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Post-Traumatic Stress Symptoms, Motivational Quality and Academic Performance Among Türkiye-Born and Early-Arriving Syrian-Background Students: The Moderating Role of Academic Language Proficiency

Metin Çınaroğlu [1,2,*] and Eda Yılmazer [3]

[1] Department of Psychology, Faculty of Economics, Administrative and Social Sciences, İstanbul Nişantaşı University, Maslak Mahallesi, Taşyoncası Sokak, No: 1V ve No: 1Y, Sarıyer, 34398 İstanbul, Türkiye
[2] Research Center for International and Global Higher Education, Khazar University, Baku AZ1096, Azerbaijan
[3] Department of Psychology, Faculty of Arts and Sciences, Haliç University, 5. Levent Mah. 15 Temmuz Şehitler Cad. No: 14/12, Eyüpsultan, 34060 İstanbul, Türkiye; edayilmazer@halic.edu.tr
* Correspondence: metin.cinaroglu@nisantasi.edu.tr

Abstract

Many Syrian students in Turkish schools were born in Türkiye or arrived before school entry, yet their post-traumatic stress and its links with schooling are poorly documented. In this observational two-contact study, we examined whether post-traumatic stress symptoms were associated with academic performance among 407 Türkiye-born or early-arriving (at or before age five) Syrian-background students in grades 5–12 (mean age 13.84 years), recruited non-randomly across eight provinces; whether indirect associations through autonomous motivation and amotivation were evident; and whether academic Turkish proficiency conditioned the motivation–performance path. Symptoms and motivation were measured at first contact; first-term grade averages were obtained approximately ten weeks later. Within this recruited sample, 38.6% scored at or above the CRIES-13 screening cut-off. Symptom severity was inversely associated with performance ($\beta = -0.26$), net of depressive and anxiety symptoms and recorded absence. Under an assumed ordering in which symptoms precede motivation, the indirect coefficients through autonomous motivation and amotivation represented 42.7% of the modelled total association, with a direct association remaining. In an exploratory analysis, the indirect association through autonomous motivation was weaker among students with the lowest academic Turkish proficiency (index of moderated mediation = −0.029, 95% CI −0.054 to −0.008). Because symptoms and motivation were measured concurrently, general cognitive ability was not assessed, and sampling was non-probability, these associations are hypothesis-generating and call for longitudinal and intervention research.

Keywords: post-traumatic stress; self-regulated learning; academic motivation; self-determination theory; academic language proficiency; Syrian-background students; early arrival; Türkiye

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1. Introduction

Türkiye has hosted the largest refugee population in the world for more than a decade, most of them Syrians living under the temporary protection regime (Presidency of

Migration Management, Republic of Türkiye, 2025). Since the first large arrivals in 2011 and 2012, what began as the displacement of adults and school-aged children has become a settled community with a Türkiye-born cohort now moving through compulsory education. A substantial and growing proportion of the Syrian children enrolled in Turkish public schools were born in Türkiye, in Gaziantep, Şanlıurfa or İstanbul, or arrived in infancy or early childhood, and have known no school system other than the Turkish one. Strictly, only those born in Türkiye are second-generation; in Rumbaut's decomposition of the immigrant first and second generations, children who arrive between birth and age five form a "1.75" generation that stands closest to the second (Rumbaut, 2004). We therefore refer throughout to Türkiye-born and early-arriving Syrian-background students. This group is conceptually distinct from the school-aged arrival cohorts that dominate the refugee mental health literature, and the distinction matters for how their needs, and their learning, are understood.

The mental health burden carried by refugee children who experienced war and flight is well documented. Systematic reviews report prevalence estimates for post-traumatic stress disorder in child and adolescent refugee samples that are several times those of general child populations, although heterogeneity is substantial and reflects displacement recency, reception policy, sampling frame and instrument (Blackmore et al., 2020; Fazel et al., 2012; Kien et al., 2019), and studies of Syrian children in Türkiye report elevated post-traumatic stress, depression and behavioural difficulty alongside high cumulative adversity (Eruyar et al., 2018; Kandemir et al., 2018). Whether children who were born in Türkiye or arrived in early childhood inherit this burden is far less clear. An attenuation account predicts that children who experienced little or no direct bombardment, flight or loss of home, and who were socialised in the host language and enrolled in mainstream schooling from the first grade, should come to resemble their host-country peers. A transmission account predicts the opposite: parental post-traumatic pathology alters caregiving through reduced emotional availability, harsh or inconsistent discipline, and the child's chronic exposure to parental distress (Bryant et al., 2018; Yehuda & Lehrner, 2018). Where displacement has been followed by legal precarity, economic marginality and daily discrimination, these children may face an adversity profile that differs in kind from war exposure but is not lighter in consequence. Our first aim was therefore descriptive: to characterise post-traumatic stress symptoms in a group defined by birth in Türkiye or arrival before school entry. Early arrival makes direct war experience less likely but does not establish its absence, and the child's own exposure was not assessed separately from that of the family.

The functional consequences of such symptoms during the school years bear directly on how cognitive capacity is expressed in performance. Underperformance among refugee-background students is documented across resettlement contexts (Suárez-Orozco et al., 2010), and the mechanisms usually invoked are cognitive: post-traumatic stress is reliably associated with deficits in sustained attention, working memory, processing speed, and executive control (Scott et al., 2015), and classroom-based work links trauma exposure and post-traumatic symptoms to lower grades and grade repetition (Perfect et al., 2016). Attentional control theory offers a precise account of why this should be so. Threat-related processing competes with goal-directed attention for limited executive resources, so that emotional load reduces the efficiency with which available capacity is deployed even where it does not reduce the capacity itself (Eysenck et al., 2007). On this view, academic performance under emotional load is not a direct readout of ability but the product of how well emotion and motivation are regulated in the service of cognitive work. Contemporary models of self-regulated learning reach the same conclusion from the educational side, treating the regulation of emotion and of motivation as components of self-regulated learning alongside cognitive and metacognitive control (Boekaerts & Corno, 2005;

Pintrich, 2004; Zimmerman, 2000). In the dual-processing formulation of Boekaerts and Corno, emotional threat that is not regulated diverts students from a growth pathway oriented to learning goals towards a well-being pathway oriented to protecting the self. Engagement with the task is withdrawn accordingly (Boekaerts & Corno, 2005). Our second aim was to test whether symptom severity is associated with academic performance in this group, net of depressive and anxiety symptoms, absence, language proficiency and socioeconomic position, and whether the quality of motivation is statistically linked to part of that association.

Motivational quality is the candidate process examined here. We distinguish motivational self-regulation, the effortful management of one's own motivation (Wolters, 2003), from motivational quality, the autonomous, controlled, or absent character of the reasons for engaging with school; the Academic Motivation Scale measures the latter, which we treat as an observable marker of the former and not as equivalent to it. Self-determination theory holds that sustained engagement depends on the satisfaction of needs for autonomy, competence, and relatedness, and that the quality rather than the quantity of motivation governs persistence and performance (Ryan & Deci, 2000). Motivation is arrayed along a continuum from amotivation through controlled to autonomous forms, and educational research shows that autonomous regulation predicts achievement and persistence while amotivation predicts disengagement (Howard et al., 2021; Taylor et al., 2014; Vallerand et al., 1992); within self-regulated learning theory, the capacity to sustain such motivation is itself a regulatory competence (Wolters, 2003). Post-traumatic symptoms are difficult to reconcile with each basic need. Hypervigilance and intrusive re-experiencing undermine the sense of volitional control over one's own activity; concentration difficulty and the repeated failure that tends to follow it erode perceived competence; and numbing, irritability and withdrawal strain relatedness to teachers and classmates, the principal vehicle through which the value of academic activity is internalised. A student preoccupied with managing threat-related affect has fewer resources left for the volitional, interest-driven engagement that autonomous motivation describes. This is precisely the diversion from the growth pathway that the dual-processing model specifies (Boekaerts & Corno, 2005).

Three links in this account are unevenly documented. The association of post-traumatic symptoms with school performance is established mainly in exposed or newly arrived children (Perfect et al., 2016; Suárez-Orozco et al., 2010); the association of such symptoms with motivational quality is largely inferred from theory and has rarely been tested directly; and the association of motivational quality with achievement, though well documented in general student samples (Howard et al., 2021; Taylor et al., 2014), has to our knowledge seldom been examined in refugee-background students, or alongside the academic language in which grades are earned. The present model brings these links together. Integrating the frameworks above, we reasoned that emotional load, through the attentional costs described by attentional control theory (Eysenck et al., 2007) and the frustrated needs described by self-determination theory (Ryan & Deci, 2000), would be associated with lower autonomous motivation and higher amotivation, which self-regulated learning models relate to lower attainment (Boekaerts & Corno, 2005; Wolters, 2003), and that the conversion of motivation into grades would depend on the academic language in which grades are earned (Cummins, 2000), because motivated effort must be expressed through reading, writing and examination in that language.

The distinction between cognitive capacity and self-regulatory mechanism has practical weight. Trauma-related cognitive impairment calls for clinical intervention and, in the interim, for accommodation. Motivational quality, by contrast, is shaped by features of the learning environment that teachers control: autonomy-supportive instruction, competence-building structure and relational warmth are trainable and have been linked to

change in classroom motivational climate (Reeve & Cheon, 2021; Vansteenkiste et al., 2020), and school-based social–emotional programmes for refugee and war-affected youth have shown promise where clinical services are scarce (Sullivan & Simonson, 2016). Establishing whether motivational quality is statistically associated with a meaningful share of the symptom-to-performance association is therefore a question about mechanism worth testing, and a precondition for asking, in later intervention research, what schools could realistically offer.

