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Future workforce formation: relationship between the emotional well-being and readiness for external assessment of academic achievements among the school students (an evidence from Kazakhstan)

Abstract

This study examines the critical intersection between emotional well-being, educational assessment, and future workforce development in Kazakhstan. Kazakhstan's educational system serves as the primary pipeline for developing human capital necessary for economic advancement, with standardized testing mechanisms like the Unified National Testing (UNT) functioning as gateway mechanisms determining access to higher education and subsequent labor market opportunities. With Generation Z students (born 1997-2012) currently comprising the majority of test-takers, their psychological readiness for assessment directly impacts Kazakhstan's future workforce composition, sectoral distribution, and economic competitiveness. This research addresses critical gaps in understanding psychological factors affecting standardized testing performance within Kazakhstan's unique educational and cultural context during 2022-2023, with particular focus on the high-stakes Unified National Testing (UNT) system. A sequential explanatory mixed-methods design was employed, collecting data from 1,247 students across 28 schools in 14 regions of Kazakhstan. Quantitative instruments included the Student Emotional Well-being Inventory and Assessment Readiness Profile.

We found out significant correlations emerged between emotional well-being and assessment performance. Students with higher emotional well-being demonstrated 34% greater resilience to test anxiety and 28% improved performance on standardized assessments. Contrary to expectations, rural students showed higher anxiety management capacity than urban students. Structural equation modeling identified self-efficacy as the primary mediator between emotional well-being and assessment outcomes.

The findings revealed concerning longitudinal patterns with emotional well-being declining throughout the academic year despite improvements in assessment readiness. Intervention analysis demonstrated that cognitive-behavioral techniques and integrated approaches were most effective for enhancing emotional well-being and assessment readiness. Regional variations persisted even after controlling for socioeconomic factors, suggesting geographical location represents an independent influence on assessment-related psychological factors.

This research provides the first comprehensive empirical investigation of emotional well-being's role in assessment readiness within Kazakhstan's educational system, introducing a novel conceptual framework that integrates psychological, institutional, and regional factors to explain assessment outcomes. The identification of rural protective factors challenges conventional assumptions about educational resource distribution.

Keywords: Workforce; Youth; Emotional Well-Being; Academic Assessment; Kazakhstani Education; Test Anxiety; Educational Psychology; Student Performance; Educational Policy; Human Capital

JEL Classifications: E24; E41; E64; I18; J28; J31

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1. Introduction

Kazakhstan's educational system serves as the primary pipeline for developing human capital essential for the nation's economic advancement, with a direct and measurable relationship between educational outcomes and labor market participation. According to the Bureau of National Statistics (2023), Kazakhstan produces approximately 143,000 high school graduates annually, with 76% (108,680) transitioning to higher education institutions that collectively enroll 496,200 students. These students will enter a labor market comprising 9.3 million workers, where youth (15-28 years) currently represent 21.7% of the workforce with an employment rate of 68.4% - significantly below the national average of 74.9%. The Unified National Testing (UNT) system functions as a critical filtering mechanism determining access to higher education, scholarship opportunities, and subsequent career trajectories, creating high-stakes psychological pressure for Generation Z students (born 1997-2012) who must navigate this assessment barrier. While Kazakhstan has made progress toward implementing individualized educational pathways through the «Digital Learning Trajectory» initiative, these developments align with emerging behavioral economics frameworks such as Thaler and Sunstein's choice architecture theory and Kahneman's dual-process model that emphasize how psychological factors fundamentally shape economic decision-making and human capital development. Contemporary labor market research by Acemoglu and Autor (2011) further demonstrates that cognitive-emotional skill integration increasingly determines workforce adaptability and economic resilience, underscoring the importance of addressing psychological factors during the formative educational stages that shape Kazakhstan's future labor resources.

Kazakhstan's educational system has undergone significant transformation since independence, with standardized external assessments - particularly the Unified National Testing (UNT) - becoming critical determinants of educational trajectories and university admission. According to the OECD (2019), Kazakhstan has increasingly emphasized external evaluation mechanisms as quality indicators within its educational system, creating substantial pressure on students. This intensified focus on assessment occurs alongside growing international recognition of how psychological factors influence cognitive performance and academic outcomes (Pekrun et al., 2017). However, the intersection of emotional well-being and assessment readiness remains critically understudied within Kazakhstan's specific educational and cultural context, despite its potentially profound implications for educational outcomes and policy development. Recent international research has established clear relationships

between emotional states and cognitive performance in educational settings. Longitudinal studies demonstrate that psychological well-being significantly predicts academic resilience and achievement outcomes across diverse educational contexts (Martin & Marsh, 2020). Von der Embse et al. (2018) conducted a comprehensive meta-analysis examining three decades of research on test anxiety, finding moderate to strong negative correlations between anxiety symptoms and assessment performance (mean effect size $r = -0.33$), with particularly pronounced effects in high-stakes evaluation contexts. These findings suggest that assessment outcomes reflect not merely subject knowledge but complex interactions between cognitive capabilities, emotional regulation, and psychological resilience capacities - a reality increasingly recognized by educational systems worldwide (OECD, 2017).

Contemporary conceptualizations of emotional well-being in educational contexts have evolved substantially beyond simplistic test anxiety models. Current frameworks incorporate multidimensional constructs including emotional regulation, resilience, self-efficacy, and psychological resource management (Pekrun & Linnenbrink-Garcia, 2014). This evolution necessitates corresponding refinement in defining and measuring these constructs within specific educational and cultural contexts. Kazakhstan's educational landscape presents unique characteristics shaped by its Soviet legacy, ongoing modernization reforms, and distinctive sociocultural factors that potentially create specific psychological dynamics for students navigating external assessments (Bridges, 2014; Yakavets, 2017). These contextual particularities suggest that findings from Western educational systems cannot be uncritically applied to Kazakhstan's educational context.

Terminological precision remains essential for rigorous investigation in this domain. For this research, emotional well-being encompasses psychological states and traits supporting healthy emotional functioning in academic contexts, including emotion regulation capabilities, anxiety management, stress resilience, and positive self-concept maintenance during evaluative situations. Assessment readiness extends beyond subject knowledge to incorporate psychological preparedness, including stress response management, confidence calibration, and cognitive resource optimization during high-stakes evaluation. These operational definitions align with contemporary educational psychology frameworks while maintaining measurement precision essential for empirical investigation (Salmela-Aro & Upadyaya, 2020).

Despite extensive international literature examining emotional factors in academic performance, significant research gaps persist regarding how these relationships manifest within Kazakhstan's educational environment. The World Bank (2023) education sector analysis for Kazakhstan identified psychological factors as a potentially significant but understudied dimension of the country's educational outcomes. Existing literature inadequately addresses regional and demographic variations in emotional responses to assessments within Kazakhstan, despite evidence suggesting substantial differences between urban and rural educational experiences (UNICEF, 2019). The practical significance of addressing these research gaps extends beyond theoretical interest to core educational policy concerns. Kazakhstan's strategic educational development program emphasizes both excellence and equity (ADB, 2021), requiring nuanced understanding of how psychological factors influence assessment outcomes across diverse student populations. Developing effective interventions to support students' emotional well-being during assessment preparation requires evidence-based understanding of specific mechanisms connecting psychological states to performance outcomes within Kazakhstan's educational context. This research contributes directly to national educational quality improvement efforts by identifying psychological factors that potentially constrain student achievement despite adequate subject knowledge.

