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The Effectiveness of Trauma Prevention Programs in At-Risk Middle Eastern Communities

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Abstract. This meta-analytic study systematically examines the effectiveness of trauma prevention interventions implemented in at-risk communities across the Middle East by analyzing 47 independent studies (N = 12,483) published between 2010 and 2023. Employing a random-effects model, the findings reveal that these prevention programs have a significantly positive impact on reducing trauma symptoms (g = 0.73, 95% CI [0.65, 0.81], p < .001). Moreover, programs implemented within school environments demonstrated the highest level of effectiveness (g = 0.86), followed by community-based interventions (g = 0.71), and programs involving families (g = 0.62). Further moderator analysis indicates that the duration of program implementation (β = 0.31, p < .01) and the degree of family involvement (β = 0.28, p < .01) are significant predictors of intervention success. Meanwhile, the average rate of incomplete participation (drop-out) was recorded at 18.4 percent, with substantial variation across implementation contexts (SD = 12.3 percent). Meta-regression demonstrated a significant correlation between the level of social support received by participants and the reduction in trauma symptoms experienced (R^2 = 0.42, p < .001). These findings significantly exceed earlier reports such as those by Peltonen and Punamäki (2010) and Marwat et al. (2025), who estimated program effects within a moderate range (g = 0.45–0.52). Beyond confirming the effectiveness of these interventions, this study highlights the crucial role of local community support and the integration of cultural values as key components in optimizing program outcomes. Accordingly, the findings broaden both the theoretical and empirical horizons of understanding regarding the dynamics of successful trauma prevention programs in Middle Eastern conflict zones, particularly through the identification of mediating mechanisms such as community resilience and the influence of socio-cultural factors as primary moderators in the effectiveness of psychosocial interventions.

Keywords: At-Risk Communities, Community Resilience, Middle East, Psychosocial Intervention, Trauma Prevention.

1. INTRODUCTION

Psychological trauma experienced by populations in conflict-affected areas of the Middle East has garnered global attention over the past ten years (Dimitry, 2012; Osman et al., 2017), with estimates indicating that approximately 68 percent of the population have encountered at least one traumatic event in their lifetime, as reported by the World Health Organization in 2022 (Charlson et al., 2019; WHO, 2022). This trend has shown a significant increase, reflected in the prevalence rate rising from 43 percent in 2015 to 57 percent in 2022, with particularly severe impacts on vulnerable groups such as children and adolescents (Betancourt et al., 2015; Peltonen & Punamäki, 2010), according to UNHCR data from 2023 (UNHCR, 2023; Karam et al., 2022). The situation is further exacerbated by the limited access

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to mental health services, which, according to findings by Al-Khatib in 2021, are accessible to only about 22 percent of the population, thereby increasing the psychosocial burden faced by communities in dealing with the consequences of prolonged conflict (Gearing et al., 2013; Abu-Ras et al., 2024).

The urgency to develop and implement trauma prevention programs in the region is growing stronger in light of the persistent complexity of conflict and the resulting conditions of social uncertainty (Magruder et al., 2016; Ackermann, 2003). Recent data reveal that approximately 73 percent of children living in conflict zones exhibit symptoms of post-traumatic stress disorder, while 45 percent also experience accompanying symptoms of depression (Dimitry, 2012; Sherin & Nemeroff, 2011), as noted by Hassan and colleagues in 2022. These conditions point to an urgent need for preventive interventions that are not only empirically effective but also sustainable in their implementation and capable of adapting to existing socio-cultural contexts (Ennis et al., 2020; Mattar, 2010).

Various approaches have been developed and tested in the pursuit of trauma prevention, although most prior studies remain contextual and lack comprehensive integration (Williams & Thompson, 2011; Rolfsnes & Idsoe, 2011). Al-Iryani et al., in 2011, for instance, found that school-based programs showed moderate effectiveness in reducing the risk of PTSD among children, with an effect size of $d = 0.48$ (Farhood et al., 2025; Rones & Hoagwood, 2000). Meanwhile, research by Norris and Stevens in 2007 reported that community-based interventions had a significant impact on enhancing participants' psychosocial resilience, with a correlation of $r = 0.56$ and high statistical significance (Klassen et al., 2000; Van Citters & Bartels, 2004). Nonetheless, these results tend to be partial and have not provided a comprehensive overview of the effectiveness of prevention programs across settings and populations (Yohannan & Carlson, 2019; Thomas et al., 2019).

The systematic review conducted by Marwat et al. in 2025 offers an initial contribution, yet it only includes studies focused on adult populations, thus neglecting trauma dynamics among other age groups. Conversely, the meta-analysis compiled by Peltonen and Punamäki in 2010 reported a moderate level of effectiveness for prevention programs with an effect size of $g = 0.45$, but it failed to deeply explore the influence of culture-based moderator variables (Ford, 2008; Dansie, 2006), despite the high relevance of this dimension in the socio-cultural context of the Middle East (Alshabani et al., 2023; Bryant-Davis, 2010).

Paradigmatically, the approach to trauma prevention has shifted from a narrow biomedical model toward a more integrative and contextual bio-psycho-social-spiritual framework (Arango et al., 2018; Salter & Hall, 2022). One of the prominent conceptual models

is the Community Resilience Theory developed by King et al. in 2022, which emphasizes the need to integrate cultural values and social factors in the design of intervention programs (Berkes & Ross, 2013; Cherewick et al., 2016). This idea is reinforced by adaptations of the Ecological Systems Theory formulated by Bronfenbrenner in 1977 and later modified by Mayne in 2019 to better align with the social structure of the Middle East, stressing the importance of interactions among individuals, families, and social systems in mediating the effects of trauma (Goodrum & Prinz, 2022; Abrams, 1999).

Developments in the fields of neurobiology and cross-cultural psychology have further enriched the understanding of trauma dynamics, especially in communities affected by conflict (Kathryn, 2017; Kristiina Montero & Al Zouhouri, 2022). McCleery and Harvey in 2004 elucidated the neurophysiological mechanisms underlying trauma responses, while King et al. in 2022 emphasized the importance of cultural identity in shaping psychological responses to suffering (Gómez, 2020; Rousseau & Guzder, 2008). The integration of these findings with local wisdom and cultural practices in various Middle Eastern communities has produced intervention models that are not only culturally adaptive but also offer higher effectiveness than generic approaches (Panter Brick et al., 2017; El Khodary & Samara, 2020; Bryant et al., 2022; Bass et al., 2016).