The study bears on intelligence scholarship in a specific and limited way. General cognitive ability is among the strongest predictors of school grades (Deary et al., 2007), but grades are not a measure of intelligence: they also reflect motivation, language, schooling and emotional state. We did not measure general cognitive ability, and nothing reported here should be read as evidence of differences in intelligence between students. What we examine is the emotional, motivational and linguistic conditions under which cognitive capacity may or may not be expressed in recorded performance, treating academic language proficiency as an acquired cognitive-linguistic skill (Cummins, 2000) and not as a proxy for ability.

Two features of the Turkish context shape these questions further. The first is the February 2023 Kahramanmaraş earthquakes, which struck with greatest force in the provinces where the Syrian population is most densely settled and layered an acute mass-casualty event onto a chronic, minority-specific adversity profile. Post-disaster research documents elevated post-traumatic symptoms in exposed child populations (Beaglehole et al., 2018), and we therefore retained earthquake exposure both as a covariate and as a sensitivity stratum. Earthquake exposure is also a possible source of the symptoms studied, not merely a nuisance covariate, and the construct examined here is trauma-related symptoms in general and not symptoms attributable to a single index event. The second is linguistic. Instruction and assessment in Turkish public schools are conducted exclusively in Turkish, and although Türkiye-born and early-arriving students are typically conversationally fluent, academic language proficiency develops more slowly and unevenly, particularly where the home language remains Arabic (Aydin & Kaya, 2017; Cummins, 2000). Academic language proficiency is a cognitive-linguistic resource through which motivation must be enacted in reading, writing and examination, and may therefore act as a boundary condition on the motivational pathway: a student may be motivated and still unable to convert that motivation into recorded attainment if the linguistic demands of assessment exceed their capacity. Because proficiency may also index school quality, family resources, prior achievement or ability, any such reading is provisional.

We accordingly formulated five hypotheses. First (H1), as a descriptive expectation drawn from the prior literature and not as a tested comparison, because no contemporaneous host-country comparison group was included, we expected symptom levels to exceed those commonly reported for general child populations and not to differ appreciably between students born in Türkiye and those who arrived before school entry. Second (H2), symptom severity would be inversely associated with academic performance after adjustment for depressive and anxiety symptoms, absence from school, language proficiency, and family socioeconomic position. Third (H3), symptom severity would be inversely associated with autonomous motivation and positively associated with amotivation, and autonomous motivation would be positively and amotivation inversely associated with academic performance. Fourth (H4), under an assumed ordering in which symptoms precede motivation, both motivational composites would carry significant indirect coefficients, with a direct coefficient persisting. Fifth (H5, exploratory), the path from autonomous motivation to academic performance would be weaker among students with weaker academic Turkish; perceived discrimination was examined as a second candidate moderator of the same path.

2. Materials and Methods

2.1. Study Design and Setting

This was an observational study of Türkiye-born and early-arriving Syrian-background students conducted across eight Turkish provinces using a two-contact structure. The exposure, the mediators, and all covariates were assessed at a first contact, and the academic outcome was obtained at a second contact approximately ten weeks later, so that measurement of the outcome followed measurement of the exposure and mediators in time. Symptoms and mediators were measured concurrently, however, and the grade average refers to the whole first term, including weeks before first contact, so temporal ordering among symptoms, motivation and the outcome is only partly established. Reporting follows the STROBE statement for observational research (von Elm et al., 2007), and the completed checklist is available from the corresponding author. Supplementary tables and materials are provided as Supplementary Files S1–S6 (Tables S1–S9) and are cited where relevant below. The analysis plan for the primary mediation model, the moderation analyses and the sensitivity analyses was specified in advance of data inspection. We treat the mediation model (H2–H4) as confirmatory and the moderation analyses (H5) as exploratory, because H5 was labelled exploratory at the outset and used a continuous moderator without a prespecified threshold; sensitivity analyses added after the primary analysis plan are identified as such below.

The provinces were selected to span the range of Syrian settlement in Türkiye along two dimensions: the absolute density of the population under temporary protection and the metropolitan-versus-border-province character. İstanbul represents a large-scale metropolitan settlement distant from the border; Gaziantep, Şanlıurfa, Hatay, Kilis and Mardin are border or near-border provinces with very high proportional Syrian presence; and Adana and Mersin are secondary internal destinations with substantial agricultural and informal labour markets. Six of the eight provinces (all except İstanbul and Mersin) fall within the zone declared as affected by the February 2023 earthquakes.

2.2. Participants and Eligibility

Students were eligible if at least one parent had been born in Syria and the student had either been born in Türkiye or arrived in Türkiye at or before the age of five years, that is, before the ordinary age of school entry. This criterion was preferred to birthplace alone because children who arrive in infancy or early childhood are unlikely to retain autobiographical memory of war or flight and enter the Turkish education system at the same point as those born in the country, although absence of memory does not establish absence of exposure. Students who arrived after their fifth birthday were excluded. Further inclusion criteria were current enrolment in a Turkish public school in grades 5 to 12, at least two completed academic years in the Turkish school system, and written parental consent together with written student assent. Students with a documented intellectual disability or a formal special-education placement were excluded, as were students for whom no report card record could be obtained at second contact and those with more than 20% missing responses on any primary measure. Students with intellectual disability or special-education placement were excluded so that the self-report instruments and the cloze test could be administered without adaptation and grades would reflect the standard curriculum; this limits generalisability to those students.

2.3. Recruitment

Recruitment was conducted entirely through community channels rather than through schools, using four overlapping channels in each province: Syrian community associations, neighbourhood solidarity organisations and mosque-affiliated family

support groups; established parent messaging groups on WhatsApp and Telegram, through which a bilingual study announcement was circulated; clinical psychologists and psychological counsellors resident in each province, several of them Arabic-speaking, who identified eligible families among their community contacts but were instructed to exclude their own current and former patients; and a limited chain-referral component in which participating families invited other eligible families. Recruitment was distributed across 22 identifiable community nodes, a node being a distinct association, messaging group, or practitioner network, with a median of 18 participants per node (range 6 to 41). Node identity was recorded for every participant and used as the clustering unit in analysis. This strategy does not condition inclusion on regular school attendance or on the willingness of a school administration to host research, and therefore does not systematically exclude irregularly attending students; its cost is that the sample is not probability-based.

Data were collected by 14 clinical psychology graduate students and research assistants, all resident in the province in which they worked, and 9 of them are fluent in Arabic. All completed a standardised four-hour training covering the protocol, standardised administration and prompting, the consent and assent procedure, cultural and linguistic considerations in trauma assessment with bilingual minors, and the distress escalation protocol, followed by two supervised practice administrations and weekly supervision with the first author throughout fieldwork.

2.4. Procedure

First-contact assessments were conducted between 3 November and 22 December 2025 on the premises of community associations, in the consulting rooms of participating practitioners or, where families preferred, in the family home with a parent present in the dwelling but not in the room. Students were assessed individually or in groups of no more than six, with a trained assessor present throughout. The full battery was completed in a single session, and a break was offered after the trauma module. Second-contact data collection took place between 9 and 27 February 2026, after first-term report cards for the 2025–2026 academic year had been issued. Families were re-contacted by the same research assistant, and the first-term weighted grade average, the individual course grades, and the recorded days of absence were transcribed from the report card. The median interval between contacts was 71 days (interquartile range 64 to 79).

A written distress protocol was in force throughout. Any student scoring at or above the screening cut-off on the post-traumatic stress measure, or endorsing any item indicating self-harm or suicidal ideation, was flagged at the point of scoring; the parent was informed the same day in the family's preferred language and given a written referral to the nearest community mental health centre and the provincial guidance and research centre. Students who endorsed an item indicating self-harm or suicidal ideation were not left to the referral route alone: the assessor interrupted the session, a brief structured risk assessment covering current intent, plan, means and recent self-harm was completed with the student before the family left, and the first author, who supervised fieldwork, was contacted by telephone on the same day to review the case. Where risk was judged to be acute, the parent was informed in person before the family left and accompanied the student to the nearest emergency psychiatric service; where risk was judged to be lower, the parent was informed on the same day and an appointment was arranged through the community mental health centre. Information about these cases was disclosed only to the parent and, where a referral was made, to the receiving service; it was not shared with schools or teachers and was stored separately from the research data with restricted access. Each case was followed up by telephone within one week and again at second contact. Students were told at assent that their answers would be shared only with the research team, that

no scores would be passed to schools or teachers, and that a parent would be informed only if this protocol was triggered. In total, 157 students scored at or above the screening cut-off and 12 endorsed an item indicating self-harm or suicidal ideation, of whom 7 also scored at or above the screening cut-off; 162 families were therefore contacted, and 116 (71.6%) confirmed at second contact that they had made or attempted contact with a service.

2.5. Measures

The instruments administered at first contact are described below, with their scoring, Turkish validation sources, and internal consistency in the present sample.