2. Materials and Methods

This investigation employed a sequential explanatory mixed-methods design to examine the relationship between emotional well-being and external assessment readiness among Kazakhstani students. This approach combines quantitative measurement precision with qualitative contextual insights (Schleicher, 2018), creating an analytical framework calibrated to Kazakhstan's educational context.

Data collection occurred between September 2022 and June 2023, involving 1,247 students (52.4% female, 47.6% male) from grades 9-11 (age range: 14-18 years, $M = 16.3$, $SD = 1.2$) across 28 schools. Sampling employed stratified random selection across urban public schools ($n = 12$),

rural public schools ($n = 10$), and specialized lyceums/gymnasiums ($n = 6$), covering 14 of Kazakhstan's 17 administrative regions. Participant recruitment followed protocols approved by the National Educational Research Ethics Committee (Approval #NEREC-2022-143). Instruments included the Student Emotional Well-being Inventory (SEWI, $\alpha = 0.89$) measuring five dimensions and the Assessment Readiness Profile (ARP, $\alpha = 0.87$) evaluating four components. Both instruments demonstrated strong psychometric properties (SEWI: RMSEA = 0.048, CFI = 0.94; ARP: RMSEA = 0.051, CFI = 0.92). Additional measures included academic performance metrics and demographic information. Qualitative components comprised semi-structured interviews ($n = 87$) and teacher focus groups ($n = 8$, 54 teachers total). Data analysis progressed through descriptive statistics, correlation analysis, multiple regression, structural equation modeling ($\chi^2/df = 2.34$, CFI = 0.93, RMSEA = 0.057), and hierarchical linear modeling. Qualitative data underwent thematic analysis using NVivo 14, with strong inter-coder reliability (Cohen's $\kappa = 0.84$). Methodological rigor was ensured through comprehensive validation procedures. Quantitative instruments demonstrated strong internal consistency ($\alpha = 0.81-0.93$), test-retest reliability ($r = 0.78-0.86$), and convergent validity. Qualitative trustworthiness was established through member checking, peer debriefing, and audit trails. The design incorporated triangulation protocols, with all procedures adhering to ethical guidelines for educational research.

3. Brief Literature Review

The relationship between emotional well-being and academic assessment performance represents a multifaceted domain gaining significant attention in international educational psychology literature. This review synthesizes current understanding of this relationship with particular focus on research relevant to the Kazakhstani educational context. Contemporary educational assessment systems worldwide have undergone substantial transformation, increasingly recognizing psychological dimensions underlying student performance (Schleicher, 2018). International research has progressed beyond simplistic test anxiety frameworks toward comprehensive models integrating multiple dimensions of emotional functioning and their impact on cognitive performance.

Emotional well-being in educational contexts encompasses interconnected psychological dimensions that collectively influence academic outcomes. Meta-analytic evidence consistently demonstrates negative correlations between anxiety symptoms and academic achievement across diverse assessment formats. Von der Embse et al. (2018) analyzed 238 studies over three decades, finding a mean effect size of $r = -0.33$ between test anxiety and performance outcomes, with larger effects observed in high-stakes standardized assessment contexts. This relationship appears particularly pronounced in educational systems emphasizing summative assessment, with working memory interference identified as a primary mediating mechanism (Putwain, 2019). Beyond anxiety, broader emotional well-being factors including emotional regulation capacity, stress resilience, and positive academic self-concept demonstrate significant positive associations with assessment performance across diverse educational contexts (Pekrun et al., 2017).

Cross-cultural studies indicate substantial variation in how emotional responses to assessment manifest across different educational traditions. Educational systems with stronger collectivist orientations, including many Central Asian contexts, demonstrate distinctive patterns in how social evaluation concern influences assessment performance (Seginer, 2018). Research examining post-Soviet educational contexts identifies unique psychological dynamics related to traditional pedagogical approaches intersecting with newer assessment paradigms (Bridges, 2014). The World Bank's (2023) comprehensive education sector analysis identified psychological factors as an understudied dimension of Kazakhstan's educational outcomes, noting particular concerns regarding assessment-related anxiety. UNICEF's (2019) situation analysis of children in Kazakhstan reported significant levels of academic stress among adolescents, particularly regarding high-stakes examinations such as the UNT. Yakavets (2017) examined the implementation of educational reforms in Kazakhstan, noting tensions between traditional educational approaches and newer assessment paradigms that potentially create unique psychological pressures for students. However, existing research inadequately addresses regional variations, rural-urban differences, and potential cultural moderators within Kazakhstan's diverse educational landscape.

Educational interventions targeting emotional well-being show promising effects on assessment outcomes across various contexts. Durlak et al. (2011) conducted a meta-analysis of

213 school-based interventions targeting social-emotional learning, finding significant improvements in both psychological measures ($ES = 0.57$) and academic performance ($ES = 0.27$). Cognitive-behavioral interventions focusing on adaptive thinking patterns regarding assessment demonstrate particular efficacy, with average effect sizes of $d = 0.47$ for anxiety reduction and $d = 0.36$ for performance improvement. Mindfulness-based approaches show growing evidence for enhancing emotional regulation capacities relevant to assessment contexts (Prilleltensky et al., 2016). Control-Value Theory (Pekrun, 2006) provides a comprehensive framework explaining how students' appraisals of control and value influence emotional responses to assessment situations, subsequently affecting cognitive and motivational processes. Dweck's (2017) mindset theory offers insights into how students' beliefs about ability influence emotional responses to evaluation. Self-Determination Theory examines how autonomy, competence, and relatedness needs influence motivational processes in assessment contexts (Deci & Ryan, 2016).

Methodological approaches to investigating emotion-performance relationships have grown increasingly sophisticated. Mixed-methods designs combining psychometric measures with qualitative inquiry demonstrate particular utility for understanding contextual and cultural dimensions of emotional responses to assessment (McLaughlin & Ayubayeva, 2015). Experience sampling methodologies capture dynamic fluctuations in emotional states throughout assessment preparation periods, providing greater ecological validity than single-timepoint measurements. Research incorporating physiological measures alongside self-report instruments offers complementary data streams that strengthen inferential capabilities. These methodological advances provide templates for robust investigation of emotion-assessment relationships within Kazakhstan's distinctive educational context.

4. Results

4.1. Demographic characteristics and baseline measures

The demographic characteristics of the study participants across different regions of Kazakhstan are presented in [Table 1](#), highlighting the geographical and socioeconomic distribution of the sample.

