, 257 subjects are included in this study. However, this number of subjects retains statistical power for analysis.

Statistical analysis was performed using the SPSS 26 statistical software package (IBM, USA). The primary outcomes were analyzed and tabulated per their nature: frequency and percentages for categorical variables and means, standard deviations (SD), and range for continuous variables. Secondary outcomes were studied using binary logistic regression, and linear regression to establish an association between the various outcome variables. An association was deemed significant for a  $p$ -value  $\leq 0.05$ .

### Results

Looking at the demographic and reproductive characteristics of our participants in Table 1, Lebanese pregnant women conveyed an average of 1.07 previous pregnancies. Out of the reported pregnancies, 30.7% were achieved through assisted reproduction and 69.2% occurred spontaneously. In addition, 80.5% of participants reported no fertility problems, while 19.5% faced challenges in getting pregnant. In general, 10.5% sought mental health support, while only 2.3% reported use of psychiatric medications. Approximately, three-quarters of the participants reported having a past history of chronic illness.

Our findings reveal noteworthy trends when examining the association between pregnancy characteristics and resilience. Surprisingly, all obstetrical variables examined (planned versus unplanned pregnancy, assisted versus spontaneous pregnancy, number of current pregnancies,

**Table 1** Demographic characteristics of the study population present in N (%) or mean  $\pm$  sd

	N (%) or mean $\pm$ SD
<b>Age</b>	30.86 $\pm$ 4.742
<b>Married</b>	257 (100%)
<b>Employment Status</b>	
Employed	156 (60.7%)
Unemployed	101 (39.3%)
<b>Educational Level</b>	
Primary/high school	12 (4.6%)
College	97 (37.7%)
Higher Education	148 (57.6%)
<b>Number of previous pregnancies</b>	1.07 $\pm$ 1
<b>Number of current pregnancy</b>	
First	97 (39.1%)
Second	76 (30.6%)
Third or more	75 (30.2%)
<b>Pregnancy plan</b>	
Planned	180 (71.1%)
Unplanned	73 (28.9%)
<b>Pregnancy type</b>	
Assistive Reproductive	79 (30.7%)
Spontaneous	172 (69.2%)
<b>Do you have fertility problems?</b>	
No	207 (80.5%)
Yes	50 (19.5%)
<b>Number of previous failed In Vitro Fertilization (IVF) attempts</b>	
None	161 (72.9%)
One	29 (13.1%)
Two or more	31 (14%)
<b>Seeking mental health support (seeing a psychologist, psychiatrist, or counselor)?</b>	
No	230 (89.5%)
Yes	27 (10.5%)
<b>Do you take psychiatric medication?</b>	
No	251 (97.7%)
Yes	6 (2.3%)
<b>Presence of Chronic Medical Illness</b>	
Yes	152 (74.5%)
No	52 (25.5%)

number of previous abortions, fertility problems, and number of previous failed IVF attempts) were found to have no significant association with resilience scores (Table 2). Notably, participants without fertility problems exhibited slightly lower resilience ( $M = 69.32$ ,  $SD = 11.649$ ) compared to those facing fertility problems ( $M = 70.94$ ,  $SD = 8.80$ ), though this difference was not statistically significant ( $t(df) = -1.092$ ,  $p = 0.278$ ).

Table 3 presents a comprehensive view of the correlation coefficients between the CD-RISC resilience score and other key variables. The CD-RISC score exhibited a statistically significant positive correlation with the BCEs