2.5.1. Post-Traumatic Stress Symptoms

Post-traumatic stress symptoms were assessed with the 13-item Children's Revised Impact of Event Scale (CRIES-13), validated as a screening instrument by Perrin and Meiser-Stedman and Smith, who reported a three-factor structure of intrusion (4 items), avoidance (4 items) and arousal (5 items) and a total-score cut-off of 30 that correctly classified 75% to 83% of children against diagnostic interview (Perrin et al., 2005). Items are rated 0, 1, 3 or 5 (not at all, rarely, sometimes, often), giving a total range of 0 to 65. Because the CRIES-13 is anchored to a specific event, participants were asked to answer with reference to the experience that had upset them most, which they named at the start of the module (for example the 2023 earthquakes, a bereavement, or family exposure to conflict or violence); the index experience was the earthquakes for 142 students (34.9%), a family or conflict-related event for 118 (29.0%) and another event for 97 (23.8%), and the 50 students (12.3%) who could not name one answered with reference to the most stressful thing that had happened to them. A family or conflict-related event was defined as an experience named by the student that concerned the family's exposure to the Syrian conflict, displacement or violence, in line with the corresponding items of the adversity checklist (Section 2.5.7); such events were not necessarily experienced directly by the student, and the data do not establish whether the student was personally present, so they are not treated as the child's own exposure to a qualifying traumatic event. The Turkish adaptation of Çeri and colleagues reported an internal consistency of 0.85 and a correlation of 0.58 with the Child PTSD Symptom Scale (Çeri et al., 2021). In the present sample, $\alpha = 0.88$ and $\omega = 0.89$ for the total score, with subscale alphas of 0.82 (intrusion), 0.74 (avoidance) and 0.79 (arousal). The continuous total score was the exposure variable in all inferential models; the cut-off of 30 was used only to describe the proportion scoring at or above the screening threshold, which indicates elevated post-traumatic stress symptoms on a screening measure and not a diagnosis. Because the instrument was applied without establishing a qualifying (Criterion A) event, we do not describe this proportion as probable post-traumatic stress disorder. The outcome is accordingly described throughout as post-traumatic stress symptoms and not as post-traumatic stress disorder.

2.5.2. Learning Motivation

Learning motivation was assessed with the 28-item Academic Motivation Scale, an operationalisation of the self-determination continuum in the educational domain, answered on a seven-point scale (1, does not correspond at all, to 7, corresponds exactly) in response to the stem "Why do you go to school?" and yielding seven four-item subscales: intrinsic motivation to know, to accomplish, and to experience stimulation; identified, introjected, and external regulation; and amotivation (Vallerand et al., 1992). The Turkish adaptation of Karagüven confirmed the seven-factor structure (Karagüven, 2012), as did an independent validation in 797 students (Can, 2015). Because both Turkish validations used the university form in tertiary-education samples, item wording was reviewed by

two educational psychologists and two Turkish language teachers and adjusted where a university-specific referent appeared, without alteration of item content, and the factor structure was re-examined in the present sample. Re-examination recovered the seven factors, but fit was acceptable rather than good (CFI = 0.938, TLI = 0.928, below our preferred 0.95; Supplementary File S2, Table S3), so developmental validity at ages 10 to 18 is supported by structural evidence only and not by external validation. Subscales were aggregated into three composites following the self-determination continuum (Howard et al., 2021; Ryan & Deci, 2000; Vallerand et al., 1992): autonomous motivation (the three intrinsic subscales and identified regulation, $\alpha = 0.87$), controlled motivation (introjected and external regulation, $\alpha = 0.74$) and amotivation ($\alpha = 0.79$). Autonomous motivation and amotivation were specified in advance as the two parallel mediators and controlled motivation as a covariate. A single global index was avoided because subscales with opposing associations to the outcome would cancel within it. A higher-order model supporting the composites was not formally tested (see Section 6).

2.5.3. Academic Performance

Academic performance was the first-term weighted grade average for the 2025–2026 academic year on the Turkish 0 to 100 scale, a figure printed on the report card and computed by the school from course grades weighted by instructional hours. Because the study was conducted without access to the e-Okul central records system, the figure was transcribed by the research assistant at second contact. It was recorded directly from the report card or an e-Devlet transcript for 171 students (42.0%) and reported verbally by the parent or student for 236 (58.0%). In a subsample of 63 students for whom both were available, agreement was high (intraclass correlation 0.91; mean absolute discrepancy 2.4 points; mean positive bias in verbal report 1.1 points), and all analyses were repeated within the document-verified subsample. Self-reported grades tend to run higher than recorded grades (Kuncel et al., 2005), as the positive bias observed here illustrates. Grades are not standardised across schools, teachers, grade levels or provinces, and the weighted averages for grades 5–8 and 9–12 share a 0 to 100 scale but are not guaranteed to be equivalent; age and province were therefore covariates. Students attended 163 schools (median 2 students per school, range 1 to 9; 41.7% of schools contributed a single student), identified from the report card.

2.5.4. Academic Turkish Proficiency

Because self-rated proficiency is an unreliable index of the academic language that classroom assessment demands, academic Turkish was assessed with a 20-item cloze test constructed for this study from four passages drawn from Turkish language textbooks at the fifth-, seventh-, ninth-, and eleventh-grade levels, with every seventh content word deleted. A response was scored correct if it was semantically and syntactically acceptable. Passage selection and scoring criteria were reviewed by two Turkish language teachers, who independently scored a random 15% of protocols ($\kappa = 0.89$). The score ranged from 0 to 20 ($\alpha = 0.86$, $\omega = 0.87$), correlated 0.58 with mean self-rated proficiency and 0.93 with exact-match scoring, and was used as the proficiency variable in all analyses. Item difficulty (proportion correct) ranged from 0.34 to 0.91 and corrected item–total correlations from 0.38 to 0.62 (Supplementary File S6, Table S9); the score correlated with grades at $r = 0.27$ in grades 5–8 and $r = 0.31$ in grades 9–12. Because the same passages were given to students in grades 5 to 12, a raw score does not have an identical meaning at every grade level and mixes language proficiency with grade-level exposure to Turkish texts (see Section 6).

2.5.5. Depressive and Anxiety Symptoms

Depressive and anxiety symptoms were assessed so that any association of post-traumatic stress with performance could be distinguished from general internalising distress. The Revised Child Anxiety and Depression Scale is a DSM-aligned self-report measure for ages 8 to 18 rated from 0 to 3 (Chorpita et al., 2000), from which Ebesutani and colleagues derived a 25-item short form (Ebesutani et al., 2012). The Turkish child version was evaluated by Görmez and colleagues in 483 children aged 8 to 17 ($\alpha = 0.95$) (Görmez et al., 2017). Because the Turkish evidence concerns the full 47-item version, the 25 short-form items were administered as a subset of the Turkish-validated instrument, and the total score was used as age- and sex-referenced T-scores ($\alpha = 0.91$ in the present sample).

2.5.6. Perceived Discrimination and School Belonging

Perceived discrimination was assessed with the nine-item Everyday Discrimination Scale (Williams et al., 1997), answered from 1 (never) to 6 (almost every day). The Turkish adaptation of Kuru supported a single-factor structure with correlated residuals for the first two items and an internal consistency of 0.85 in 540 adults (Kuru, 2026). Because that validation used adults, the structure was re-examined in the present sample and showed acceptable fit, $\chi^2(26) = 54.18$, $p < .001$, CFI = 0.958, RMSEA = 0.052, SRMR = 0.041 ($\alpha = 0.84$). School belonging was assessed with the 18-item Psychological Sense of School Membership scale (Goodenow, 1993), answered from 1 (not at all true) to 5 (completely true), in the Turkish adaptation of Sarı, established in students in grades 6 to 8 (Sarı, 2015) ($\alpha = 0.85$ in the present sample).

2.5.7. Adversity Exposure and Demographic Information

Adversity and trauma exposure was recorded with a 12-item checklist compiled for this study and reviewed by four clinicians experienced in work with the Syrian community in Türkiye, covering family exposure to the Syrian conflict, family displacement history, death of a close relative, separation from a parent, direct experience of the February 2023 earthquakes, displacement following the earthquakes, household food insecurity, involuntary residential moves, parental unemployment, child labour, exposure to violence in the home and serious illness in the household; the item wording and item-level endorsement frequencies are given in Supplementary File S1 (Table S1). The items on conflict exposure and displacement referred to the family and did not isolate the child's own experience, whereas direct earthquake exposure referred to the child's own presence. The count of endorsed items (0 to 12) was used as a covariate, and direct earthquake exposure was additionally retained as a dichotomous covariate. The unweighted count treats heterogeneous experiences as equivalent and additive, a coarse simplification adopted because the checklist has no validated weighting; it was examined in a sensitivity analysis using domain indicators (Section 3.7). Demographic and family information comprised age, sex, grade, place of birth, age at arrival where applicable, years resident in Türkiye, home language, parental education and employment, household size and legal status of the household.

2.6. Language of Administration and Translation

Instruments were administered in Turkish or Arabic according to the student's stated preference: 276 students (67.8%) elected Turkish and 131 (32.2%) Arabic. Where a published Arabic version of an instrument existed, it was used as published. For the remaining instruments, Arabic forms were produced for this study from the English originals, with the permission of the original developers where required, by a four-person bilingual team. Forward translation into Arabic was carried out independently by two team members and reconciled; the other two members back-translated the reconciled version blind

to the original. Discrepancies were resolved by consensus; two Arabic-speaking psychologists reviewed the items for cultural and developmental appropriateness, and the forms were piloted with 12 Syrian-background students aged 10 to 17 who were not part of the sample, following published guidelines (Beaton et al., 2000). The cloze test, as a measure of Turkish, was administered in Turkish to all students. Equivalence across language of administration was examined through formal tests of measurement invariance, and all principal models were re-estimated in the Turkish-administration subsample.