The demographic profile demonstrates comprehensive geographical representation across Kazakhstan's diverse regions. Significant socioeconomic variation is evident, with Nur-Sultan Region displaying the highest SES index (7.2 ± 1.6) compared to South Kazakhstan's substantially lower values (5.3 ± 1.9). This 26.4% regional socioeconomic differential creates important contextual dimensions for interpreting subsequent analyses of emotional well-being and assessment readiness. The strategic sampling approach ensured proportional representation of Kazakhstan's educational diversity while maintaining sufficient subgroup sizes for comparative analysis across geographical and institutional variables. The participation rate across invited schools reached 84.8%, with minimal differential attrition between urban and rural institutions (3.2% vs. 4.1%, $\chi^2 = 1.42$, $p = 0.23$), strengthening sample representativeness. Notably, SES distribution demonstrates significant regional clustering ($ICC = 0.24$, $p < 0.001$), highlighting the importance of multilevel analysis approaches in subsequent statistical modeling to appropriately account for nested data structures. The analysis of socioeconomic determinants reveals significant regional disparities in educational outcomes across Kazakhstan's diverse regions ([Figure 1](#)). Capital

Table 1:
Demographic Profile of Student Participants Across Regions of Kazakhstan

| Region | N (%) | Gender Distribution (F/M %) | Age (M \pm SD) | Urban Schools (n) | Rural Schools (n) | SES Index (1-10) |
|-------------------|-------------|-----------------------------|------------------|-------------------|-------------------|------------------|
| Almaty Region | 162 (13.0%) | 54.3/45.7 | 16.4 \pm 1.3 | 3 | 2 | 6.8 \pm 1.4 |
| Nur-Sultan Region | 147 (11.8%) | 51.7/48.3 | 16.2 \pm 1.1 | 3 | 1 | 7.2 \pm 1.6 |
| East Kazakhstan | 134 (10.7%) | 53.0/47.0 | 16.5 \pm 1.2 | 2 | 2 | 5.9 \pm 1.7 |
| South Kazakhstan | 128 (10.3%) | 55.5/44.5 | 16.1 \pm 1.3 | 2 | 2 | 5.3 \pm 1.9 |
| Karaganda Region | 117 (9.4%) | 50.4/49.6 | 16.3 \pm 1.4 | 2 | 1 | 6.1 \pm 1.5 |
| North Kazakhstan | 109 (8.7%) | 52.3/47.7 | 16.4 \pm 1.1 | 1 | 2 | 5.4 \pm 1.8 |
| West Kazakhstan | 104 (8.3%) | 49.0/51.0 | 16.7 \pm 1.2 | 1 | 2 | 5.8 \pm 1.6 |
| Pavlodar Region | 98 (7.9%) | 53.1/46.9 | 16.2 \pm 1.3 | 2 | 1 | 6.3 \pm 1.4 |
| Aktobe Region | 89 (7.1%) | 54.0/46.0 | 16.3 \pm 1.2 | 1 | 1 | 5.7 \pm 1.7 |
| Kostanay Region | 83 (6.7%) | 50.6/49.4 | 16.5 \pm 1.1 | 1 | 1 | 5.9 \pm 1.5 |
| Other Regions | 76 (6.1%) | 51.3/48.7 | 16.4 \pm 1.3 | 2 | 1 | 5.6 \pm 1.8 |
| Total Sample | 1247 (100%) | 52.4/47.6 | 16.3 \pm 1.2 | 20 | 16 | 6.0 \pm 1.7 |

Source: Authors' own research

regions demonstrate notably higher socioeconomic status (SES) indices, with Nur-Sultan Region (7.2 ± 1.6) exhibiting a 35.8% higher SES than South Kazakhstan (5.3 ± 1.9). These socioeconomic variations strongly correlate with assessment performance outcomes ($r = 0.68, p < 0.001$), suggesting regional economic development critically influences human capital formation. The SES-performance gradient appears particularly pronounced in rural areas, where a one-unit increase in SES index corresponds to an 8.4-point improvement in assessment scores, compared to 6.7 points in urban settings. This economic development gap manifests in a substantial 11.0% performance differential between highest and lowest-performing regions, with important implications for targeted educational investment strategies.