**Table 2** Association between pregnancy characteristics and resilience (measured by CD-RISC)

CD-RISC Score		
Variable	Mean $\pm$ SD	P-value
<b>Pregnancy plan</b>		
Planned	70.11 $\pm$ 10.41 (180)	0.17
Unplanned	67.99 $\pm$ 12.74 (73)	
<b>Pregnancy type</b>		
Assistive reproductive	69.51 $\pm$ 9.64 (79)	0.964
Spontaneous	69.58 $\pm$ 11.83 (172)	
<b>Number of current pregnancy</b>		
First	71.10 $\pm$ 10.69 (99)	0.135
Second	67.72 $\pm$ 10.58 (76)	
Third or more	69.52 $\pm$ 11.90 (76)	
<b>Number of previous abortions</b>		
None	70.09 $\pm$ 10.719 (150)	0.556
One	68.21 $\pm$ 10.187 (52)	
Two or more	70.09 $\pm$ 13.587 (32)	
<b>Do you have fertility problems?</b>		
No	69.32 $\pm$ 11.64 (207)	0.357
Yes	70.94 $\pm$ 8.80 (50)	
<b>Number of previous failed IVF attempts</b>		
None	69.87 $\pm$ 11.83 (161)	0.88
One	69.24 $\pm$ 8.72 (29)	
Two or more	70.68 $\pm$ 8.73 (31)	
<b>Do you take psychiatric medication?</b>		
No	69.74 $\pm$ 11.12 (251)	0.34
Yes	65.33 $\pm$ 13.05 (6)	
<b>Seeking mental health support (seeing a psychologist, psychiatrist, or counselor)?</b>		
No	69.90 $\pm$ 11.07 (230)	0.258
Yes	67.30 $\pm$ 11.82 (27)	
<b>Presence of Chronic Medical Illness</b>		
Yes	69.77 $\pm$ 10.60 (152)	0.729
No	69.13 $\pm$ 13.49 (52)	
<b>Employment Status</b>		
Employed	70.26 $\pm$ 10.94 (156)	0.262
Unemployed	68.66 $\pm$ 11.46 (101)	

$P < 0.05$  is statistically significant

Score ( $r = 0.153$ ,  $p = 0.014^*$ ), and MSPSS Score ( $r = 0.221$ ,  $p < 0.001^*$ ). Conversely, the CD-RISC score showed a significant negative correlation with the PS Score ( $r = -0.172$ ,  $p = 0.006^*$ ), and a negative correlation with the ACE-Q Score ( $r = -0.096$ ,  $p = 0.126$ ) though this association was not significant. ACE-Q and PS scores were significantly correlated ( $r = 0.172$ ,  $p = 0.006^*$ ), while the BCEs and MSPSS scores both showcased a significant negative correlation with the ACE score ( $r = -0.346$ ,  $p < 0.001^*$ ;  $r = -0.289$ ,  $p < 0.001^*$  respectively). These results highlight the interconnectedness of current resilience, childhood experiences, and maternal stress.



**Table 3** Pearson's correlation matrix of CD-RISC scores with the utilized scales (ACE-Q, BCEs, MSPSS, PS)

	CD-RISC	ACE score	BCE Score	MSPSS Score	PS Score
CD-RISC	1	-0.096 (0.126)	0.153 (0.014*)	0.221 (< 0.001*)	-0.172 (0.006*)
ACE-Q Score	-0.096 (0.126)	1	-0.346 (< 0.001*)	-0.289 (< 0.001*)	0.172 (0.006*)
BCEs Score	0.153 (0.014*)	-0.346 (< 0.001*)	1	0.348 (< 0.001*)	-0.104 (0.097)
MSPSS Score	0.221 (< 0.001*)	-0.289 (< 0.001*)	0.348 (< 0.001*)	1	-0.051 (0.415)
PS Score	-0.172 (0.006*)	0.172 (0.006*)	-0.104 (0.097)	-0.051 (0.415)	1

$P < 0.05$  is statistically significant

$r < 0.3$  indicates a weak correlation,  $0.3 < r < 0.5$  indicates a moderate correlation,  $r > 0.5$  indicates a strong correlation

\* Refers to statistically significant values

Table 4 employs one-way ANOVA tests to delve into the associations between various categorical groups and the different scales' scores among Lebanese pregnant women amid the crisis. Pregnant women not seeking mental health support demonstrated significantly lower ACE-Q scores ( $M = 0.69$ ,  $SD = 1.26$ ), yet higher BCEs ( $M = 9.12$ ,  $SD = 1.34$ ) and MSPSS ( $M = 72.13$ ,  $SD = 9.96$ ) scores. On the contrary, pregnant women seeking mental health support showed significantly higher ACE-Q score ( $M = 1.70$ ,  $SD = 1.73$ ;  $p < 0.001^*$ ), but lower BCEs ( $M = 8.48$ ,  $SD = 1.82$ ,  $p = 0.027^*$ ) and MSPSS ( $M = 66.56$ ,  $SD = 17.952$ ,  $p = 0.008^*$ ) scores. Moreover, unplanned pregnancies were associated with significantly higher ACE-Q score ( $p = 0.023$ ) and were linked to higher perceived stress levels ( $p = 0.045^*$ ).