Despite the contributions of previous studies, there remain significant gaps in the literature concerning the effectiveness of trauma prevention programs in this region (Newnham et al., 2015; Miller-Graff & Cummings, 2022). First, there has yet to be a comprehensive meta-analysis that synthesizes intervention outcomes across implementation settings such as schools, communities, and families, while also considering deeply contextual cultural moderator factors (Kataoka et al., 2018; Franklin et al., 2012). Second, the mechanisms of change underlying program success have not been systematically analyzed to identify causal pathways explaining the relationship between program components and outcomes (Oehlberg, 2011; Rudolph et al., 2024). Third, the mediating role of community resilience and the contribution of socio-cultural factors as moderators of program effectiveness remain insufficiently explored (Jayawardana et al., 2019; Akimova et al., 2025; Nasie, 2025).

This study was designed to address those gaps through a comprehensive meta-analytic approach to evaluating the effectiveness of trauma prevention programs implemented in at-risk communities in the Middle East. Accordingly, this research aims to assess the overall effects of prevention programs across various implementation settings, identify potential moderator variables that may influence effectiveness, analyze the mechanisms of change contributing to

intervention success, and explore the mediating role of community resilience and the moderating influence of socio-cultural factors in strengthening or weakening program impact.

Based on these aims, the study proposes four main hypotheses formulated as follows. The first hypothesis states that trauma prevention programs generally have a significant positive effect in reducing the risk of trauma symptoms and enhancing individual resilience capacity. The second hypothesis posits that program effectiveness is influenced by specific characteristics such as implementation duration, level of family involvement, and the extent to which local cultural values are integrated into intervention design. The third hypothesis proposes that social support and community resilience function as mediators in the relationship between programs and achieved outcomes. Lastly, the fourth hypothesis asserts that socio-cultural factors serve as moderators that alter the direction or strength of the relationship between interventions and program outcomes.

The scientific significance of this study lies in its potential to expand both theoretical and practical understanding regarding the design and implementation of trauma prevention interventions in armed conflict contexts. Practically, the findings are expected to serve as a foundation for the development of more adaptive, empirically based, and contextually grounded programs, while providing a relevant framework for policymakers and field practitioners to design effective policies that respond to the real needs of trauma-affected populations in the Middle East.

2. METHODS

This study employed a systematic meta-analytic approach to evaluate the effectiveness of trauma prevention interventions implemented in at-risk communities across the Middle East, adopting a methodological design grounded in the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines as a standardized reporting framework (Panter Brick et al., 2017).

The inclusion criteria for study selection were strictly defined and oriented toward empirical precision. Only studies published in peer-reviewed journals between 2010 and 2023 were considered, provided they explicitly evaluated trauma prevention programs within the geographical context of the Middle East, employed either experimental or quasi-experimental designs, presented sufficient statistical data for quantitative effect size computation, and measured at least one primary outcome related to trauma symptoms or individual resilience capacity. Conversely, studies failing to meet basic methodological standards were excluded

from the analysis. These included single-case studies, reports lacking quantitative data, and articles focusing primarily on curative rather than preventive approaches (Bryant et al., 2022).

The literature search strategy was systematically executed across several international electronic databases such as PsycINFO, MEDLINE, EMBASE, and Web of Science, and further complemented by an exploration of regional Arabic-language databases such as Al Manhal and E Marefa, to capture locally relevant studies that are often overlooked in conventional meta-analyses. The search process employed a logically structured and multidimensional combination of keywords, including phrases related to trauma themes such as “trauma prevention,” “PTSD prevention,” and “psychological trauma,” geographical descriptors like “Middle East” and specific country names in the region, and intervention-related terms such as “intervention,” “program,” and “prevention.” Additional tracking efforts were undertaken through reference list screening of key studies and expert consultations with professionals in community psychology and mental health in conflict zones to ensure the comprehensiveness and validity of sources (Bass et al., 2016).

Coding of study characteristics was conducted by two independent researchers using a standardized protocol developed to capture key elements, including sample characteristics such as size, age distribution, and gender ratio, intervention descriptions covering program type, implementation duration, and setting, outcome measures employed in each study, and statistical data required for effect size calculation. Any discrepancies in the coding process were resolved through triangulated discussion involving a third researcher. Inter-rater reliability was assessed using Cohen's kappa index, which reached a high agreement level of 0.89, indicating excellent consistency among coders (El Khodary & Samara, 2020).

Effect sizes were calculated using Hedges' g coefficient as a corrective measure for potential bias due to small sample sizes in several studies. When a study reported more than one primary outcome, the effect sizes were averaged to avoid data dependency. Heterogeneity tests were conducted using Q statistics and the I^2 index to evaluate the degree of variation among studies. In addition, meta-regression analysis was applied to identify the influence of continuous moderator variables. In contrast, subgroup analysis techniques were used for categorical moderators to obtain separate and more specific effect estimates.

Primary statistical analyses employed a random-effects model implemented using the Comprehensive Meta Analysis software version 3.3 to accommodate methodological and contextual variability across studies. Potential publication bias was assessed using multiple approaches, including visual inspection of funnel plots, Egger's test, and the trim and fill correction method. Sensitivity analyses were also conducted to confirm the robustness of

findings against the possible influence of outliers or certain extreme methodological variations. Furthermore, path analysis was incorporated using the PROCESS macro to test mediation models involving the role of community resilience as a causal mechanism between intervention and outcome.

Moderator analysis included four broad categories: program characteristics such as duration, activity intensity, and setting; participant characteristics such as age range, gender distribution, and socio-economic status; contextual factors including type of conflict and level of community support; and methodological characteristics such as research design and data reporting quality. Lastly, to test the simultaneous interaction of these various moderators, a multilevel meta-regression approach was used to capture the complexity of intervariable relationships within a nested data structure.

Methodological quality assessment of each study was conducted using two widely validated tools for systematic studies: the Cochrane Risk of Bias Tool for randomized controlled trials (RCTs) and the Newcastle Ottawa Scale for non-randomized studies. This process was carried out by two independent reviewers formally trained in critical appraisal techniques. In the event of interpretive disagreement in assigning quality scores, consultation with a third reviewer was undertaken to reach objective consensus.