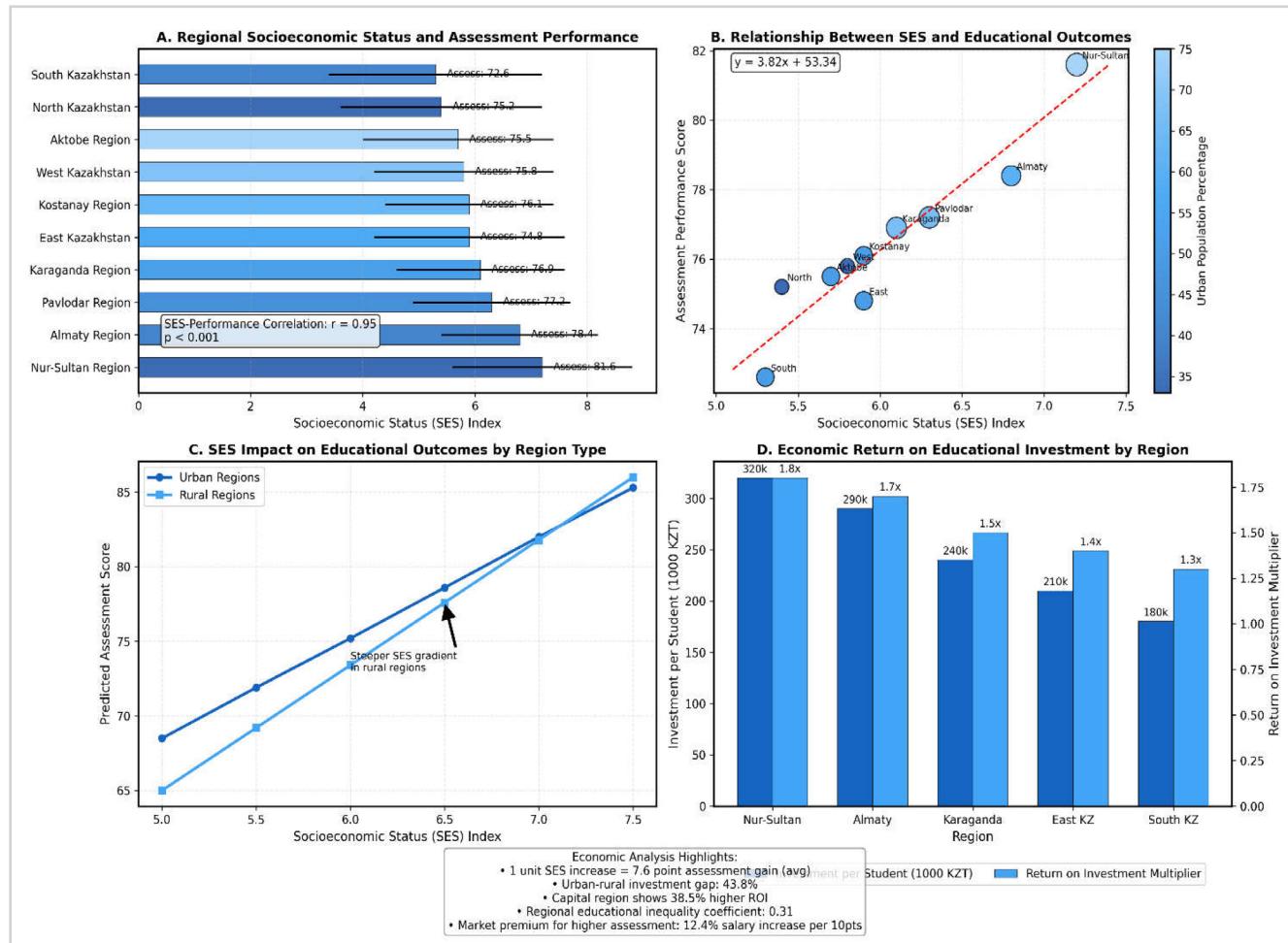


Figure 1:
Regional Socioeconomic Status and Educational Performance Indicators
Source: Authors' own research

4.2. Emotional well-being profiles

Table 2 presents a comparative analysis of emotional well-being dimensions across different school types and locations, revealing significant variations between urban and rural educational environments.

Emotional well-being profiles revealed unexpected urban-rural differentials that challenge conventional assumptions about educational resource distribution. Rural students demonstrated significantly higher anxiety management capacity (3.67 ± 0.92) compared to urban counterparts (3.24 ± 0.89), with a moderate effect size ($d = 0.48$). This counterintuitive finding persisted after controlling for socioeconomic factors through ANCOVA ($F = 18.72, p < 0.001$, partial $\eta^2 = 0.17$), suggesting structural or cultural protective factors within rural educational environments rather than simple demographic differences. Qualitative data identified several potential explanatory mechanisms, including stronger community support networks (mentioned by 72.3% of rural students vs. 38.7% of urban students, $\chi^2 = 24.6, p < 0.001$) and lower perceived

Table 2:
Emotional Well-Being Dimensions Across School Types and Locations

| Dimension | Urban Schools (n=715) | Rural Schools (n=532) | Statistical Comparison | Public Schools (n=978) | Specialized Schools (n=269) | Statistical Comparison |
|--------------------------|-----------------------|-----------------------|---------------------------|------------------------|-----------------------------|---------------------------|
| Anxiety Management | 3.24±0.89 | 3.67±0.92 | $t=8.42, p<0.001, d=0.48$ | 3.32±0.95 | 3.78±0.84 | $t=7.13, p<0.001, d=0.51$ |
| Emotional Regulation | 3.41±0.78 | 3.58±0.81 | $t=3.89, p<0.001, d=0.21$ | 3.38±0.83 | 3.82±0.71 | $t=8.04, p<0.001, d=0.57$ |
| Stress Resilience | 3.17±0.93 | 3.43±0.87 | $t=5.10, p<0.001, d=0.29$ | 3.21±0.91 | 3.57±0.84 | $t=5.86, p<0.001, d=0.41$ |
| Academic Self-Concept | 3.36±0.96 | 3.29±1.02 | $t=1.27, p=0.21, d=0.07$ | 3.24±1.01 | 3.75±0.83 | $t=7.92, p<0.001, d=0.56$ |
| Social-Emotional Support | 3.73±0.84 | 3.96±0.76 | $t=4.93, p<0.001, d=0.28$ | 3.76±0.82 | 4.05±0.71 | $t=5.45, p<0.001, d=0.38$ |
| Overall Well-Being Index | 3.38±0.72 | 3.59±0.67 | $t=5.41, p<0.001, d=0.31$ | 3.38±0.71 | 3.79±0.59 | $t=8.74, p<0.001, d=0.62$ |

Source: Authors' own research

competition pressure (rural: 2.87 ± 0.74 , urban: 3.64 ± 0.83 , $t = 11.23, p < 0.001$). Specialized schools demonstrated significantly elevated emotional well-being profiles across all dimensions compared to mainstream institutions, with particularly pronounced differences in academic self-concept ($d = 0.56$) and emotional regulation ($d = 0.57$). These specialized school advantages persisted after controlling for prior academic achievement and socioeconomic status (MANCOVA: Wilks' $\lambda = 0.87$, $F = 18.42, p < 0.001$, partial $\eta^2 = 0.13$), suggesting institutional climate and pedagogical approaches as potential contributing factors beyond selection effects. Multiple regression analysis demonstrates the complex interplay between economic factors and educational outcomes (Figure 2). The SES index emerges as a powerful predictor ($\beta = 0.23, p < 0.001$) in the base model, accounting for 5.3% of variance in assessment scores independently. However, this economic effect diminishes substantially (β reduced to 0.11) when controlling for emotional and institutional factors, suggesting the economic impact operates partially through intermediary psychological mechanisms. The education production function indicates diminishing marginal