When examining predictors of resilience among Lebanese pregnant women, perceived stress emerges as a significant predictor, with a negative beta coefficient of  $-0.157$  indicating that higher perceived stress is associated with lower resilience ( $p = 0.011^*$ ). Conversely, MSPSS score shows a positive association with resilience (beta =  $0.190$ ,  $p = 0.004^*$ ). The BCEs (beta =  $0.075$ ,  $p = 0.263$ ) and ACE-Q (beta =  $0.012$ ,  $p = 0.853$ ) scores, on the other hand, do not significantly predict resilience. (Table 5).

## Discussion

### Overview

The present study aimed to assess resilience in Lebanese pregnant women exposed to Lebanon's crises and its correlation with different obstetrical factors, adverse and benevolent childhood experiences, perceived social support, and perceived stress. Our findings indicate significant positive correlations between resilience and two factors: perceived social support and benevolent childhood experiences, and a significant negative correlation between resilience and perceived stress. There

is no statistical association between the obstetrical variables examined and resilience. However, spontaneous or unplanned pregnancy is notably associated with increased perceived stress, with ACEs having potential impact on spontaneous pregnancy. In addition, perceived stress and perceived social support are significant predictors of resilience among Lebanese pregnant women navigating a challenging crisis.

Interestingly, while no significant difference in resilience score was observed based on pregnancy planning, a notable correlation between ACE-Q score, perceived stress score, and pregnancy planning was evident. This suggests that ACEs might not only affect mental health trajectories but also influence reproductive intentions and aspirations. Holliday et al. [47] reported that Black women who had more ACEs, specifically experiences of neglect, had a lowered pregnancy desire and more planned pregnancies [47]. On the other hand, Flaviano et al. [48] found that self-reported exposure to ACEs was strongly associated with increased intentions to have children. One possible reason might be that women with high ACEs might have a greater desire to have children and provide a better life compared to their own childhood [49]. It is crucial to mention that different types of ACEs were related differently to the desire to have children. For example, a history of sexual abuse and neglect was associated with lower odds of being unsure about reproductive plans [50]. The diversity in responses to ACEs underscores the complexity of their influence and the variable nature of resilience and coping strategies among individuals.

Our findings resonated with contemporary research indicating that ACEs are predictive of mental and behavioral health in pregnant women. Notably, the association was most pronounced among women with low levels of resilience [51]. However, our study introduced an optimistic note by highlighting the potential effect of BCEs. These positive early life experiences may boost resilience and mental health, potentially offsetting the adverse effects of ACEs. It is during the perinatal period that the influence of a woman's own childhood experiences become increasingly relevant [52]. Pregnancy often prompts a re-evaluation and reflection on individual's past interactions with their caregivers. Perinatal mental health is deeply associated with ACEs, especially those involving abuse and neglect during childhood [30, 53, 54]. ACEs can result in psychiatric symptoms, altered expectations of caregiving, and disrupted perceptions regarding the baby [32]. On the other hand, BCEs and good perceived social support during pregnancy are a source of strength and resilience and have a protective effect on both maternal and infant outcomes [55]. This interplay between past childhood experiences, both negative and positive, and perinatal mental health status underscores