2.7. Statistical Analysis

Sample size was determined before recruitment by Monte Carlo simulation for the smaller of two indirect effects in a parallel two-mediator model. Assuming standardised paths of a = −0.30 and b = 0.25, normally distributed variables with no covariates, $\alpha = 0.05$ and 5000 replications, 80% power was attained at $n = 312$; inflating for clustering within recruitment nodes (mean cluster size 18, intraclass correlation 0.05) and anticipated loss at second contact gave a target of 400 completed cases, and 407 were achieved. The simulation addressed the primary indirect effect only and was not designed to provide power for the interaction terms of H5.

Analyses were conducted in Mplus 8.10 (Muthén & Muthén, 2017) and in R 4.4.2 using lavaan version 0.6-19 (Rosseel, 2012), semTools version 0.5-6 and EValue version 4.1.3. Univariate skewness did not exceed an absolute value of 2 and kurtosis an absolute value of 7. Item-level missingness did not exceed 5% on any measure, Little's test was non-significant, $\chi^2(418) = 443.9$, $p = .191$ (Little, 1988), and full information maximum likelihood was used throughout. Correlations are estimated under the same full-information procedure and are therefore based on all 407 cases.

The measurement structure of the post-traumatic stress and motivation constructs was established by a joint confirmatory factor analysis with maximum likelihood estimation and robust standard errors. Fit was judged against comparative fit and Tucker–Lewis indices of at least 0.95 (with 0.90 regarded as acceptable), root mean square error of approximation of 0.06 or below and standardised root mean square residual of 0.08 or below (Hu & Bentler, 1999). Measurement invariance of the joint model was tested at the configural, metric and scalar levels across sex, grade band (grades 5 to 8 versus 9 to 12), language of administration, and outcome verification status, using a change in comparative fit index not exceeding 0.010 and a change in root mean square error of approximation not exceeding 0.015 as criteria (Chen, 2007; Cheung & Rensvold, 2002).

The primary analysis estimated a parallel two-mediator path model in which post-traumatic stress severity predicted academic performance directly and indirectly through autonomous motivation and amotivation. Estimation used maximum likelihood with robust standard errors and a sandwich estimator adjusting for non-independence within the 22 recruitment nodes. Because standard sandwich estimators can be biased downward with few clusters (Pustejovsky & Tipton, 2018/2023), we also re-estimated the primary model with a small-sample cluster-robust correction (CR2 with Satterthwaite degrees of freedom) as an added sensitivity analysis. Recruitment nodes are not the main source of dependence in grades, which are generated within schools, so school-level dependence was examined in a further added sensitivity analysis. Covariates entered on all endogenous paths were age, sex, generation status, years resident in Türkiye, maternal education, household size, academic Turkish proficiency, controlled motivation, depression and anxiety total, adversity exposure count, direct earthquake exposure, days absent and province. Province was entered as seven dummy-coded fixed effects, which capture regional differences in earthquake exposure, refugee concentration and educational context but not school-level differences. Covariate selection followed a causal rationale (Rohrer, 2018): age, sex, generation status, years in Türkiye, maternal education, household size,

adversity count, earthquake exposure and province were treated as pre-exposure or contextual confounders. By contrast, academic Turkish proficiency, controlled motivation, depression and anxiety, and days absent may be correlates or consequences of symptoms and could absorb part of the association of interest, so models without them were estimated as added sensitivity analyses. Variance inflation factors were below 2.4 for all covariates. Baseline achievement, cognitive ability, parental mental health, school quality and household income were not measured. The terms total, direct and indirect effect are used in their conventional path-analytic sense, as components of a statistical decomposition under an assumed variable ordering, and are not intended to convey causal identification or temporal precedence between symptoms and motivation. Indirect effects were tested with Monte Carlo confidence intervals based on 20,000 draws from the asymptotic sampling distribution of the component paths (Preacher & Selig, 2012), a procedure preferred to the bootstrap under robust maximum likelihood with cluster adjustment.

Moderation was tested by adding interaction terms between each motivational mediator and each proposed moderator (academic Turkish proficiency and perceived discrimination) to the model predicting academic performance. The index of moderated mediation, computed as the product of the post-traumatic stress to mediator path and the mediator-by-moderator interaction coefficient, was the inferential criterion, and conditional indirect effects were reported at the mean and at one standard deviation above and below the mean of the moderator (Hayes, 2022). The moderator was treated as continuous and no threshold was estimated. Four mediator–moderator combinations were tested (autonomous motivation and amotivation, each with academic Turkish proficiency and perceived discrimination). The corresponding p-values and confidence intervals are nominal and were not adjusted for multiplicity, so some of the interaction results may be chance findings, and any that emerge require replication.

Four sensitivity analyses were prespecified: E-values for the direct association (VanderWeele & Ding, 2017); re-estimation in the document-verified outcome subsample; re-estimation excluding students reporting direct earthquake exposure; and assessment of common method variance by Harman's single-factor test and by an unmeasured latent method factor loading on all self-report indicators (Podsakoff et al., 2003). Because the outcome is continuous, E-values were obtained by converting the standardised coefficient for a one-standard-deviation contrast in symptom severity to an approximate risk ratio, $RR \approx \exp(0.91 \times d)$ (VanderWeele & Ding, 2017), which assumes an approximately normal outcome and linearity; the value is a heuristic index of the strength of unmeasured confounding on that metric and not a robustness guarantee. Harman's test is a weak diagnostic and the latent method factor may not match realistic sources of shared variance, so neither is taken to exclude common-method bias. Full sensitivity output is given in Supplementary File S5 (Tables S7 and S8). Models were also re-estimated separately by language of administration, under the partial invariance specification, in complete cases and without cluster adjustment. Additionally, we added exploratory sensitivity analyses: a comparison of students with and without document-verified grades; small-sample-corrected cluster-robust inference; school-level clustering; models omitting days absent, controlled motivation or the depression and anxiety score in turn; replacement of the adversity count by domain indicators; and separate estimation for students born in Türkiye and early arrivals. We further re-estimated the primary model after excluding the 50 students who could not name an index experience (n = 357) and after additionally excluding the 118 students whose index experience was a family or conflict-related event (n = 239), so that the retained students named an experience more clearly their own.

3. Results

3.1. Participant Flow and Sample Characteristics

Six hundred and twenty-four households were reached, 561 were screened, and 81 students were excluded at screening, most often because they had arrived in Türkiye after their fifth birthday. Of 480 eligible students, parental consent and student assent were obtained for 437 (91.0%), 420 completed the first-contact assessment, and 407 were retained in the analytic sample. Participant flow is presented in Figure 1.

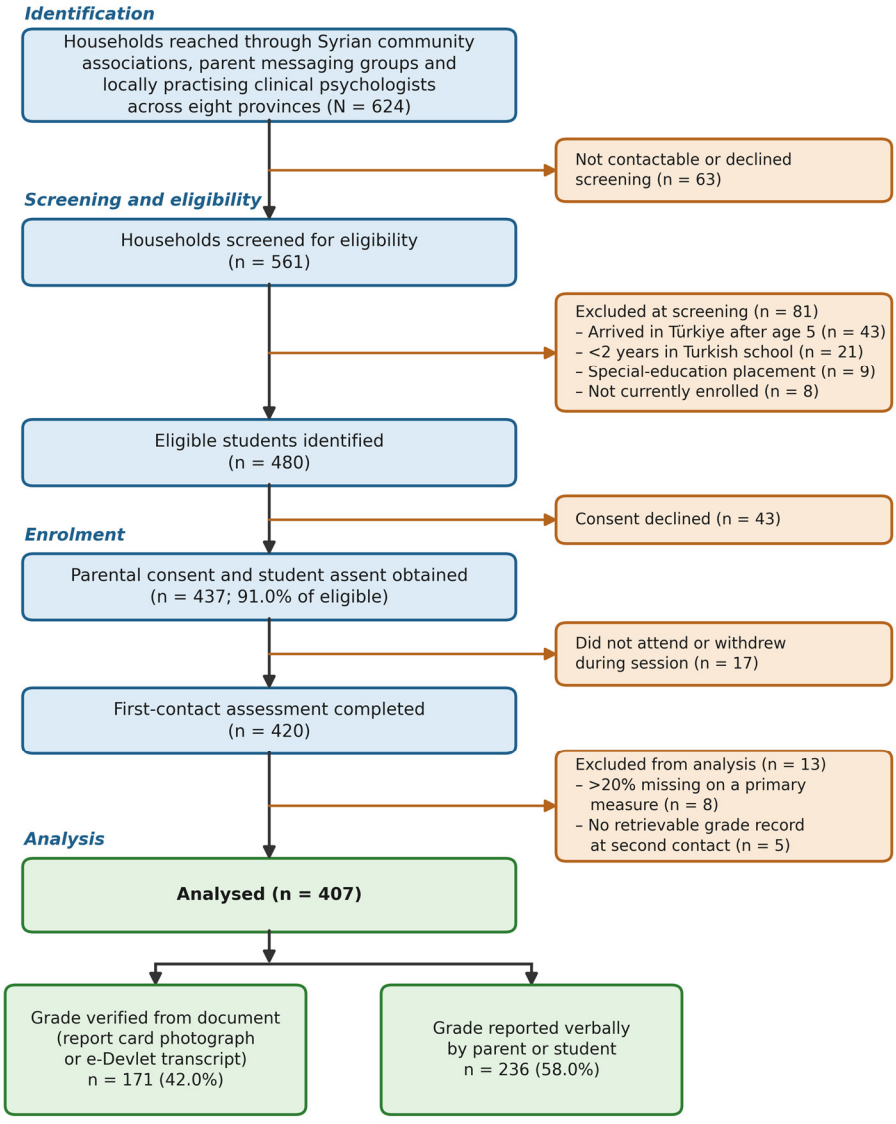


Figure 1. Participant flow through recruitment, eligibility screening, enrolment, assessment and analysis. Province distribution of the analysed sample: İstanbul 79, Gaziantep 63, Şanlıurfa 55, Hatay 49, Mersin 45, Adana 42, Mardin 40 and Kilis 34. Recruitment was distributed across 22 community nodes (median 18 participants per node, range 6 to 41).