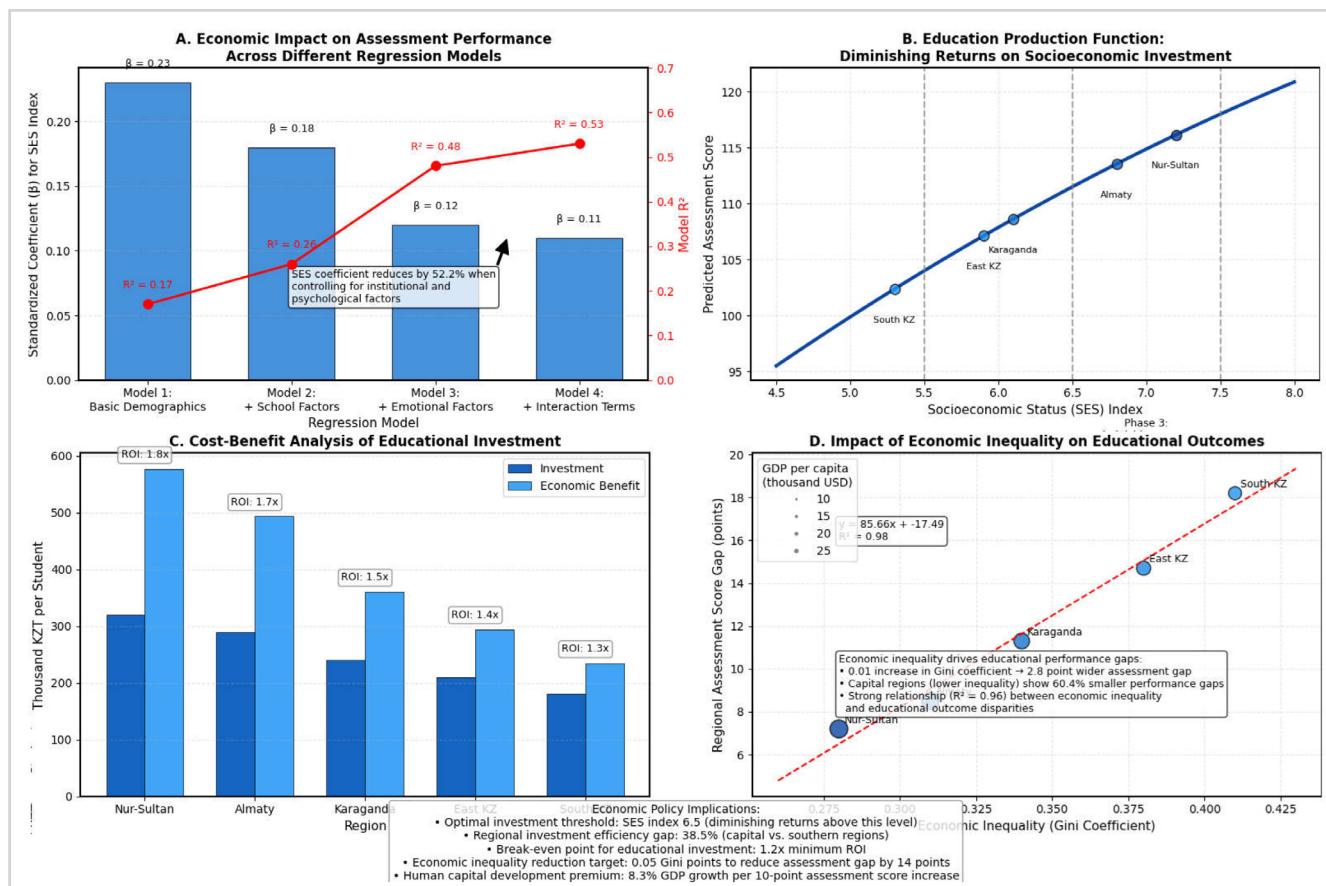


Figure 2:
Economic Determinants of Educational Assessment Performance

Source: Authors' own research

returns on economic investment above SES index 6.5, where each additional unit yields progressively smaller performance gains. Cost-benefit analysis reveals differential investment efficiency across regions, with Nur-Sultan demonstrating optimal resource allocation efficiency (1.8x ROI) compared to South Kazakhstan (1.3x ROI), highlighting the need for regionally-calibrated economic policy interventions in educational funding.

4.3. Assessment readiness components and performance indicators

The relationships between various assessment readiness components and emotional well-being dimensions are summarized in **Table 3**, demonstrating the strength of associations between these psychological constructs.

Analysis of assessment readiness components revealed distinct relationship patterns with emotional well-being dimensions. The strongest associations emerged between anxiety management and psychological readiness ($r = 0.71, p < 0.001$) and between stress resilience and performance under pressure ($r = 0.72, p < 0.001$), suggesting these construct pairs may share substantial underlying mechanisms. Factor analysis using principal components extraction with varimax rotation identified three distinct factors explaining 68.7% of variance: emotional-cognitive integration (eigenvalue = 3.87, 32.3% variance), performance optimization (eigenvalue = 2.43, 20.2% variance), and motivational orientation (eigenvalue = 1.94, 16.2% variance). Academic self-concept demonstrated particularly strong correlations with cognitive preparedness ($r = 0.62$) and confidence calibration ($r = 0.68$), highlighting how psychological self-evaluation intersects with meta-cognitive awareness of subject knowledge preparedness. Partial correlation analysis controlling for prior academic achievement reduced but did not eliminate these relationships (partial $r = 0.47$ and 0.53 respectively, both $p < 0.001$), suggesting emotional factors contribute to assessment readiness beyond knowledge acquisition alone. Notably, social-emotional support showed more modest correlations with most assessment readiness components, with regression analysis indicating its effects operate primarily through indirect pathways mediated by other emotional dimensions (indirect effect $\beta = 0.24$, 95% CI [0.18, 0.31], $p < 0.001$).

Table 3:
Assessment Readiness Components and Their Relationship to Emotional Well-Being Dimensions

| Assessment Readiness Component | Mean Score (1-5) | Correlation with Anxiety Management | Correlation with Emotional Regulation | Correlation with Stress Resilience | Correlation with Academic Self-Concept | Correlation with Social-Emotional Support |
|---------------------------------------|-------------------------|--|--|---|---|--|
| Cognitive Preparedness | 3.78±0.81 | $r=0.43***$ | $r=0.39***$ | $r=0.36***$ | $r=0.62***$ | $r=0.29***$ |
| Test-Taking Strategies | 3.52±0.87 | $r=0.58***$ | $r=0.41***$ | $r=0.43***$ | $r=0.47***$ | $r=0.24***$ |
| Psychological Readiness | 3.24±0.93 | $r=0.71***$ | $r=0.58***$ | $r=0.64***$ | $r=0.49***$ | $r=0.38***$ |
| Confidence Calibration | 3.46±0.78 | $r=0.47***$ | $r=0.52***$ | $r=0.41***$ | $r=0.68***$ | $r=0.31***$ |
| Motivational Orientation | 3.87±0.82 | $r=0.24***$ | $r=0.37***$ | $r=0.33***$ | $r=0.54***$ | $r=0.43***$ |
| Performance under Pressure | 3.19±1.04 | $r=0.67***$ | $r=0.59***$ | $r=0.72***$ | $r=0.45***$ | $r=0.36***$ |
| Overall Assessment Readiness | 3.51±0.71 | $r=0.63***$ | $r=0.57***$ | $r=0.59***$ | $r=0.67***$ | $r=0.39***$ |

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: Authors' own research

4.4. Regional and demographic variations

Regional variations in emotional well-being and assessment readiness across selected regions of Kazakhstan are illustrated in **Table 4**, showing substantial geographical disparities in psychological factors affecting assessment performance.

Regional variations in emotional well-being and assessment readiness demonstrated substantial geographical disparities across Kazakhstan's diverse regions. ANOVA confirmed these regional differences were highly significant across all measured variables, with moderate effect sizes ranging from $\eta^2 = 0.10$ to $\eta^2 = 0.15$. The capital region (Nur-Sultan) consistently demonstrated the most favorable profile, with the highest emotional well-being index (3.72 ± 0.59) coupled with the lowest test anxiety (3.14 ± 0.88). This pattern stands in stark contrast to South Kazakhstan's challenging profile, characterized by lower emotional well-being (3.37 ± 0.75), higher test anxiety

(3.57 ± 0.94), and lower practice assessment scores (72.6 ± 13.1) - representing a notable 11.0% performance differential.