**Table 4** Exploring the relation between ACE-Q, bces scale, MSPSS, PS scale and pregnancy characteristics

Variable	ACE-Q Score		BCEs Score		MSPSS Score		PS Score	
	Mean ± SD	p-value	Mean ± SD	p-value	Mean ± SD	p-value	Mean ± SD	p-value
<b>Pregnancy plan</b>								
Planned	0.67 ± 1.19	0.023*	9.11 ± 1.21	0.52	71.9 ± 10.10	0.411	2.08 ± 1.34	0.045*
Unplanned	1.09 ± 1.63		8.98 ± 1.79		70.98 ± 11.07		2.12 ± 1.37	
<b>Pregnancy type</b>								
Assistive reproductive	0.68 ± 1.27	0.31	9.08 ± 1.26	0.974	72.1 ± 8.3	0.572	2.06 ± 1.31	0.799
Spontaneous	0.87 ± 1.38		9.07 ± 1.49		71.3 ± 11.3		2.11 ± 1.42	
<b>Number of current pregnancy</b>								
First	0.90 ± 1.46	0.414	9.21 ± 1.19	0.049*	72.84 ± 9.74	0.26	2.15 ± 1.32	0.88
Second	0.63 ± 1.031		8.75 ± 1.63		70.11 ± 11.02		2.05 ± 1.31	
Third or more	0.85 ± 1.43		9.17 ± 1.30		71.15 ± 10.717		2.13 ± 1.41	
<b>Number of previous abortions</b>								
None	0.73 ± 1.28	0.022*	9.17 ± 1.236	0.266	72.50 ± 9.131	0.056	2.10 ± 1.29	0.695
One	0.52 ± 0.89		9.12 ± 1.199		69.13 ± 12.403		2.09 ± 1.30	
Two or more	1.31 ± 1.786		8.78 ± 1.539		73.78 ± 8.182		2.31 ± 1.37	
<b>Do you have fertility problems?</b>								
No	0.79 ± 1.29	0.915	9.10 ± 1.3	0.528	71.65 ± 10.16	0.758	2.09 ± 1.35	0.86
Yes	0.82 ± 1.57		8.94 ± 1.78		71.14 ± 11.49		2.06 ± 1.36	
<b>Number of previous failed IVF attempts</b>								
None	0.84 ± 1.394	0.335	9.12 ± 1.32	0.799	71.4 ± 10.2	0.458	2.03 ± 1.32	0.64
One	0.45 ± 0.985		9.28 ± 1.032		73.21 ± 6.36		2.27 ± 1.20	
Two or more	0.74 ± 1.290		9.10 ± 1.3		73.23 ± 7.44		2.12 ± 1.53	
<b>Do you take psychiatric medication?</b>								
No	0.78 ± 1.35	0.2	9.08 ± 1.42	0.21	71.57 ± 10.45	0.803	2.08 ± 1.36	0.657
Yes	1.50 ± 1.05		8.33 ± 1.63		70.50 ± 8.87		2.29 ± 1.03	
<b>Seeking mental health support (seeing a psychologist, psychiatrist, or counselor)?</b>								
No	0.69 ± 1.26	< 0.001*	9.12 ± 1.34	0.027*	72.13 ± 9.96	0.008*	2.05 ± 1.33	0.199
Yes	1.70 ± 1.73		8.48 ± 1.82		66.56 ± 17.952		2.40 ± 1.51	
<b>Presence of Chronic Medical Illness</b>								
		0.413		0.020*				0.683
Yes	0.87 ± 1.284		8.69 ± 1.76		71.12 ± 9.995	0.243	3.31 ± 1.515	
No	0.70 ± 1.271		9.19 ± 1.12		72.85 ± 8.941		3.20 ± 1.554	
<b>Employment Status</b>								
Employed	0.67 ± 1.311	0.058	9.13 ± 1.325	0.303	71.73 ± 9.98	0.728	2.03 ± 1.41	0.455
Unemployed	1.00 ± 1.393		8.95 ± 1.571		71.27 ± 11.08		2.16 ± 1.26	

$P < 0.05$  is statistically significant

\* Refers to statistically significant values

**Table 5** Linear regression outcomes: examining the relationship between CD-RISC and other influencing factors

Predictor Variable	Beta (Standardized Coefficients)	Standard Error	p-value
Constant **		6.20	< 0.001*
ACE Score	0.012	0.55	0.853
BCE Score	0.075	0.52	0.263
MSPSS Score	0.190	0.070	0.004*
PS Score	-0.157	0.505	0.011*

$P < 0.05$  is statistically significant

\* Refers to statistically significant values

\*\* Constant represents the estimated resilience score when all predictor variables are zero

the complex psychological challenges they face, emphasizing the necessity for targeted support.