As Figure 1 shows, attrition was concentrated at the earliest stages: 144 of the 217 households lost between first contact and analysis were lost before consent was sought, whereas only 13 cases were lost after the assessment had been completed. The lower panel of Figure 1 records the split between document-verified and verbally reported outcomes that underlies the sensitivity analysis reported below.

The 407 students had a mean age of 13.84 years (SD = 2.29, range 10 to 18); 208 (51.1%) were girls, 256 (62.9%) had been born in Türkiye, and 151 (37.1%) had arrived at or before the age of five. Arabic was the sole or principal home language for 294 students (72.2%), and 179 (44.0%) reported direct exposure to the February 2023 earthquakes. Full characteristics are given in Table 1.

Table 1. Characteristics of the analysed sample (n = 407).

Characteristic	*n* (%) or Mean (SD)
Age, years	13.84 (2.29)
Girls	208 (51.1)
Born in Türkiye	256 (62.9)
Arrived at or before age 5	151 (37.1)
Years resident in Türkiye	10.38 (2.84)
Grades 5 to 8	235 (57.7)
Grades 9 to 12	172 (42.3)
Arabic sole or principal home language	294 (72.2)
Maternal education primary or below	222 (54.5)
Paternal education primary or below	199 (48.9)
At least one parent in regular employment	174 (42.8)
Household size, persons	6.29 (1.92)
Academic Turkish proficiency, cloze score (0–20)	13.24 (3.91)
Turkish proficiency, mean self-rating (1–5)	3.61 (0.87)
Adversity exposure count (0–12)	3.21 (1.85)
Direct earthquake exposure	179 (44.0)
Displacement following the earthquakes	86 (21.1)
Assessment conducted in Turkish	276 (67.8)
Assessment conducted in Arabic	131 (32.2)
Outcome verified from document	171 (42.0)
Province: İstanbul	79 (19.4)
Province: Gaziantep	63 (15.5)
Province: Şanlıurfa	55 (13.5)
Province: Hatay	49 (12.0)
Province: Mersin	45 (11.1)
Province: Adana	42 (10.3)
Province: Mardin	40 (9.8)
Province: Kilis	34 (8.4)

Values are n (%) for categorical and mean (SD) for continuous characteristics.

Table 1 shows that no single province contributed more than a fifth of the sample and that the two language-of-administration groups were large enough for the stratified models reported below.

3.2. Descriptive Findings

The mean post-traumatic stress score was 27.02 (SD = 11.58, observed range 2 to 61), and, within this recruited sample, 157 students (38.6%, 95% CI 33.9 to 43.4) scored at or above the screening cut-off, denoting elevated post-traumatic stress symptoms and not a diagnosis of post-traumatic stress disorder. Girls scored higher than boys (28.66 versus 25.31, t(405) = 2.95, p = .003, d = 0.29), and students reporting direct earthquake exposure scored higher than those who did not (29.44 versus 25.13, t(405) = 3.78, p < .001, d = 0.38). No statistically significant difference in scores was detected between students born in Türkiye and those who arrived before school entry (26.41 versus 28.05, t(405) = 1.39, p = .166,

d = 0.14), nor in the proportion at or above the cut-off (36.7% versus 41.7%, $\chi^2(1) = 1.00$, $p = .317$). The mean grade average was 70.91 (SD = 13.42), and students born in Türkiye outperformed those who had arrived before school entry (72.19 versus 68.74, t(405) = 2.51, $p = .012$, d = 0.25). Descriptive statistics, reliabilities and correlations for the principal variables are presented in Table 2.

Table 2. Descriptive statistics, internal consistencies and bivariate correlations ($n = 407$).

Variable	M (SD)	α	1	2	3	4	5	6	7	8	9
1. Post-traumatic stress symptoms	27.02 (11.58)	0.88	—								
2. Autonomous motivation	4.73 (1.08)	0.87	−0.32 **	—							
3. Amotivation	2.56 (1.31)	0.79	0.28 **	−0.41 **	—						
4. Controlled motivation	4.08 (1.20)	0.74	0.11 *	0.24 **	0.07	—					
5. Academic performance	70.91 (13.42)	—	−0.27 **	0.33 **	−0.25 **	0.06	—				
6. Academic Turkish proficiency	13.24 (3.91)	0.86	−0.14 **	0.19 **	−0.17 **	0.03	0.29 **	—			
7. Depression and anxiety	56.24 (11.19)	0.91	0.54 **	−0.23 **	0.22 **	0.09	−0.19 **	−0.12 *	—		
8. Perceived discrimination	19.84 (8.12)	0.84	0.21 **	−0.18 **	0.20 **	0.12 *	−0.15 **	−0.16 **	0.26 **	—	
9. School belonging	3.42 (0.78)	0.85	−0.24 **	0.38 **	−0.33 **	0.05	0.27 **	0.22 **	−0.20 **	−0.31 **	—
10. Days absent	11.3 (9.7)	—	0.19 **	−0.22 **	0.26 **	0.02	−0.31 **	−0.13 **	0.15 **	0.17 **	−0.22 **

* $p < .05$, ** $p < .01$ (two-tailed). Depression and anxiety scores are T-scores. Possible ranges: post-traumatic stress 0–65; motivation composites 1–7; academic performance 0–100; academic Turkish proficiency 0–20; perceived discrimination 9–54; school belonging 1–5.

Three features of Table 2 anticipate the modelling that follows. Post-traumatic stress correlated with autonomous motivation and with amotivation at similar magnitude but opposite sign (−0.32 and 0.28); controlled motivation, specified in advance as a covariate, was essentially unrelated to academic performance (r = 0.06); and post-traumatic stress correlated 0.54 with depressive and anxiety symptoms, so that the two constructs must be separated statistically before any claim of specificity can be made, although statistical separation cannot fully resolve their shared content.

3.3. Measurement Models and Invariance

The joint measurement model comprising the three post-traumatic stress factors and the three motivation composites showed acceptable fit, with standardised loadings between 0.52 and 0.84, and the seven-factor structure of the motivation instrument was recovered in this school-aged sample, with all loadings above 0.55 and no cross-loading above 0.30, although CFI (0.938) and TLI (0.928) met the 0.90 acceptability criterion but not the preferred 0.95. Fit statistics and the invariance sequences are given in Table 3; standardised loadings are given in Supplementary File S2 (Table S2) and the full invariance output in Supplementary File S3 (Table S4).

As Table 3 and Supplementary File S3 (Table S4) show, the joint model was invariant at the scalar level across sex, grade band and outcome verification status. Across the languages of administration, full scalar invariance was not supported, and partial scalar invariance was achieved after freeing the intercepts of two avoidance items of the post-traumatic stress measure. Differential intercepts mean that, at the same level of avoidance, students responding in Arabic and in Turkish answered these items differently; plausible reasons include translation nuance and different cultural norms about acknowledging avoidance of reminders, but the data cannot discriminate among them. The freed intercepts were estimated separately by language group in the joint measurement model, and the symptom scores used in the path models were the corresponding partial-invariance factor scores. Comparisons across language groups therefore rest on partial invariance, and substantive estimates were stable: the total indirect coefficient was −0.109 under partial invariance against −0.112 in the primary model, and −0.106 and −0.127 in the Turkish and Arabic subsamples (Section 3.7). Intraclass correlations at the recruitment-node level

were 0.07 for academic performance, 0.05 for autonomous motivation, 0.04 for amotivation, and 0.06 for post-traumatic stress, supporting the use of cluster-robust standard errors.

Table 3. Confirmatory factor analyses and measurement invariance.