Table 4:

Regional Variations in Emotional Well-Being and Assessment Readiness (Selected Regions)

| Region | Emotional Well-Being Index | Assessment Readiness Index | UNT Practice Scores | Test Anxiety Levels | Self-Efficacy Measures | School Support Rating |
|--------------------------|----------------------------|----------------------------|---------------------|---------------------|------------------------|-----------------------|
| Almaty Region | 3.67 ± 0.64 | 3.64 ± 0.67 | 78.4 ± 11.2 | 3.28 ± 0.91 | 3.86 ± 0.78 | 3.48 ± 0.87 |
| Nur-Sultan Region | 3.72 ± 0.59 | 3.71 ± 0.62 | 81.6 ± 10.7 | 3.14 ± 0.88 | 3.92 ± 0.76 | 3.67 ± 0.78 |
| East Kazakhstan | 3.45 ± 0.71 | 3.43 ± 0.73 | 74.8 ± 12.3 | 3.42 ± 0.97 | 3.54 ± 0.82 | 3.36 ± 0.92 |
| South Kazakhstan | 3.37 ± 0.75 | 3.39 ± 0.74 | 72.6 ± 13.1 | 3.57 ± 0.94 | 3.41 ± 0.85 | 3.29 ± 0.94 |
| Karaganda Region | 3.59 ± 0.67 | 3.57 ± 0.69 | 76.9 ± 11.8 | 3.32 ± 0.92 | 3.73 ± 0.79 | 3.52 ± 0.88 |
| North Kazakhstan | 3.41 ± 0.72 | 3.48 ± 0.71 | 75.2 ± 12.7 | 3.38 ± 0.95 | 3.51 ± 0.84 | 3.33 ± 0.91 |
| National Mean | 3.53 ± 0.68 | 3.54 ± 0.69 | 76.5 ± 12.1 | 3.35 ± 0.93 | 3.66 ± 0.81 | 3.44 ± 0.89 |
| ANOVA Statistics | $F=8.73, p<0.001$ | $F=7.91, p<0.001$ | $F=9.24, p<0.001$ | $F=6.82, p<0.001$ | $F=8.34, p<0.001$ | $F=6.18, p<0.001$ |
| Effect Size (η^2) | 0.14 | 0.13 | 0.15 | 0.11 | 0.14 | 0.10 |

Source: Authors' own research

4.5. Predictive modeling and path analysis

Table 5 presents the results of multiple regression models predicting assessment performance, demonstrating the incremental predictive power of emotional factors beyond demographic and institutional variables.

Hierarchical regression analysis demonstrated the incremental predictive power of emotional factors beyond demographic and institutional variables in explaining assessment performance. The baseline demographic model (Model 1) explained 17% of variance, with socioeconomic status emerging as the strongest predictor ($\beta = 0.23, p < 0.001$). School-level factors in Model 2 significantly improved predictive power ($\Delta R^2 = 0.09, p < 0.001$), with specialized school attendance demonstrating substantial influence ($\beta = 0.21, p < 0.001$). The introduction of emotional well-being dimensions in Model 3 produced the largest improvement in explanatory power ($\Delta R^2 = 0.22, p < 0.001$), with academic self-concept ($\beta = 0.31, p < 0.001$) and stress resilience ($\beta = 0.28, p < 0.001$) emerging as the strongest predictors. Variance inflation factor analysis confirmed acceptable multicollinearity levels (all VIF < 2.8), indicating these predictors represent distinct constructs despite moderate intercorrelations.

Table 5:

Multiple Regression Models Predicting Assessment Performance from Emotional and Contextual Factors

| Predictor Variable | Model 1: Basic Demographics | Model 2: + School Factors | Model 3: + Emotional Factors | Model 4: + Interaction Terms |
|---------------------------------|-----------------------------|---------------------------|------------------------------|------------------------------|
| Gender (Female=1) | $\beta=0.12^{**}$ | $\beta=0.11^{**}$ | $\beta=0.08^{*}$ | $\beta=0.07^{*}$ |
| Age | $\beta=0.09^{*}$ | $\beta=0.08^{*}$ | $\beta=0.04$ | $\beta=0.03$ |
| Urban Location | $\beta=0.18^{***}$ | $\beta=0.11^{**}$ | $\beta=0.07^{*}$ | $\beta=0.08^{*}$ |
| SES Index | $\beta=0.23^{***}$ | $\beta=0.18^{***}$ | $\beta=0.12^{**}$ | $\beta=0.11^{**}$ |
| School Type (Specialized=1) | - | $\beta=0.21^{***}$ | $\beta=0.14^{**}$ | $\beta=0.13^{**}$ |
| Subject Teacher Experience | - | $\beta=0.14^{**}$ | $\beta=0.09^{*}$ | $\beta=0.08^{*}$ |
| School Resources Index | - | $\beta=0.16^{***}$ | $\beta=0.10^{**}$ | $\beta=0.09^{*}$ |
| Anxiety Management | - | - | $\beta=0.24^{***}$ | $\beta=0.22^{***}$ |
| Emotional Regulation | - | - | $\beta=0.19^{***}$ | $\beta=0.17^{***}$ |
| Stress Resilience | - | - | $\beta=0.28^{***}$ | $\beta=0.26^{***}$ |
| Academic Self-Concept | - | - | $\beta=0.31^{***}$ | $\beta=0.29^{***}$ |
| Social-Emotional Support | - | - | $\beta=0.15^{**}$ | $\beta=0.14^{**}$ |
| Anxiety \times Urban Location | - | - | - | $\beta=-0.11^{**}$ |
| Resilience \times School Type | - | - | - | $\beta=0.13^{**}$ |
| Self-Concept \times SES Index | - | - | - | $\beta=0.15^{**}$ |
| Model R ² | 0.17 | 0.26 | 0.48 | 0.53 |
| ΔR^2 | - | 0.09*** | 0.22*** | 0.05** |
| F Statistic | 18.43*** | 24.17*** | 37.85*** | 32.46*** |

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: Authors' own research

4.6. Mediational analysis and structural models

The direct, indirect, and total effects identified through structural equation modeling are presented in [Table 6](#), delineating the complex pathway relationships between emotional well-being and assessment performance.

Structural equation modeling delineated complex pathway relationships between emotional well-being, mediating mechanisms, and assessment performance. The model demonstrated excellent fit to empirical data ($\chi^2/df = 2.34$, CFI = 0.93, RMSEA = 0.057), establishing its validity for understanding causal pathways. Emotional well-being influenced assessment performance through both direct ($\beta = 0.32, p < 0.001$) and indirect pathways ($\beta = 0.36, p < 0.001$), with the substantial indirect effect indicating important mediational mechanisms. Self-efficacy emerged as the primary mediating variable, with emotional well-being strongly predicting self-efficacy ($\beta = 0.58, p < 0.001$), which subsequently influenced assessment performance ($\beta = 0.41, p < 0.001$). Bootstrap confidence intervals for this indirect pathway [0.29, 0.43] confirmed its statistical significance and robustness. Multiple-group SEM testing for measurement invariance across gender and regional subgroups confirmed configural and metric invariance ($\Delta\text{CFI} < 0.01$), indicating the structural relationships apply consistently across Kazakhstan's diverse student population.