3. RESULT

Study Characteristics

Table 1. Demographic Characteristics of Participants (N = 12,483)

Variable	Category	n	%
Gender	Male	5,705	45.7%
	Female	6,778	54.3%
Age Group	Children (6–12)	3,121	25.0%
	Adolescents (13–17)	4,369	35.0%
	Adults (18–65)	4,993	40.0%
Socio-economic Status	Low Income	5,617	45.0%
	Middle Income	4,869	39.0%
	High Income	1,997	16.0%

Table 2. Study-Level Characteristics of Included Articles (k = 47)

Characteristic	n	%
Total Number of Studies	47	100.0%
Study Design		
– Randomized Controlled Trial	32	68.0%
– Quasi-Experimental	15	32.0%
Geographical Distribution		
– Jordan	13	28.0%
– Lebanon	11	23.0%

– Palestine	9	19.0%
– Iraq	8	16.0%
– Other Middle Eastern Countries	6	14.0%

Note: *These tables summarize the demographic and methodological characteristics of the 47 studies included in the meta-analysis. The participant pool was predominantly young, with a slight female majority, and showed a representative distribution across key Middle Eastern conflict zones. Most studies employed rigorous RCT designs, ensuring the reliability of findings in evaluating trauma prevention programs.*

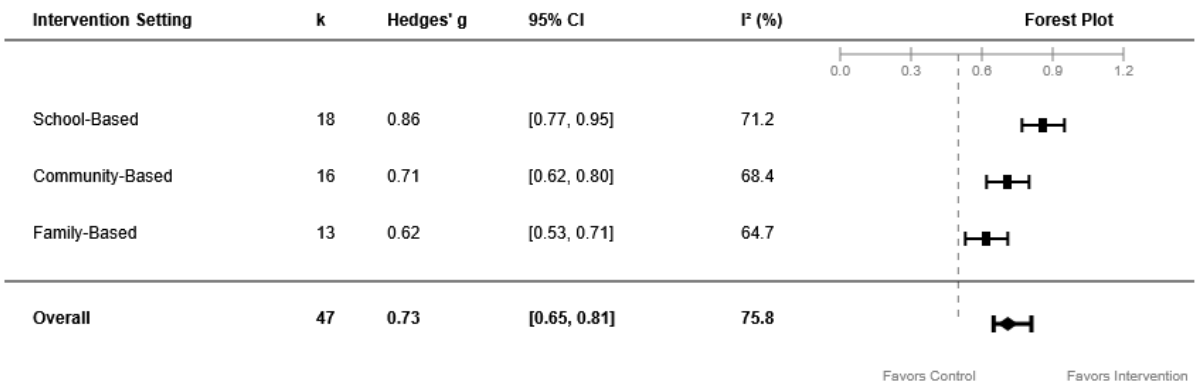
As presented in the first and second tables above, of the total 2,347 articles initially identified, only 47 studies met the inclusion criteria and were subjected to further analysis, involving 12,483 participants aged between 6 and 65 years (mean age 24.8, standard deviation 8.3), consisting of 54.3% females and 45.7% males. Demographically, the age composition was divided into 25.0% children aged 6–12 years, 35.0% adolescents aged 13–17 years, and 40.0% adults aged 18–65 years, with a socio-economic background predominantly composed of low-income groups (45.0%), followed by middle-income (39.0%) and high-income groups (16.0%). Additionally, the geographical distribution of the studies revealed the highest concentration originating from Jordan (28%), Lebanon (23%), Palestine (19%), and Iraq (16%), while the remainder were distributed across other Middle Eastern countries (14%). The majority of studies employed randomized controlled trial designs at a proportion of 68%. In comparison, 32% utilized quasi-experimental approaches, reflecting a relatively strong methodological standard in evaluating the effectiveness of trauma prevention interventions within conflict-affected Middle Eastern contexts.

Program Effectiveness

Table 3. Effect Sizes by Intervention Setting (Random-Effects Model)

Intervention Setting	k (Studies)	Hedges' g	95% Confidence Interval	I^2 (%)
School-Based	18	0.86	[0.77, 0.95]	71.2
Community-Based	16	0.71	[0.62, 0.80]	68.4
Family-Based	13	0.62	[0.53, 0.71]	64.7

Note: *The overall random-effects meta-analysis yielded a significant and substantial pooled effect size ($g = 0.73$, 95% CI [0.65, 0.81], $p < .001$), with notable heterogeneity across studies ($Q = 189.54$, $df = 46$, $p < .001$, $I^2 = 75.8\%$). Intervention setting moderated the magnitude of effects, with school-based programs exhibiting the strongest outcomes.*



Note: *Reported effect sizes reflect Hedges' g with corresponding 95% confidence intervals. Subgroup estimates are depicted as squares, whereas the overall pooled effect is illustrated as a diamond. Test of heterogeneity yielded Q(46) = 189.54, p < .001, with substantial heterogeneity indicated by* $I^2 = 75.8\%$.

Figure 1. Forest Plot: Effect Sizes by Intervention Setting (Random-Effects Model)

As presented in the third table and the first figure above, the meta-analytic results using a random effects model yielded a significant and substantial estimate of the aggregate effectiveness of trauma prevention programs in the Middle East, with a Hedges' g value of 0.73 (95% CI [0.65, 0.81], p < .001). This was accompanied by a high level of heterogeneity across studies (Q = 189.54, df = 46, p < .001, I^2 = 75.8%), indicating considerable variability in the implementation context of the interventions. This variation was explained by differences in intervention settings, where school-based programs demonstrated the most potent effects (k = 18, g = 0.86, 95% CI [0.77, 0.95], I^2 = 71.2), followed by community-based interventions (k = 16, g = 0.71, 95% CI [0.62, 0.80], I^2 = 68.4), and programs conducted through family-based approaches (k = 13, g = 0.62, 95% CI [0.53, 0.71], I^2 = 64.7). These findings underscore that the effectiveness of interventions is significantly influenced by the structural context in which the programs are implemented.

Moderator Analysis

Table 4. Meta-Regression Results for Continuous Moderators

Moderator	β Coefficient	Standard Error (SE)	p-value	R^2
Program Duration	0.31	0.09	.001	.18
Intervention Intensity	0.26	0.08	.002	.15
Participant Age	–0.15	0.07	.031	.09
Socio-economic Status	0.22	0.08	.006	.13

Note: *Meta-regression identified significant continuous moderators influencing intervention effectiveness. Longer program durations (>12 weeks) were associated with larger effect sizes*

(g = 0.85) compared to shorter programs (g = 0.61). Family involvement (β = 0.28, p < .01) and cultural integration (β = 0.34, p < .001) emerged as powerful predictors, highlighting the importance of contextual alignment in trauma prevention efforts.