Model	χ^2	df	CFI	RMSEA	SRMR	ΔCFI	ΔRMSEA	Decision
Single-group confirmatory models								
Joint post-traumatic stress and motivation model	232.41	129	0.947	0.044	0.050	—	—	—
Motivation instrument, seven factors	601.14	329	0.938	0.045	0.053	—	—	—
Invariance of the joint model								
Sex—configural	401.16	258	0.944	0.048	0.054	—	—	Reference
Sex—metric	421.88	273	0.942	0.047	0.057	−0.002	−0.001	Retained
Sex—scalar	451.72	288	0.936	0.051	0.059	−0.006	0.004	Retained
Grade band—configural	408.34	258	0.941	0.049	0.055	—	—	Reference
Grade band—metric	430.05	273	0.938	0.049	0.058	−0.003	0.000	Retained
Grade band—scalar	463.19	288	0.931	0.054	0.061	−0.007	0.005	Retained
Language—configural	415.72	258	0.938	0.051	0.057	—	—	Reference
Language—metric	441.06	273	0.933	0.052	0.060	−0.005	0.001	Retained
Language—scalar	492.85	288	0.919	0.064	0.068	−0.014	0.012	Rejected
Language—partial scalar	463.41	286	0.925	0.059	0.063	−0.008	0.007	Retained
Verification—configural	397.88	258	0.946	0.047	0.053	—	—	Reference
Verification—metric	417.24	273	0.944	0.046	0.056	−0.002	−0.001	Retained
Verification—scalar	444.61	288	0.939	0.050	0.058	−0.005	0.003	Retained

CFI, comparative fit index; RMSEA, root mean square error of approximation; SRMR, standardised root mean square residual. Tucker–Lewis indices were 0.937 for the joint model and 0.928 for the seven-factor model, and RMSEA 90% confidence intervals were 0.035 to 0.053 and 0.039 to 0.051, respectively. Change statistics are computed against the preceding model in each sequence, except for the partial scalar row, which is referenced to the metric model; partial scalar invariance across languages was achieved after freeing the intercepts of avoidance items 7 and 10. Group sizes: 208 girls and 199 boys; 235 students in grades 5–8 and 172 in grades 9–12; 276 assessed in Turkish and 131 in Arabic; 171 document-verified and 236 verbally reported outcomes.

3.4. Post-Traumatic Stress and Academic Performance

The total standardised coefficient linking post-traumatic stress severity to academic performance was inverse and significant, $\beta = -0.26$, SE = 0.05, $p < .001$, 95% CI −0.36 to −0.16, corresponding to a difference of 3.49 points in the grade average per standard deviation of symptom severity. The association held after adjustment for depressive and anxiety symptoms, days absent, academic Turkish proficiency, maternal education, household size and adversity exposure.

3.5. Indirect Associations Through Learning Motivation

Post-traumatic stress severity was inversely associated with autonomous motivation, $a_1 = -0.29$, SE = 0.06, $p < .001$, and positively associated with amotivation, $a_2 = 0.26$, SE = 0.06, $p < .001$. Autonomous motivation was positively associated with academic performance, $b_1 = 0.24$, SE = 0.05, $p < .001$, and amotivation inversely, $b_2 = -0.16$, SE = 0.06, $p = .006$. The indirect coefficient through autonomous motivation was $\beta = -0.070$ (95% CI −0.116 to −0.033) and that through amotivation $\beta = -0.042$ (95% CI −0.081 to −0.013); the total indirect coefficient, $\beta = -0.112$ (95% CI −0.166 to −0.063), represented 42.7% of the modelled total association (95% CI 24.1% to 63.8%). This percentage is a model-dependent decomposition that assumes symptoms precede motivation, linearity, the specified covariate set, and no unmeasured confounding of the mediator–outcome relation; it is not an empirical estimate of the share of a real-world effect that motivation explains. The two

specific indirect coefficients did not differ, Δ = −0.028 (95% CI −0.081 to 0.024). The direct coefficient remained significant, c′ = −0.15, SE = 0.05, p = .004, so the indirect coefficients did not exhaust the modelled association. The model accounted for 18.2% of the variance in autonomous motivation, 14.4% in amotivation and 31.0% in academic performance. Full estimates are given in Table 4; unstandardised estimates and the covariate coefficients in the academic performance equation are given in Supplementary File S4 (Tables S5 and S6), and coefficients for the covariates in the motivation equations are available from the corresponding author.

Table 4. Parallel two-mediator path model predicting academic performance (n = 407).

Path	β	SE	p	95% CI
a_1 Post-traumatic stress → Autonomous motivation	−0.29	0.06	<.001	−0.41 to −0.17
a_2 Post-traumatic stress → Amotivation	0.26	0.06	<.001	0.14 to 0.38
b_1 Autonomous motivation → Academic performance	0.24	0.05	<.001	0.14 to 0.34
b_2 Amotivation → Academic performance	−0.16	0.06	.006	−0.28 to −0.05
c′ Direct association	−0.15	0.05	.004	−0.25 to −0.05
c Total association	−0.26	0.05	<.001	−0.36 to −0.16
Indirect via autonomous motivation	−0.070	0.021	—	−0.116 to −0.033
Indirect via amotivation	−0.042	0.017	—	−0.081 to −0.013
Total indirect association	−0.112	0.026	—	−0.166 to −0.063
Difference between indirect associations	−0.028	0.027	—	−0.081 to 0.024

Standardised coefficients from maximum likelihood estimation with robust standard errors and cluster adjustment for recruitment node. Adjusted for age, sex, generation status, years resident in Türkiye, maternal education, household size, academic Turkish proficiency, controlled motivation, depression and anxiety total, adversity exposure count, direct earthquake exposure, days absent and province. Confidence intervals for indirect effects are Monte Carlo intervals based on 20,000 draws. Unstandardised estimates and covariate coefficients for the academic performance equation are given in Supplementary File S4 (Tables S5 and S6). The terms total, direct and indirect denote components of a statistical decomposition under an assumed variable ordering and do not imply causal effects.

Reading Table 4 downward, the four constituent paths are significant and in the predicted direction, and the two specific indirect coefficients sum to the total indirect coefficient, which, together with the direct coefficient, reproduces the total association. The fitted model, with its moderation term and covariate paths, is shown in Figure 2.

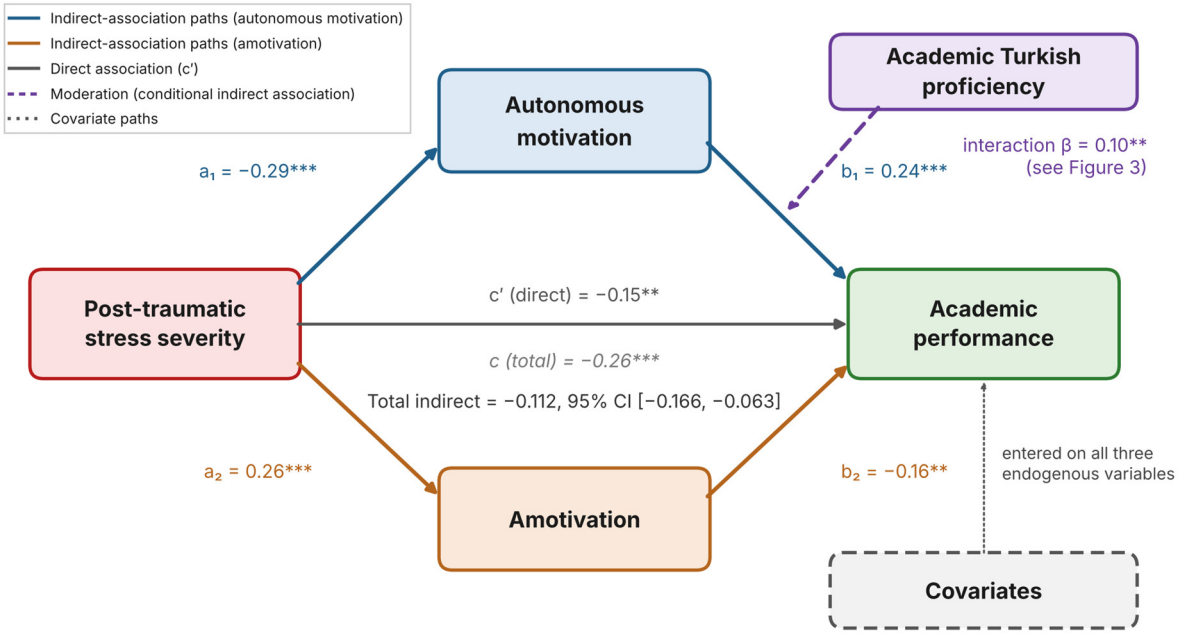


Figure 2. Statistical model of the association between post-traumatic stress severity and academic performance, with indirect associations through autonomous motivation and amotivation, moderation of the autonomous-motivation path by academic Turkish proficiency, and covariate paths. Standardised coefficients. Solid arrows are direct and indirect-association paths, the dashed arrow is the interaction of academic Turkish proficiency with the path from autonomous motivation to academic performance, and the dotted arrow denotes covariate paths. c, total association; c′, direct association. Total indirect association = −0.112 (95% Monte Carlo CI −0.166 to −0.063), 42.7% of the modelled total association. Adjusted for age, sex, generation status, years resident in Türkiye, maternal education, household size, academic Turkish proficiency, controlled motivation, depression and anxiety total, adversity exposure, direct earthquake exposure, days absent and province. ** $p <$ .01, *** $p <$ .001.

Figure 2 renders the same decomposition graphically and shows that the autonomous-motivation and amotivation routes are of broadly comparable weight rather than one dominating the other; the moderation term is described in the next section.

3.6. Exploratory Moderation

The association of autonomous motivation with academic performance varied with academic Turkish proficiency, being weaker at lower proficiency (interaction β = 0.10, SE = 0.04, p = .005, 95% CI 0.02 to 0.18). The index of moderated mediation, computed as the product of a_1 and the interaction coefficient, was −0.029 (95% Monte Carlo CI −0.054 to −0.008). Conditional indirect associations through autonomous motivation were β = −0.041 (95% CI −0.084 to −0.008) at one standard deviation below the mean of proficiency, β = −0.070 (95% CI −0.116 to −0.033) at the mean, and β = −0.099 (95% CI −0.156 to −0.052) at one standard deviation above the mean. The conditional indirect associations are displayed in Figure 3. These p-values are nominal and unadjusted across the four exploratory mediator–moderator tests, so the interaction may reflect chance; it is a hypothesis requiring replication and not evidence of a causal mechanism or of a specific intervention threshold.