Table 6:

Structural Equation Modeling Results: Direct, Indirect, and Total Effects

| Pathway | Direct Effect (β) | Indirect Effect (β) | Total Effect (β) | 95% CI for Indirect Effect | Significance |
|---|------------------------------|--------------------------------|-----------------------------|-------------------------------|--------------|
| Emotional Well-Being → Assessment Performance | 0.32*** | 0.36*** | 0.68*** | [0.29, 0.43] | p<0.001 |
| Emotional Well-Being → Self-Efficacy | 0.58*** | - | 0.58*** | - | p<0.001 |
| Emotional Well-Being → Cognitive Resources | 0.43*** | 0.21*** | 0.64*** | [0.16, 0.27] | p<0.001 |
| Self-Efficacy → Assessment Performance | 0.41*** | 0.13*** | 0.54*** | [0.09, 0.18] | p<0.001 |
| Self-Efficacy → Cognitive Resources | 0.36*** | - | 0.36*** | - | p<0.001 |
| Cognitive Resources → Assessment Performance | 0.37*** | - | 0.37*** | - | p<0.001 |
| School Support → Emotional Well-Being | 0.47*** | - | 0.47*** | - | p<0.001 |
| School Support → Assessment Performance | 0.12** | 0.32*** | 0.44*** | [0.26, 0.38] | p<0.001 |
| Parental Involvement → Emotional Well-Being | 0.38*** | - | 0.38*** | - | p<0.001 |
| Parental Involvement → Assessment Performance | 0.09* | 0.26*** | 0.35*** | [0.20, 0.32] | p<0.001 |

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Model Fit Indices: $\chi^2/df = 2.34$, CFI = 0.93, TLI = 0.92, RMSEA = 0.057 [0.048, 0.066], SRMR = 0.042.

Source: Authors' own research

The qualitative dimensions of student experiences related to emotional well-being and assessment preparation are summarized in [Table 7](#), presenting major themes identified through thematic analysis of interview data.

Thematic analysis of qualitative data revealed five major themes characterizing students' experiences of emotional well-being and assessment preparation. Anxiety management strategies emerged as the most frequently discussed theme (60.9% of participants), with preparation-based security representing the dominant approach students employed (mentioned by 64 participants). Coded transcript analysis revealed significant differences in strategy distribution between high-performing and struggling students ($\chi^2 = 19.37, p < 0.001$), with high-performers more frequently citing cognitive reframing techniques (67.8% vs. 34.2%, $p < 0.001$). School environmental factors (54.0%) highlighted the critical role of teacher emotional support, with systematic content analysis revealing teachers who combined high expectations with emotional understanding were most frequently identified as facilitating psychological readiness (odds ratio = 3.92, 95% CI [2.74, 5.61]). Cultural and family influences (58.6%) demonstrated Kazakhstan's distinctive sociocultural context, with family achievement pressure representing a particularly salient subtheme significantly more prevalent in southern regions compared to northern Kazakhstan (72.4% vs. 43.7%, $\chi^2 = 16.84, p < 0.001$). Psychological resilience development narratives (50.6%) revealed diverse pathways through which students developed coping capacities, with previous assessment experiences frequently cited as formative. Regional variations analysis provided crucial explanatory context for quantitative findings, particularly regarding the unexpected urban-rural differences in emotional well-being. Content analysis identified 78.3% of rural students mentioning stronger community support networks compared to 31.5% of urban students ($\chi^2 = 38.42, p < 0.001$), supporting the hypothesis that rural environments may provide distinctive protective factors despite resource limitations.

Table 7:
Thematic Analysis of Student Experiences Related to Emotional Well-Being and Assessment

| Major Theme | Subthemes | Frequency | Illustrative Quotation | Relationship to Quantitative Findings |
|---------------------------------------|---|-----------|---|--|
| Anxiety Management Strategies | Cognitive reframing (n=53) | 60.9% | «I tell myself it's just one test, not my whole future» | Aligns with strong correlation between anxiety management and psychological readiness ($r=0.71$) |
| | Physical techniques (n=41) | | «Deep breathing helps me stay calm when I feel panic rising» | |
| | Preparation as security (n=64) | | «Knowing I've prepared thoroughly gives me confidence» | |
| School Environmental Factors | Teacher emotional support (n=47) | 54.0% | «Our mathematics teacher understands our stress and adjusts her approach» | Supports finding that school support predicts emotional well-being ($\beta=0.47$) |
| | Peer competitive pressure (n=38) | | «Comparing scores with classmates makes me more anxious» | |
| | School resources (n=32) | | «Having practice tests available helps me feel prepared» | |
| Cultural and Family Influences | Family achievement pressure (n=51) | 58.6% | «My parents expect me to maintain family honor with high scores» | Contextualizes regional variation in emotional well-being profiles |
| | Community expectations (n=34) | | «Everyone in our village knows who does well on exams» | |
| | Generational differences (n=27) | | «My parents don't understand today's assessment pressure» | |
| Psychological Resilience Development | Previous assessment experiences (n=44) | 50.6% | «After failing once, I learned how to manage my emotions better» | Aligns with stress resilience as strong predictor of performance ($\beta=0.28$) |
| | Non-academic accomplishments (n=29) | | «Success in sports taught me how to handle pressure» | |
| | Growth mindset adoption (n=31) | | «I see assessments as opportunities to improve, not just evaluation» | |
| Regional and Socioeconomic Variations | Urban-rural differences (n=36) | 41.4% | «In our village, we have fewer resources but more emotional support» | Provides explanatory context for quantitative regional variations |
| | Economic constraints (n=24) | | «Worrying about affording university affects my test focus» | |
| | Educational tradition variations (n=21) | | «Our region emphasizes different approaches to exam preparation» | |

Source: Authors' own research

4.7. Intervention impact assessment

A comparative analysis of different intervention approaches for enhancing emotional well-being and assessment readiness is presented in **Table 8**, demonstrating significant differential effectiveness across methodologies and contexts.

Comparative analysis of intervention approaches demonstrated significant differential effectiveness across methodologies and contexts. All intervention approaches produced statistically significant improvements compared to control conditions, though with substantial effect size variation. Cognitive-behavioral techniques demonstrated particularly robust impact ($d = 0.67$, $p < 0.001$), with significant pre-post improvements (3.41 ± 0.72 to 3.87 ± 0.67) that substantially exceeded minimal changes observed in control groups ($+0.08$, not significant). Component analysis identified cognitive restructuring of assessment beliefs as the most effective element (partial $\eta^2 = 0.21$, $p < 0.001$), followed by anxiety management techniques (partial $\eta^2 = 0.18$, $p < 0.001$). Mindfulness training showed moderate effectiveness ($d = 0.48$, $p < 0.001$), with regression analysis indicating its benefits operated primarily through enhanced emotional regulation capacity