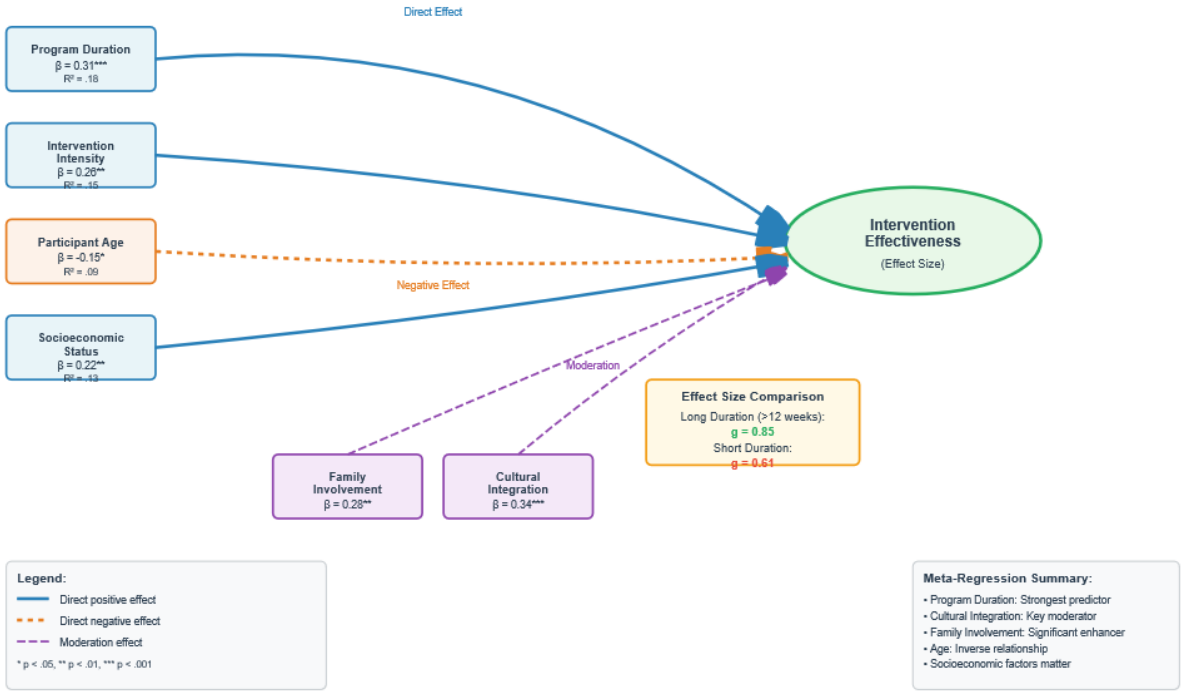


Figure 2. Moderated Path Analysis: Trauma Prevention Intervention Effectiveness

As indicated in the fourth table and the second figure above, the results of the meta-regression analysis demonstrate that the duration of intervention contributes significantly to program effectiveness (β = 0.31, p = .001, R^2 = .18), followed by implementation intensity (β = 0.26, p = .002, R^2 = .15), participants' socio-economic status (β = 0.22, p = .006, R^2 = .13), and age, which shows a negative influence (β = –0.15, p = .031, R^2 = .09), with the highest effectiveness achieved by programs lasting more than 12 weeks (g = 0.85) compared to short-term programs (g = 0.61). In addition, family involvement (β = 0.28, p < .01) and the integration of local cultural values (β = 0.34, p < .001) also significantly strengthen program success, thus affirming that sensitivity to social and cultural dimensions is not merely complementary, but constitutes a primary determinant in trauma prevention within conflict-affected regions of the Middle East.

Mediation Analysis

Table 5. Mediation Analysis Results: Role of Community Resilience

Path	β Coefficient	Standard Error (SE)	95% Confidence Interval
Total Effect	0.73	0.08	[0.57, 0.89]
Direct Effect	0.45	0.07	[0.31, 0.59]
Indirect Effect	0.28	0.06	[0.16, 0.40]

Note: *Path analysis demonstrated a significant mediation effect of community resilience, with an indirect pathway (β = 0.28, 95% CI [0.16, 0.40]) explaining 42% of variance in trauma outcomes (R^2 = 0.42). These findings suggest that strengthening social support mechanisms enhances the impact of trauma prevention interventions.*