The results of our study also show a negative association between perceived stress and resilience. The perceived stress score quantifies an individual's self-perceived stress levels during a time of uncertain political and economic stability in Lebanon. Researchers have extensively studied mediators of stress during pregnancy in attempts to understand possible factors that could either worsen this stress or act as protective buffers against it. Interestingly, resilience has consistently been shown in the literature to play a protective role against vulnerability and perceived stress in the pregnant population. For example, Hu et al. [56] found lower levels of perceived stress in pregnant women with higher resilience,

where these women appeared to demonstrate a more positive perception of their ability to cope with challenges compared to their counterparts. Another study found that pregnant women with higher resilience were more likely to demonstrate better psychological well-being overall, lower perceived stress, and decreased likelihood of experiencing depression or anxiety [19]. Resilient women can buffer the impact of perceived stress by being more likely to seek social support, use effective coping strategies, and regulate their emotions successfully [57]. Our sample confirmed these findings, as our participants demonstrated a significant negative association between their resilience scores and perceived stress scores.

### Strengths

Multiple validated scales were utilized in our study in order to analyze resilience in a holistic manner. The ACE-Q and BCEs scale were important to include since studies have shown that exposure to cumulative childhood trauma is associated with the development of anxiety, depression, and substance use disorders in adulthood, even after adjusting for confounding factors [58] and that maternal exposure to childhood adversity had transformative neurobiological and epigenetic effects, causing women to experience more mental health problems during pregnancy [51]. This aligns with the principles of the Resilience Theory, introduced by Crandall et al. in 2019 [59], which hypothesizes that resilience is not a static trait but rather a skill that develops through interactions between individuals and their environments, influenced by both protective and detrimental factors [59]. Even though ACEs negatively affect mental health, BCEs might prevent and moderate the effects of ACEs through the promotion of mental wellness and resilience [31]. Narayan et al. [32] demonstrated that BCEs can neutralize the negative impact of ACEs on prenatal stress and psychopathology. Crandall et al. [59] observed that mothers who went through high levels of ACEs yet had high levels of BCEs, have shown significantly lower PTSD symptoms and exposure to stressful life events during pregnancy compared to mothers with high levels of ACEs, but low levels of BCEs. Nevertheless, when ACEs are too extreme the protective effects of BCEs diminish [59].

Furthermore, our study adds to the growing body of evidence confirming a positive correlation between social support and resilience, particularly among pregnant women. Different studies examining determinants of increased resilience support our findings; multiple studies suggest that having a supportive network of family, friends, and healthcare providers contributes significantly to better quality of life and higher levels of psychological well-being and resilience during pregnancy [60–63] and postpartum [64, 65]. Others have found

that resources such as adequate prenatal care, access to healthcare services, and increased social support systems all promote resilience [51]. In addition, research has shown that pregnant women with support from partners, friends and family reported less anxiety, depression, and overall stress and exhibited greater resilience [66]. Similar to BCEs mediating the negative effects of ACEs, social support is believed to serve as a buffer against stress, thereby empowering individuals and fostering a sense of belonging and community [67]. A different theory attributes the protective effect of social support to enhancing self-esteem and self-efficacy, explaining that social support provides positive feedback, encouragement, and reassurance which in turn boosts the person's confidence and coping strategies [68]. Researchers also argue that social support promotes resilience by providing people with different types of resources, including emotional, informational, and instrumental, which in turn helps individuals better regulate their emotions, develop problem-solving skills, and gain important knowledge [33]. This is particularly vital for pregnant women, who benefit from guidance, advice, and reliable information regarding pregnancy, prenatal care, childbirth, and parenting, as well as practical assistance during a transformative and often challenging period.

### Limitations

As is common with studies involving self-administered questionnaires, self-report bias and social desirability bias present a limitation to our results. Given the cross-sectional study design, we were unable to examine resilience scores beyond the specified time-frame of the study, nor were we able to assess other confounding factors affecting resilience beyond the scope of the study's measures. Furthermore, since recruitment was done via social media and the AUBMC EPIC healthcare system, the study is subject to selection bias. The subjects recruited limit the representation of the pregnant Lebanese women to those with access to a smartphone or those who sought care at AUBMC. Finally, due to the use of multiple scales subjects reported the survey was tedious and lengthy, resulting in a high drop-out rate.

Potential limitations also arise from the cultural variation of the population studied; although the scales were validated in Arabic and utilized in other Arabic-speaking populations, the questionnaires were developed by non-Arab researchers which may limit their ability to accurately assess resilience, ACEs, BCEs, and social support within the context of Lebanese culture and norms. Further studies using measures developed specifically targeting native Arabs are necessary to deeply examine psychological strengths and resilience characteristics of Arab subjects.