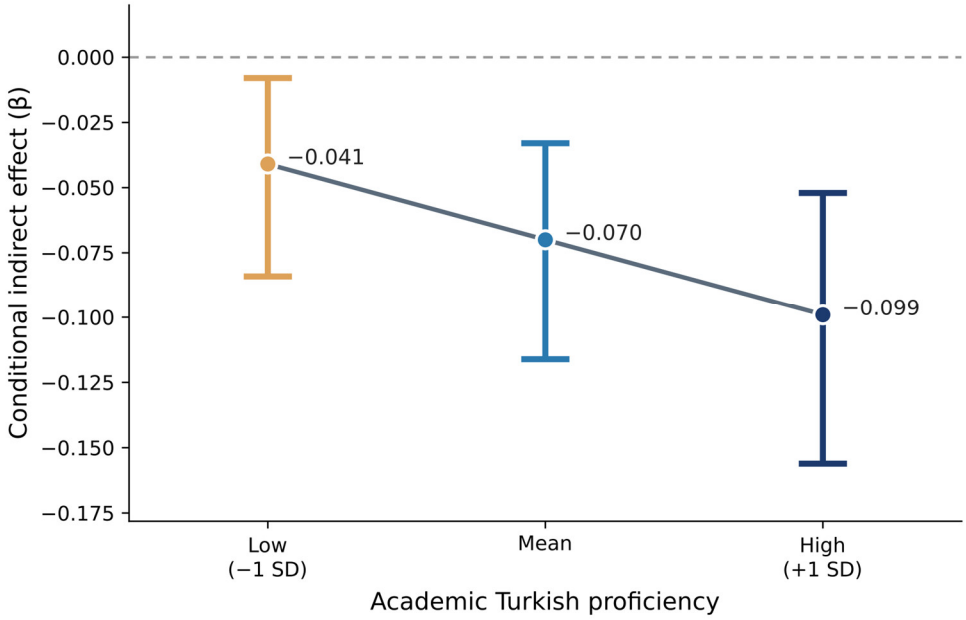


Figure 3. Conditional indirect association of post-traumatic stress on academic performance through autonomous motivation by academic Turkish proficiency. Points are standardised conditional indirect effects at one standard deviation below the mean, at the mean and at one standard deviation above the mean of academic Turkish proficiency; bars are 95% Monte Carlo confidence intervals based on 20,000 draws. The dashed line marks a null indirect effect.

Figure 3 shows the indirect association through autonomous motivation strengthening steadily from low to high proficiency, with the confidence interval at low proficiency lying close to zero. This is a continuous interaction of modest size and identifies no threshold. Perceived discrimination did not moderate the same path (index of moderated mediation −0.03, 95% CI −0.08 to 0.01), although it was directly associated with lower autonomous motivation, β = −0.14, p = .011, and higher amotivation, β = 0.16, p = .004. Neither moderator conditioned the path from amotivation to performance. Full moderation estimates, including the amotivation paths, are available from the corresponding author.

3.7. *Sensitivity Analyses*

The E-value for the direct association was 1.57, and 1.27 for the confidence limit nearest the null, on the approximate risk-ratio scale described above (Supplementary File S5, Table S8); an unmeasured confounder associated with both symptom severity and academic performance at about that strength, beyond the measured covariates, could explain away the direct association, and confounding of such modest strength is plausible. The total indirect coefficient was −0.121 (95% CI −0.206 to −0.045) in the document-verified subsample (n = 171), −0.098 (95% CI −0.162 to −0.041) after excluding students with direct earthquake exposure (n = 228), −0.106 (95% CI −0.169 to −0.048) among students assessed in Turkish (n = 276) and −0.127 (95% CI −0.226 to −0.039) among those assessed in Arabic (n = 131), the language-stratified estimates not differing (Δ = 0.021, p = .691). Estimates were also stable under the partial invariance specification (−0.109), in complete cases (n = 388; −0.108) and without cluster adjustment (−0.112). Harman's test extracted 26.8% of total variance, and a latent method factor changed no standardised path by more than 0.03; neither result excludes shared-method variance. The specifications are tabulated in Supplementary File S5 (Table S7). Every restricted, stratified and alternative estimate fell within the confidence band of the primary analysis.

The added sensitivity analyses gave a consistent picture. Students with and without document-verified grades did not differ in post-traumatic stress (26.4 versus 27.4, $p = .32$), autonomous motivation (4.78 versus 4.70, $p = .44$), amotivation (2.52 versus 2.59, $p = .55$), academic Turkish proficiency (13.5 versus 13.1, $p = .27$), age, sex or province (all $p > .10$), or mean grade (70.2 versus 71.4, $p = .37$). With CR2 small-sample-corrected cluster-robust inference the total indirect coefficient was −0.112 (95% CI −0.171 to −0.055) and the direct coefficient remained significant ($p = .007$); with school-level clustering the total indirect coefficient was −0.110 (95% CI −0.169 to −0.054) and the direct coefficient −0.15 ($p = .006$). Omitting days absent, controlled motivation or the depression and anxiety score in turn gave total indirect coefficients of −0.115, −0.111 and −0.131, with total associations of −0.27, −0.26 and −0.31, respectively; replacing the adversity count with four domain indicators (conflict and displacement, bereavement and separation, household economic strain, violence and illness) gave a total indirect coefficient of −0.109 (95% CI −0.163 to −0.058). The total indirect coefficient was −0.118 (95% CI −0.186 to −0.059) among students born in Türkiye ($n = 256$) and −0.103 (95% CI −0.187 to −0.033) among early arrivals ($n = 151$), without a significant difference ($p = .74$). Findings were also stable under restrictions on the index experience. After excluding the 50 students who could not name an index experience ($n = 357$), the total association was $\beta = -0.27$ (95% CI −0.37 to −0.17), the total indirect coefficient was −0.113 (95% CI −0.171 to −0.060) and the direct coefficient remained significant ($p = .005$); after additionally excluding students whose index experience was a family or conflict-related event ($n = 239$), the corresponding estimates were $\beta = -0.25$ (95% CI −0.37 to −0.13), −0.108 (95% CI −0.176 to −0.049) and $p = .011$.

4. Discussion

This study examined whether post-traumatic stress symptoms are associated with academic performance among Türkiye-born and early-arriving Syrian-background students, and whether the quality of motivation statistically accompanies part of that association. The findings bear on how emotional load may be related to the cognitive work that school performance records; because general cognitive ability was not measured, they concern recorded performance and its correlates, not intelligence itself.

The first finding is that symptoms were common in this group. Within this non-probability sample, just over 38% scored at or above the CRIES-13 screening cut-off. This is the proportion of recruited students with elevated symptoms on a screening instrument, not the prevalence of post-traumatic stress disorder among Syrian-background students in Türkiye: recruitment through community associations and practitioner networks may preferentially reach families already engaged with psychosocial resources, the CRIES-13 misclassifies roughly one child in five against diagnostic interview (Perrin et al., 2005), and no qualifying event was established for each child. No statistically significant difference was detected between students born in Türkiye and those who arrived before school entry, which is compatible with the transmission literature (Bryant et al., 2018; Yehuda & Lehrner, 2018) but does not test it, because parental mental health was not assessed; it would be equally compatible with an adversity-based account, since students reported a mean of more than three adversities, including food insecurity, involuntary residential mobility and, for 44%, direct exposure to the 2023 earthquakes. The most defensible reading is that these students experience an adversity profile that is chronic, structural and dispersed across everyday life, and that symptoms were not uncommon within it. The observed proportion sits toward the upper part of the range reported for refugee children who did experience displacement directly (Blackmore et al., 2020; Fazel et al., 2012; Kien et al., 2019), but those studies differ in populations, instruments, cut-offs and sampling, so this is an informal comparison, and the expectation of elevation relative to general child populations (H1) is supported only descriptively.

The second finding is that symptom severity was associated with lower recorded academic performance, by roughly three and a half grade points per standard deviation of symptom severity. The association remained after adjustment for depressive and anxiety symptoms, which correlated 0.54 with post-traumatic stress. Because the two scales share symptom content and likely causes, this shows only that the symptom score retained an association conditional on the particular internalising measure included, and not that the association is specific to post-traumatic stress or that the construct is empirically separable from general emotional distress. It also remained after adjustment for recorded absence, but absence was taken from first-term records and may partly follow symptom onset, so it may itself lie on the pathway. Statistical adjustment for a noisy measure cannot rule out behavioural explanations. The grade average covers the whole semester and therefore includes performance before first contact, which further limits temporal interpretation. The size of the association is modest, and whether differences of this kind persist or accumulate over schooling cannot be judged from one semester of grades. It is consistent in direction and broadly in magnitude with the literature on trauma and school outcomes (Perfect et al., 2016) and with studies of refugee-background attainment (Suárez-Orozco et al., 2010). From the standpoint of attentional control theory, it is also the pattern expected when threat-related processing competes with task-directed attention: capacity need not be diminished for its expression in performance to be (Eysenck et al., 2007).