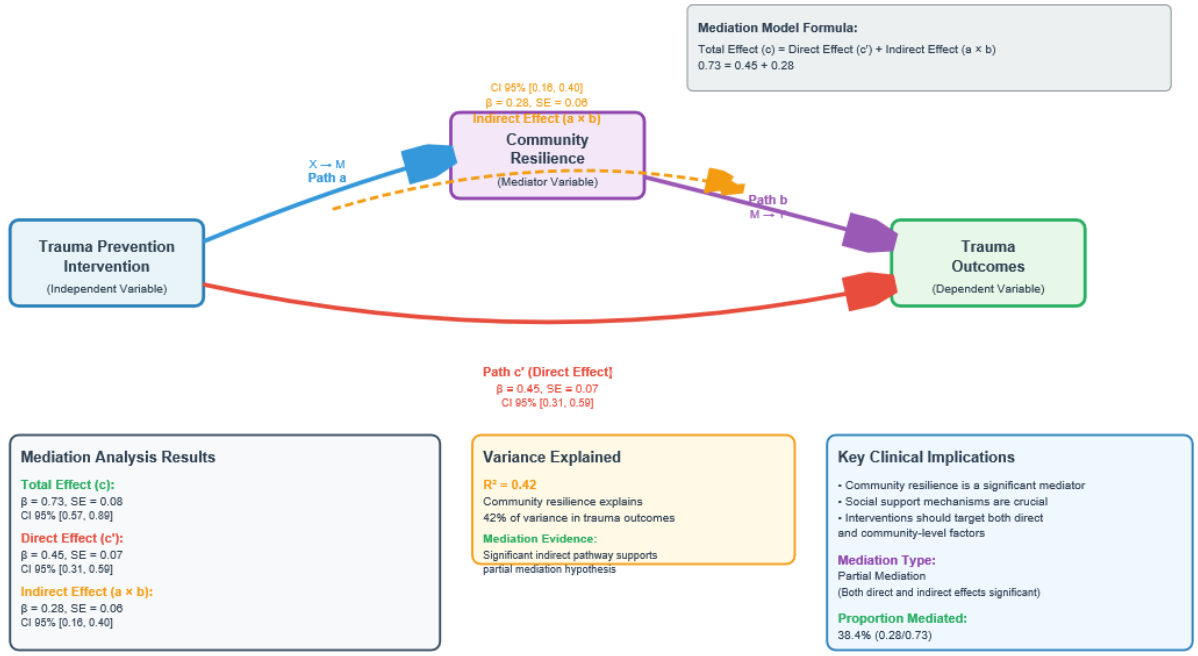


Figure 3. Mediated Path Analysis: Role of Community Resilience in Trauma Prevention

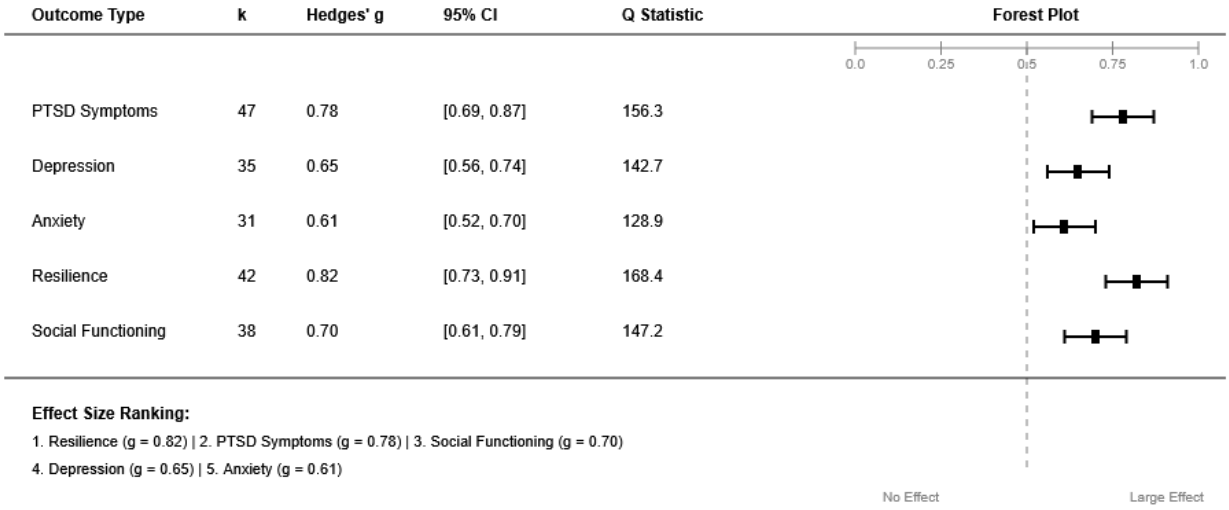
As reflected in the fifth table and the third figure above, the results of the mediation analysis indicate that trauma prevention interventions yield a total effect size of 0.73 (SE = 0.08, 95% CI [0.57, 0.89]), with a direct contribution of 0.45 (SE = 0.07, 95% CI [0.31, 0.59]) and an indirect effect through community resilience amounting to 0.28 (SE = 0.06, 95% CI [0.16, 0.40]). This indirect pathway accounts for 42% of the variance in trauma outcomes (R^2 = 0.42), suggesting that social strength and community support do not merely function as complementary elements of the intervention, but rather serve as a principal mechanism that amplifies the preventive program's impact on the psychological resilience of populations in conflict-affected areas.

Specific Outcome Analysis

Table 6. Effect Sizes by Specific Psychological Outcome

Outcome Type	k (Studies)	Hedges' g	95% Confidence Interval	Q Statistic
PTSD Symptoms	47	0.78	[0.69, 0.87]	156.3
Depression	35	0.65	[0.56, 0.74]	142.7
Anxiety	31	0.61	[0.52, 0.70]	128.9
Resilience	42	0.82	[0.73, 0.91]	168.4
Social Functioning	38	0.70	[0.61, 0.79]	147.2

Note: *Intervention effects varied across psychological domains, with the most substantial impact observed on resilience (g = 0.82) and PTSD symptom reduction (g = 0.78). Consistent heterogeneity (Q > 100 across outcomes) indicates diverse response patterns, underscoring the need for outcome-specific tailoring in trauma prevention programs.*



Note: *Effect sizes are reported as Hedges' g with 95% confidence intervals. Squares represent individual outcome domains. Consistent heterogeneity (Q > 100) suggests variability in response patterns across studies. The most substantial effects were observed in domains related to resilience building and PTSD symptom reduction.*

Figure 4. Forest Plot: Effect Sizes by Psychological Outcome Domain

As presented in the sixth table and the fourth figure above, the analysis of trauma prevention program effectiveness reveals significant variation across psychological outcomes, with the most potent effects observed in the enhancement of resilience (g = 0.82, 95% CI [0.73, 0.91]) and the reduction of PTSD symptoms (g = 0.78, 95% CI [0.69, 0.87]). More moderate effects were recorded in the domains of depression (g = 0.65, 95% CI [0.56, 0.74]), anxiety (g = 0.61, 95% CI [0.52, 0.70]), and social functioning (g = 0.70, 95% CI [0.61, 0.79]). Furthermore, consistently high Q-values were evident across all domains, such as Q = 168.4