### Clinical implications

Our study offers several key insights with important clinical implications for healthcare providers working with pregnant women, particularly in settings affected by crises like Lebanon. These implications span mental health care, obstetric care, social support and pregnancy planning. Healthcare providers should recognize resilience as a vital protective factor in pregnant women's mental health, especially in high-stress environments. Incorporating resilience-building interventions into prenatal care could help mitigate the adverse effects of stress and improve overall maternal, and subsequently fetal, mental health. These interventions can be cognitive behavioral therapy, mindfulness training and social support enhancement. In addition, our study shows that women with high ACEs may experience heightened levels of perceived stress and altered reproductive intentions (unplanned or spontaneous pregnancies), which could affect their mental health. Therefore, it is crucial for healthcare providers to screen for ACEs during prenatal visits, as this could offer early insights into potential challenges in both psychological and obstetric care. Accordingly, patients can be referred to mental health specialists for specific trauma-focused cognitive behavioral therapy. This can allow clinicians to refer to mental health specialists early on and offers more personalized mental health care, reducing the risk for anxiety, depression or PTSD during or after pregnancy. Moreover, screening for BCEs can help in strengthening positive coping strategies which can significantly help in reducing risk of mental health disorders during or after pregnancy, especially in high-risk populations. Our study shows that social support is strongly correlated with resilience and improving maternal mental health. It is helpful for clinicians to screen for adequate social support; actively encouraging the partner or the family to be involved, advising the patient to build strong social networks, or referring to community support groups is crucial. Furthermore, assessing for perceived stress during prenatal care visits help identify women at risk for developing mental health issues, allowing for early interventions such as mindfulness-based stress reduction (MBSR), stress-reduction techniques, mindfulness techniques, and needed referrals to psychiatrists or psychologists.

### Conclusion

Our research adds a critical dimension to the understanding of perinatal mental health by examining it through the lens of Lebanese pregnant women, considering the specific obstetrical, environmental, social, and psychological contexts they navigate. Lebanese pregnant women represent an important and unique demographic, particularly in the context of the significant sociopolitical challenges and crises that have affected Lebanon and

therefore, their experiences provide valuable insights into resilience, coping mechanisms and the sociocultural dynamics at play in times of crisis. By correlating resilience scores with perceived stress, perceived social support, ACEs and BCEs, the study offers a comprehensive view of the factors contributing to the resilience and mental well-being of pregnant women in Lebanon. These insights underscore the need for comprehensive prenatal care, including psychological support and developing targeted interventions to cultivate resilience and enhance support systems and social networks.

By fully understanding the protective cultivation of resilience and social support, healthcare providers can better support pregnant women in navigating the complexities of pregnancy, prenatal care, and childbirth ultimately contributing to healthier maternal and fetal outcomes.

### Abbreviations

BCE	Benevolent Childhood experiences scale
ACE	Adverse Childhood Experiences
CD-RISC	Connor-Davidson Resilience Scale
ACE-Q	Q Adverse Childhood Experiences questionnaire
MSPSS	Multidimensional Scale of Perceived Social Support
AUBMC	American University of Beirut Medical Center
IRB	Institutional Review Board
PS	Perceived Stress
SD	Standard Deviations
IVF	In Vitro Fertilization

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### Author contributions

G.G. and M.B. were responsible for the conceptualization and study design, overseeing the data curation process, and reviewing the final manuscript. D.F. was responsible for data collection and analysis, and drafted the results section. S.S. drafted the abstract, introduction, and methods sections and conducted literature review. S.S. was also responsible for critically reviewing and editing the manuscript. H.I. and G.K. assisted with data interpretation, drafted the discussion section, and provided critical revisions to the manuscript.

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### Data availability

No datasets were generated or analysed during the current study.

### Declarations

#### Ethical approval

Ethical approval was obtained from the American University of Beirut IRB prior to conducting the study (IRB ID SBS-2021-0377). This study is in accordance with the ethical principles of the Belmont Report.

#### Consent to participate

Subjects signed their consent to participate electronically on the Lime Survey website prior to responding to the survey.

#### Consent for publication

Not applicable.

#### Competing interests

The authors declare no competing interests.

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