The third finding concerns motivational quality. Autonomous motivation and amotivation showed indirect associations that together represented 42.7% of the modelled total association, each route contributing significantly and neither dominating. This is the pattern self-determination theory anticipates where basic psychological needs are unmet (Ryan & Deci, 2000), and it agrees with evidence that the quality rather than the quantity of motivation predicts achievement (Howard et al., 2021; Taylor et al., 2014). The ordering is, however, assumed. Symptoms and motivation were measured at the same contact, so a model in which low motivation contributes to distress, or in which both arise from an unmeasured factor, is equally compatible with the data, and the percentage depends on the assumed ordering, linearity, the covariate set and the absence of confounding of the mediator–outcome relation; it should not be read as the share of a real-world effect that motivation explains, nor as evidence that changing motivation would change grades. Controlled motivation, specified in advance as a covariate, was unrelated to performance, which reinforces the case against treating motivation as a unitary quantity: had the subscales been aggregated into a single index, the opposing associations of the autonomous and amotivational components would have partly cancelled and the indirect association would have been underestimated. Read through self-regulated learning theory, amotivation may mark not merely low motivation but a failure of motivational regulation, the loss of any regulatory basis for engaging with school at all (Wolters, 2003); our measure captures the quality of motivation, not the regulatory process itself.

The exploratory moderation finding qualifies the motivational picture in the direction hypothesised. The association of autonomous motivation with academic performance was weaker among students with the weakest academic Turkish, and the conditional indirect association grew from −0.041 at low proficiency to −0.099 at high proficiency, with the confidence interval at the lower end approaching zero. One plausible interpretation is that academic language proficiency operates as a conversion constraint: motivation must be enacted through reading, writing and examination in Turkish, and where that capacity is insufficient, regulated effort may not be expressible in the currency the assessment system recognises. This reading is consistent with the distinction between conversational fluency and academic language proficiency and with the longer developmental horizon of the latter in minority-language learners (Aydin & Kaya, 2017; Cummins, 2000), but it is an interpretation and not a demonstrated mechanism. Proficiency may equally index school

quality, socioeconomic position, parental education, prior achievement, broader adaptation or general cognitive ability, which was not measured and could contribute both to proficiency and to grades, a plausible source of residual confounding in the motivation–performance association (Deary et al., 2007). The interaction is of modest size ($\beta = 0.10$), continuous, and identifies no threshold, and it requires replication before weight is placed on it. It should not be interpreted as evidence of a causal mechanism or of a specific intervention threshold. Because four mediator–moderator combinations were tested and no correction for multiplicity was applied, its nominal p-value should be treated with caution, and a chance finding cannot be excluded.

Perceived discrimination did not moderate the motivational pathway but was directly associated with lower autonomous motivation and higher amotivation. This is compatible with discrimination sitting upstream, among the ambient conditions that shape the sense of belonging and volition on which self-determined engagement depends, rather than governing whether motivation converts into attainment; the parallel associations of school belonging with both motivational composites support the same interpretation. The persistence of a direct coefficient of −0.15 indicates that motivational quality accounts for only part of the modelled association. Cognitive processes (Scott et al., 2015), sleep disruption, teacher expectancy and intermittent attendance not fully captured by recorded absence are all plausible contributors to the remainder, and the absence of a measure of general cognitive ability means that the cognitive share cannot be estimated here. Recorded academic performance is a joint product of ability, emotional state, motivation and linguistic resources, so differences in grades between students with and without elevated symptoms should not be read as differences in intelligence or capacity.

5. Educational Implications

Three implications follow, each conditional on the associational nature of the findings and offered as hypotheses and priorities for future research, not as demonstrated intervention effects. The first concerns identification. Provision targeted on the basis of displacement history will not reach this group; eligibility criteria for refugee mental health services typically key on flight experience, recency of arrival, or camp residence, none of which apply to a child born in Gaziantep to Syrian parents, yet more than a third of the recruited students scored at or above the screening cut-off. Schools reach, essentially, the whole cohort, and the brevity of the screening instrument suggests that school-based case-finding may be feasible, provided that it is coupled in advance to an agreed referral pathway; in the present study, 157 students scored at or above the screening cut-off, a caseload that would overwhelm an unprepared service.

The second concerns what classrooms might offer. Specialist trauma-focused treatment remains the indicated intervention for children meeting diagnostic criteria, but capacity in refugee-hosting settings falls far short of need. The motivational associations examined here suggest processes that ordinary teaching could plausibly reach, a hypothesis for future trials and not a finding: autonomy-supportive teaching, competence-building structure and relational warmth are trainable and have been linked to change in student motivation (Reeve & Cheon, 2021; Vansteenkiste et al., 2020), and school-based social–emotional programmes for refugee and war-affected youth have shown benefits in earlier research (Sullivan & Simonson, 2016). Whether changing motivation would change grades among symptomatic students was not tested here, and these associations do not establish that it would. The two-mediator structure also suggests that programmes could usefully distinguish amotivation from low intrinsic engagement, since a student who no longer sees any reason to engage plausibly requires a different response from one whose engagement is merely externally driven.

The third concerns sequencing and is offered as a hypothesis. Motivational and academic language support may be complements rather than substitutes: raising motivation among students who cannot yet meet the linguistic demands of assessment may generate effort that produces no visible return, a configuration that could erode perceived competence over time. If the exploratory moderation result is replicated in longitudinal or experimental work, it would be worth testing whether students with weaker academic Turkish benefit from language support alongside motivational programmes. The present data identify no threshold and cannot say which kind of support should come first.

6. Limitations

Several limitations qualify these findings. Post-traumatic stress and motivation were assessed at a single contact, and the grade average covers the whole semester, including performance before that contact, so the ordering among the constructs is assumed, reverse or reciprocal pathways are plausible, and the indirect coefficients are statistical decompositions. No measure of general cognitive ability was included, so associations of motivation and language proficiency with performance may be partly confounded with ability, and the direct path cannot be attributed to cognitive impairment; baseline achievement, parental mental health, school quality and household income were also unmeasured. The sample was not probability-based, so socially isolated families are likely under-represented and families engaged with psychosocial networks may be over-represented, and the 38.6% figure applies only within this sample. The CRIES-13 is a screening instrument, was applied without establishing a qualifying event for each child, and was anchored to self-nominated experiences, so the figure denotes elevated symptoms and not diagnosed disorder; family or conflict-related index experiences (118 students) did not necessarily involve the child's own exposure and 50 students named no experience, although the estimates were stable when these students were excluded; the child's own exposure to war-related violence was not separately assessed, and the adversity checklist is unvalidated and weights heterogeneous items equally. Grades were verbally reported for 58% of the sample, although results held in the document-verified subsample, and are not standardised across schools, teachers or provinces; school-level dependence was examined only in an added sensitivity analysis, and clustering by 22 recruitment nodes may not reflect the main structure of dependence. The cloze test was constructed for this study, and its raw scores do not have an identical meaning across grades 5 to 12. The Turkish validations of the motivation instrument were conducted in tertiary-education samples, and in those of the discrimination measure in adults; the motivation composites were not tested in a higher-order model; full scalar invariance across the languages of administration was not attained, with Arabic forms adapted for this study. Several covariates may be consequences of symptoms, so adjustment may have removed part of the association of interest, and single-session self-reports share method variance that Harman's test and a latent method factor cannot rule out. The moderation analysis was exploratory, involved four mediator–moderator tests whose p-values are nominal and unadjusted for multiplicity so that chance findings are possible, and the E-value is a heuristic on an approximate risk-ratio scale. Finally, students with intellectual disability or special-education placement were excluded, which limits generalisability.

7. Conclusions

Among the Türkiye-born and early-arriving Syrian-background students recruited for this study, post-traumatic stress symptoms were common on a screening measure and were inversely associated with academic performance. Under an assumed ordering in which symptoms precede motivation, indirect associations through autonomous

motivation and amotivation represented a sizeable share of the modelled association, and the indirect association through autonomous motivation was weaker among students with the lowest academic Turkish proficiency. These findings are associational, rest on non-probability sampling and on symptoms and motivation measured at the same contact point, and do not identify mechanisms, thresholds or intervention targets; they warrant longitudinal and intervention research designed to establish temporal order before any intervention is built upon them.

Supplementary Materials: The following supporting information can be downloaded at: https://www.mdpi.com/article/10.3390/jintelligence14110285/s1. Supplementary File S1: Adversity and trauma exposure checklist (Table S1); Supplementary File S2: Confirmatory factor analysis (Tables S2 and S3); Supplementary File S3: Measurement invariance (Table S4); Supplementary File S4: Unstandardised path estimates and full covariate set (Tables S5 and S6); Supplementary File S5: Sensitivity analyses (Tables S7 and S8); Supplementary File S6: Cloze test construction and item statistics (Table S9).

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Data Availability Statement: The data are not publicly available because they concern minors from a legally vulnerable population and the consent obtained did not extend to open deposition. De-identified data, analysis code and the cloze passages are available from the corresponding author on reasonable request, subject to a data use agreement. The adversity checklist and endorsement frequencies, factor loadings, measurement invariance output, unstandardised estimates, covariate coefficients, sensitivity analyses and cloze item statistics are provided in the Supplementary Materials (Supplementary Files S1–S6).

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Abbreviations

CFI, comparative fit index; CI, confidence interval; CRIES-13, Children's Revised Impact of Event Scale, 13-item version; RMSEA, root mean square error of approximation; SD, standard

deviation; SE, standard error; SRMR, standardised root mean square residual; STROBE, Strengthening the Reporting of Observational Studies in Epidemiology; TLI, Tucker–Lewis index.

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