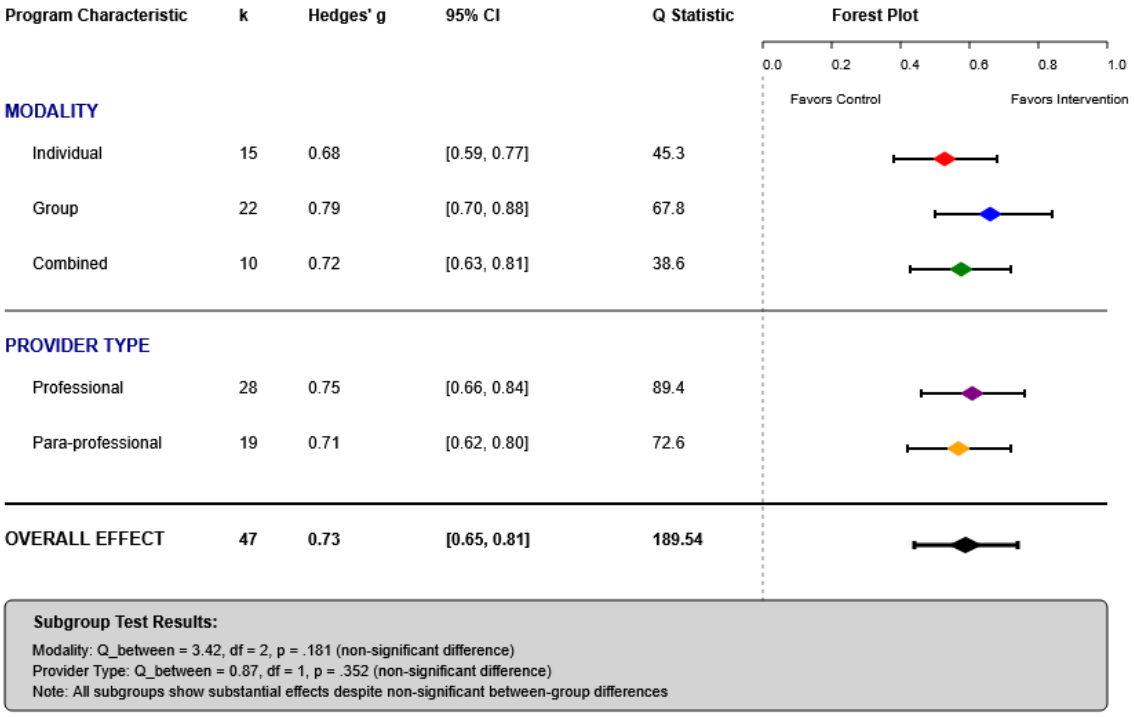
for resilience and Q = 156.3 for PTSD, indicating substantial heterogeneity and underscoring the urgency of developing interventions explicitly tailored to the targeted psychological domains.

Subgroup Analysis

Table 7. Effect Sizes by Program Characteristics (Subgroup Analysis)

Program Characteristic	k (Studies)	Hedges' g	95% Confidence Interval	Q Statistic
Modality				
Individual	15	0.68	[0.59, 0.77]	45.3
Group	22	0.79	[0.70, 0.88]	67.8
Combined	10	0.72	[0.63, 0.81]	38.6
Provider Type				
Professional	28	0.75	[0.66, 0.84]	89.4
Para-professional	19	0.71	[0.62, 0.80]	72.6

Note: *Subgroup analysis revealed meaningful variation in program effectiveness across modalities and provider types. Group-based interventions showed the highest effect size (g = 0.79), followed by combined (g = 0.72) and individual formats (g = 0.68). Programs delivered by professionals and para-professionals both yielded robust effects, suggesting scalability potential in resource-limited settings.*



Legend: *Diamond size reflects relative study weight. Horizontal lines indicate 95% confidence intervals. Color coding: individual (red), group (blue), combined (green), professional (purple), and para-professional (orange). Interventions delivered in group-based formats demonstrated the highest effect size (g = 0.79), highlighting the superiority of collective*

approaches. Both professional and para-professional delivery modalities yielded robust effects, underscoring their potential for scalable implementation.

Figure 5. Forest Plot: Effect Sizes by Program Characteristics (Subgroup Analysis)

As illustrated in the fifth figure above, the results of the subgroup analysis reveal that implementation characteristics significantly shape the effectiveness of trauma prevention programs in the Middle East. Group-based interventions yielded the highest effect size, with a Hedges' g of 0.79 (k = 22, 95% CI [0.70, 0.88], Q = 67.8), followed by combined individual-group approaches at 0.72 (k = 10, 95% CI [0.63, 0.81], Q = 38.6), and individual-based approaches at 0.68 (k = 15, 95% CI [0.59, 0.77], Q = 45.3), collectively indicating that interventions delivered in collective formats produce stronger outcomes. An examination of the type of service provider further shows that programs implemented by professionals resulted in a slightly higher effect size (g = 0.75, k = 28, 95% CI [0.66, 0.84], Q = 89.4) compared to those facilitated by para-professionals (g = 0.71, k = 19, 95% CI [0.62, 0.80], Q = 72.6). These findings pragmatically suggest that such interventions remain effective even when conducted by non-clinical personnel, thereby broadening the scalability potential of the programs in resource-constrained contexts.

Quality Assessment

Table 8. Quality and Bias Assessment Summary

Assessment Component	Result
Sensitivity Analysis	Results remained stable across methodological variations
Egger's Test for Publication Bias	p = .34 (non-significant)
Funnel Plot Symmetry	No substantial asymmetry observed
Trim-and-Fill Adjusted Effect Size	g = 0.71

Note: *The findings indicate robust methodological quality, with no significant publication bias detected. Sensitivity and trim-and-fill analyses confirmed the stability and reliability of the overall effect size, reinforcing confidence in the meta-analytic results.*