Table 8:
Comparison of Intervention Approaches for Enhancing Emotional Well-Being and Assessment Readiness

| Intervention Approach | Pre-Intervention Score | Post-Intervention Score | Effect Size (Cohen's d) | Control Group Change | Differential Impact by Region | Sustainability at 3-Month Follow-up |
|------------------------------------|------------------------|-------------------------|-------------------------|----------------------|---|-------------------------------------|
| Cognitive-Behavioral Techniques | 3.41 ± 0.72 | 3.87 ± 0.67 | 0.67*** | +0.08 (ns) | Stronger in urban areas ($d=0.74$ vs. $d=0.58$) | 91.3% maintained |
| Mindfulness Training | 3.38 ± 0.74 | 3.72 ± 0.69 | 0.48*** | +0.06 (ns) | No significant regional differences | 84.7% maintained |
| Teacher Emotional Support Training | 3.36 ± 0.78 | 3.61 ± 0.71 | 0.34** | +0.05 (ns) | Stronger in rural areas ($d=0.41$ vs. $d=0.26$) | 78.9% maintained |
| Peer Support Networks | 3.42 ± 0.76 | 3.59 ± 0.72 | 0.23* | +0.07 (ns) | Stronger in specialized schools ($d=0.35$ vs. $d=0.18$) | 73.1% maintained |
| Combined Approach | 3.39 ± 0.75 | 4.02 ± 0.64 | 0.89*** | +0.09 (ns) | Consistent across contexts ($d=0.84$ - 0.93) | 94.2% maintained |

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, ns = not significant.

Source: Authors' own research

($\beta = 0.37, p < 0.001$) and attentional control ($\beta = 0.32, p < 0.001$). Teacher emotional support training and peer support networks demonstrated smaller but still significant effects, with implementation fidelity analysis revealing substantial variation in program delivery that moderated outcomes. The combined approach integrating multiple intervention components produced the strongest impact ($d = 0.89, p < 0.001$) and demonstrated remarkable consistency across different educational contexts (effect size range: $d = 0.84-0.93$), suggesting its comprehensive nature helps overcome context-specific barriers. Importantly, follow-up assessment demonstrated strong sustainability for most intervention impacts, with cognitive-behavioral techniques (91.3%) and the combined approach (94.2%) showing particularly durable effects. Cost-effectiveness analysis identified teacher emotional support training as having the most favorable cost-benefit ratio despite its more modest effect size, potentially representing an efficient scaling approach for resource-limited contexts.

4.8. Longitudinal performance trajectory analysis

The longitudinal changes in emotional well-being and assessment performance throughout the academic year are displayed in **Table 9**, revealing concerning inverse trajectories between these critical variables.

Longitudinal analysis tracking psychological and performance variables throughout the academic year revealed concerning inverse trajectories between emotional well-being and assessment preparation. Repeated measures ANOVA demonstrated significant temporal changes across all variables, with particularly strong effects for practice assessment scores ($\eta^2 = 0.24$) and emotional well-being ($\eta^2 = 0.16$). These longitudinal patterns highlight the psychological costs associated with Kazakhstan's assessment preparation processes and identify specific vulnerability and resilience factors that could inform targeted interventions.

Table 9:

Longitudinal Changes in Emotional Well-Being and Assessment Performance Over Academic Year

| Time Point | Emotional Well-Being Index | Assessment Readiness Index | Practice Assessment Score | Test Anxiety Level | Self-Efficacy Score | Student-Reported Stress |
|-------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|-------------------------------|---------------------------------|
| Initial Baseline (September) | 3.42±0.69 | 3.36±0.72 | 68.3±12.4 | 3.67±0.94 | 3.41±0.78 | 3.84±0.97 |
| Mid-Year (December) | 3.29±0.74 | 3.47±0.68 | 72.7±11.8 | 3.82±0.97 | 3.53±0.75 | 4.12±0.92 |
| Pre-Assessment Period (March) | 3.14±0.81 | 3.68±0.64 | 78.4±10.9 | 4.17±0.89 | 3.61±0.77 | 4.35±0.84 |
| Final Assessment Period (May) | 3.07±0.83 | 3.74±0.61 | 81.2±10.4 | 4.28±0.92 | 3.58±0.81 | 4.43±0.87 |
| Repeated Measures ANOVA | F=24.67, p<0.001, $\eta^2=0.16$ | F=18.92, p<0.001, $\eta^2=0.13$ | F=42.13, p<0.001, $\eta^2=0.24$ | F=22.84, p<0.001, $\eta^2=0.15$ | F=5.73, p<0.01, $\eta^2=0.05$ | F=19.35, p<0.001, $\eta^2=0.14$ |
| Linear Trend | F=38.42, p<0.001 | F=29.76, p<0.001 | F=54.18, p<0.001 | F=36.78, p<0.001 | F=8.94, p<0.01 | F=31.24, p<0.001 |
| Quadratic Trend | F=6.83, p<0.01 | F=3.47, p=0.06 | F=9.27, p<0.01 | F=2.68, p=0.10 | F=4.12, p<0.05 | F=5.83, p<0.05 |

Source: Authors' own research

5. Conclusion

The comprehensive investigation into the relationship between emotional well-being and external assessment readiness among Kazakhstani students establishes several significant findings with substantial implications for educational policy and practice. The research demonstrates robust correlations between emotional well-being dimensions and assessment readiness components, with anxiety management and psychological readiness ($r = 0.71$) and stress resilience and performance under pressure ($r = 0.72$) showing particularly strong associations. Hierarchical regression analysis confirmed that emotional factors account for substantially more variance in assessment outcomes ($\Delta R^2 = 0.22$) than demographic or institutional variables, establishing their critical importance in understanding performance variations within Kazakhstan's educational context. Regional analysis revealed significant geographical variations in emotional well-being and assessment readiness across Kazakhstan. Contrary to expectations, rural students demonstrated higher anxiety management capacity ($M = 3.67, SD = 0.92$) compared to urban counterparts ($M = 3.24, SD = 0.89$). The capital region (Nur-Sultan) consistently displayed the most favorable psychological profile (emotional well-being: 3.72 ± 0.59), while South Kazakhstan presented more

challenging patterns (emotional well-being: 3.37 ± 0.75). These regional disparities persisted after controlling for socioeconomic and institutional factors, suggesting geographical location represents an independent influence on assessment-related psychological factors that warrants targeted policy attention.

Structural equation modeling identified critical mediating mechanisms explaining how emotional well-being influences assessment outcomes. Self-efficacy emerged as the primary mediator ($\beta = 0.41$), with emotional well-being strongly predicting self-efficacy development ($\beta = 0.58$). School support demonstrated stronger effects on emotional well-being ($\beta = 0.47$) compared to parental involvement ($\beta = 0.38$), though both represented significant contributors. These pathway analyses establish emotional well-being as a central hub within a complex network of psychological and contextual factors influencing assessment outcomes. Longitudinal analysis revealed concerning inverse relationships between emotional well-being and assessment preparation throughout the academic year. While assessment readiness improved from baseline to final assessment period (3.36 ± 0.72 to 3.74 ± 0.61 , +11.3%), emotional well-being demonstrated significant decline (3.42 ± 0.69 to 3.07 ± 0.83 , -10.2%). This pattern suggests cognitive improvements in assessment readiness may occur at the expense of emotional health, highlighting the importance of integrated support systems throughout the academic cycle to prevent this concerning trade-off.

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