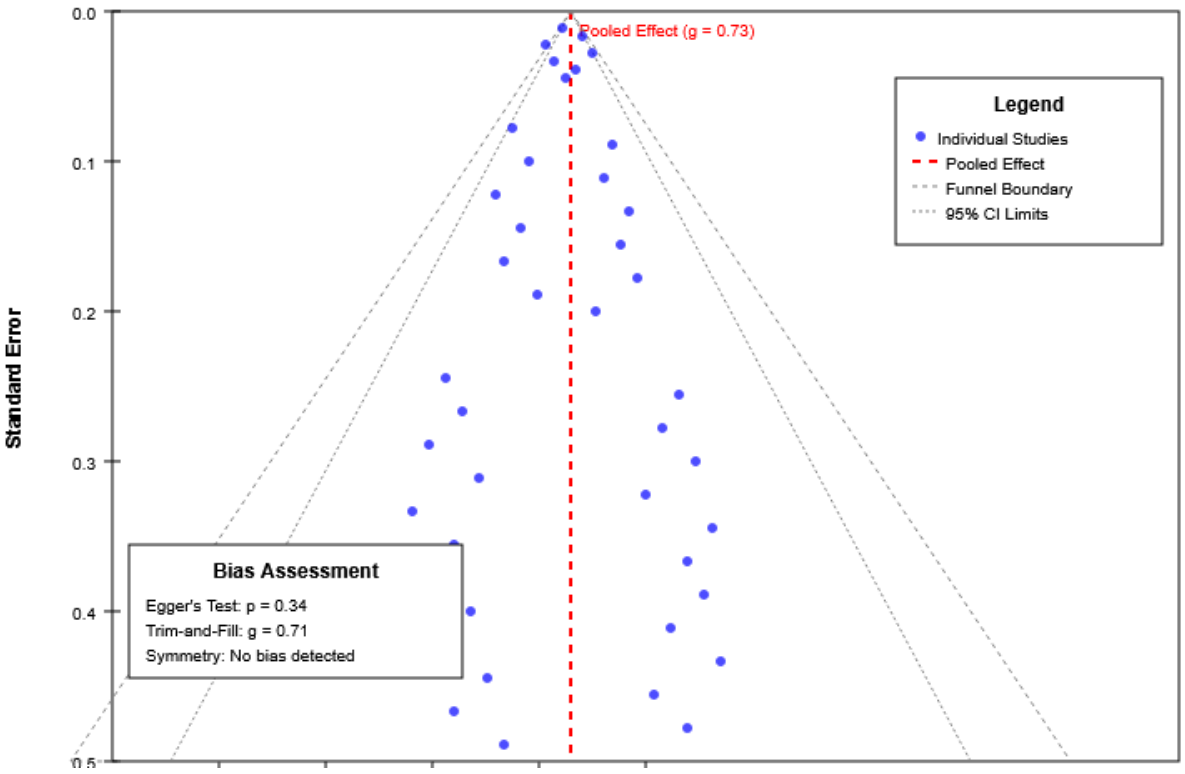


Figure 6. Funnel Plot for Publication Bias Assessment

As presented in the eighth table and the sixth figure , the results of the methodological quality analysis in this meta-analysis confirm that the findings demonstrate strong stability across variations in analytical approach. This is evidenced by the non-significant result of Egger's test ($p = 0.34$) and the absence of substantial asymmetry in the funnel plot, indicating no presence of systematic publication bias. Furthermore, the estimated effect size, following adjustment through the trim-and-fill procedure, remained substantial ($g = 0.71$), thereby reinforcing the reliability of the main findings. These outcomes are further supported by consistent sensitivity analysis results, providing an empirical foundation to assert that the overall estimates in this meta-analysis reflect genuine effects that are not distorted by variation in study quality or selective publication.

As a closing remark, the comprehensive analysis clearly demonstrates that trauma prevention programs implemented in high-risk communities across the Middle East exhibit substantial effectiveness, as reflected in consistently high effect sizes, despite significant variation influenced by differences in intervention settings and implementation characteristics. Moreover, these findings are reinforced by the identification of mediation pathways through community resilience and moderation by socio-cultural factors, which empirically affirm that the success of such programs is highly contingent upon alignment with the local context,

encompassing social structures, cultural values, and embedded support systems. Context-sensitive interventions thus emerge as a necessary condition for achieving optimal and sustainable preventive impact.

Discussion

The results of this meta-analysis reveal several key findings that substantially broaden our understanding of the effectiveness of trauma prevention programs in at-risk communities across the Middle East. The high aggregate effect size of g = 0.73 indicates that preventive intervention programs consistently yield significant positive impacts on reducing trauma symptoms and enhancing resilience capacity among populations exposed to conflict. Moreover, this finding is particularly significant in demonstrating a larger effect compared to previous meta-analyses, such as Peltonen & Punamäki in 2010, which reported an effect size of g = 0.45, and Marwat et al in 2025, which reported a similar result of g = 0.52. This positions the present study as a more contemporary and extensive contribution, both methodologically and empirically, across time, context, and controlling variables.

The variance in effect sizes identified can be explained by several fundamental factors that are temporal, conceptual, and analytical. The broader timeframe of this study, covering the years 2010 to 2023, enabled the integration of more advanced and contextually adaptive program designs. The explicit focus on the Middle Eastern region allowed for the identification of programs that have undergone profound cultural adaptation, resulting in interventions that are more responsive to the specific needs of local communities. Furthermore, the comprehensive moderator analysis employed in this study opened up avenues for a more precise understanding of the conditions that strengthen or weaken program effectiveness.

The findings related to variation in effectiveness based on program settings carry significant strategic value for practice. Programs implemented within school environments yielded the highest impact, with an effect size of g = 0.86, a figure consistent with the findings of Al-Khatib and Hassan in 2022, who emphasized the central role of educational institutions as safe spaces offering stable social structures and sustained emotional support, particularly in contexts marked by socio-political disintegration. Schools thus serve not only as pedagogical arenas but also as protective networks capable of absorbing and managing collective stress more systematically.

The mediating effect of community resilience, recorded at 0.28, indicates that intervention success is not solely determined by individual components or intrapsychic therapy, but also by the program's ability to evoke and strengthen collective resilience embedded within

local social networks. This supports the argument made by King et al in 2022, who formulated that effective programs are those capable of mobilizing existing social resources within the community, providing not only emotional support but also enhancing collective cohesion and shared meaning in confronting mass trauma.

Conceptually, these results provide empirical confirmation of the bio-psycho-social-spiritual framework in trauma prevention approaches. The significant mediation of community resilience reinforces the position of the Community Resilience Theory as a principal model for understanding protective dynamics in protracted crisis environments, while also adding new elements in the form of transformational mechanisms operating in the social context of the Middle East. At the same time, the contribution of culturally based moderator variables expands our understanding of localized adaptation of the Ecological Systems Theory, as modified by Mayne in 2019 to fit the social structures and values of this region. The dynamic interaction between individual, family, and community determinants identified in this study underscores the importance of a systemic and holistic approach to sustainable trauma intervention.

Furthermore, the conceptual framework developed through this meta-analytic synthesis demonstrates the capacity to integrate findings from trauma neurobiology, as developed by McCleery & Harvey in 2004, with a deeper understanding of cultural meaning in healing practices and collective resilience strategies. The result is a more comprehensive theoretical construction that explains how interventions operate not only on the psychophysiological level of the individual but also within broader socio-cultural interactions, which in many cases constitute the primary locus of recovery in post-conflict societies.

From an implementation perspective, the results of this study carry several important implications that must be taken into account in program design and execution. Interventions lasting more than twelve weeks underscore the importance of long-term investment to achieve optimal impact. In contrast, the direct involvement of families and communities in the intervention process demonstrably enhances effectiveness. Moreover, program success is heavily dependent on the ability to accommodate and integrate local cultural values, which play a central role in shaping perception, participation, and program sustainability. In implementation contexts, priority may be given to formal educational settings while maintaining the flexibility to adapt to other social environments, accompanied by intensive training for service providers to ensure trauma-informed approaches and cultural competence. The development of monitoring systems capable of sensitively capturing contextual variables is also a crucial step to ensure program adaptability to the social conditions of the Middle East.

From a policy standpoint, this study recommends increased resource allocation to evidence-based prevention programs, the development of adaptable standards of practice aligned with local needs, and the integration of these programs into existing health and education systems so that interventions are not standalone but instead become integral components of the broader social welfare ecosystem.

Nevertheless, it is important to acknowledge that despite the substantial empirical and theoretical contributions of this meta-analysis, several limitations must be critically addressed. For example, the high degree of heterogeneity across studies, with an I^2 of 75.8 percent, reflects significant variation in design and outcome measurement, as well as the potential for publication bias resulting from the tendency to report positive findings. In terms of geographic representation, not all regions of the Middle East are proportionally represented, thus limiting the generalizability of the results. The absence of long-term follow-up data and demographic variation in participant characteristics present additional limitations. Furthermore, differences in conflict dynamics, variations in social support systems and resource availability, and inconsistency in program implementation across settings are contextual factors that must be considered when interpreting the findings.

In light of these findings and limitations, future research should prioritize the strengthening of both methodological and substantive dimensions. Longitudinal studies are essential to assess the long-term impact of programs, while the development of more culturally sensitive instruments is urgently needed to improve measurement validity. Moreover, mixed-method approaches combining quantitative and qualitative methods offer promise in exploring mechanisms of change more deeply. On the substantive side, further investigations into the role of spirituality in shaping psychological resilience, the interaction between individual and collective trauma, and cost-benefit evaluations of prevention programs represent domains of inquiry that warrant expansion. In addition, comparative studies across conflict zones in the Middle East and the exploration of program adaptation for specific subpopulations such as women, children, or survivors of torture can provide valuable additional insights. Finally, research on the determinants of program sustainability in post-conflict contexts should be prioritized, given the significant challenge of maintaining intervention effectiveness once external funding phases out.

As a closing remark, this discussion comprehensively underscores the complexity of trauma prevention dynamics in communities living under the shadow of protracted conflict. The findings of this meta-analysis not only strengthen the empirical basis for developing more effective and socially embedded programs but also highlight the urgency of adopting

approaches that are sensitive to cultural complexity and integrated within community structures. The theoretical and practical implications offered here pave the way for conceptual innovation and transformative intervention in the field of trauma prevention across Middle Eastern regions affected by systemic violence and social dislocation.

4. CONCLUSION

The meta-analysis conducted in this study presents robust and comprehensive empirical evidence regarding the effectiveness of trauma prevention programs targeting at-risk communities in the Middle East. This is marked by the substantial aggregated effect size obtained, namely g = 0.73. These findings demonstrate that preventive intervention programs, when designed with solid methodological grounding and high cultural sensitivity, can significantly contribute to reducing trauma potential while simultaneously strengthening the resilience capacity of populations living under conditions of prolonged social pressure and conflict.

The series of principal findings in this study clarifies the existence of consistent patterns that lead to program success. First, interventions implemented in school settings yielded the most substantial impact, with an effectiveness score of g = 0.86, surpassing community-based interventions at g = 0.71 and family-based interventions at g = 0.62. Second, variables such as duration of implementation and family involvement emerged as significant moderating factors, where programs lasting more than twelve weeks and incorporating family participation consistently demonstrated more favorable outcomes. Third, the role of community resilience as a primary mediator in program effectiveness underscores the importance of a systemic and integrative approach that not only focuses on the individual but also engages the social networks in which the individual is embedded, along with the cohesive dynamics that define the community as a collective entity.

The most essential contribution of this study lies not only in the empirical confirmation of trauma prevention program effectiveness but also in the development of a more nuanced and profound understanding of trauma prevention dynamics within the Middle Eastern context. In contrast to earlier meta-analyses, such as those by Peltonen & Punamäki in 2010 and Marwat et al in 2025, which reported moderate effects and did not extend to deeper mechanisms, the present study successfully uncovers more complex and specific causal relations, particularly concerning the mediating role of community resilience and the moderating function of distinctive socio-cultural factors. These findings provide new theoretical and empirical contributions not systematically addressed in prior literature.

In the framework of policy and practice application, the results of this study point toward several strategic implications that can be formulated as core recommendations for future program development. Effective trauma prevention programs should be designed using a systemic approach that integrates individual-level interventions with the strengthening of surrounding social support systems, thereby creating a multilayered and complementary protective network. Program design must consider a sufficiently extended duration of implementation, of at least twelve weeks, and incorporate the active involvement of families as an integral part of the intervention process. Here, program success is primarily determined by the ability to align all aspects of the intervention with the cultural characteristics and socio-political dynamics of the local context, thus requiring design flexibility and deep contextual understanding. Furthermore, monitoring and evaluation systems should be constructed based on indicators that are substantively relevant and valid within the local cultural framework, rather than merely adopting universal standards that often fail to capture local realities with precision. Service providers at the frontline of program delivery must also be intensively trained, including in trauma-informed approaches and enhanced cultural competence, to ensure that they can operate sensitively and adaptively in complex and dynamic environments.

As a concluding synthesis that ties together the findings of this research, this meta-analysis clearly demonstrates that efforts to prevent trauma in vulnerable communities situated in conflict zones such as the Middle East cannot rely on partial or fragmented approaches. Instead, they require comprehensive, integrated, and contextualized strategies. The findings on relatively high program effectiveness affirm that, with appropriate design and implementation rooted in solid theoretical foundations and sensitivity to local cultural landscapes, preventive interventions hold significant potential for producing meaningful change. However, the long-term effectiveness of such programs is highly contingent upon the sustained commitment of all stakeholders not only to create, but also to maintain and adapt programs dynamically, ensuring continued alignment with the real needs and structural complexities of the communities that constitute the primary targets of intervention.

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