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Self-Regulated Learning and Psychological Resilience among University Students in Kazakhstan: A Cross-Sectional Study

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Abstract. Self-regulated learning (SRL) and psychological resilience are important resources for students' academic adaptation, yet their relationship remains insufficiently examined in Central Asian higher education contexts. This study investigated the association between SRL and resilience among undergraduates in Kazakhstan and tested whether these constructs differed by gender, year of study, and parental education. A quantitative cross-sectional survey involved 177 students aged 18–22 years at L. N. Gumilyov Eurasian National University; complete sociodemographic data were available for 173 participants. SRL was assessed using the full 41-item Self-Regulated Learning Perception Scale (SRLPS) (Turan et al., 2009), while psychological resilience was measured using the six-item Brief Resilience Scale (BRS) (Smith et al., 2008). Analyses included reliability testing, descriptive statistics, independent-samples t-tests, one-way ANOVA, Pearson correlation, and hierarchical regression. No meaningful differences in SRL or resilience were found by gender, year of study, or parental education. SRL was moderately and positively associated with resilience ($r = .522, p < .001$). In hierarchical regression, SRL explained additional variance beyond sociodemographic variables ($\Delta R^2 = .23, \beta = .49, p < .001$). The findings

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suggest that SRL and resilience are related but distinct adaptation resources.

Keywords: self-regulated learning; psychological resilience; university students; higher education; Kazakhstan

1. Introduction

University students are expected to manage increasingly complex academic demands: independent study, continuous assessment, digital learning environments, and pressure to maintain performance under uncertainty. In this context, academic success depends not only on cognitive ability or prior preparation, but also on students' capacity to regulate their own learning and recover from setbacks. Two constructs are therefore especially relevant for higher education research: self-regulated learning (SRL) and psychological resilience.

SRL refers to students' active control over their learning through goal setting, planning, monitoring, strategy use, motivation regulation, and reflection (Pintrich & De Groot, 1990; Pintrich & Zusho, 2002; Zimmerman, 1990). Psychological resilience, in contrast, describes the capacity to recover from stress and maintain adaptive functioning after difficulty or failure (Carver, 1998; Smith et al., 2008). Although these constructs come from partly different research traditions, they are conceptually connected. Students who can monitor their progress, adjust strategies, and sustain motivation may be better equipped to interpret academic difficulty as manageable. Conversely, students with stronger resilience may be more likely to persist when self-regulation becomes effortful. These demands make self-regulation and adaptive coping particularly relevant in higher education (De la Fuente et al., 2020; Ge, 2025; Theobald, 2021).

Previous studies have linked SRL-related constructs with academic functioning, self-efficacy, engagement, and well-being (Lüftenegger et al., 2012; Pedditz & Scalas, 2024; Xu et al., 2022; Zhen et al., 2017). Resilience has also been examined in relation to social support, life satisfaction, psychological well-being, and educational adaptation (Ağrık & Kağan, 2017; Thompson et al., 2013; Yıldız & Kahraman, 2021). However, SRL and resilience are still often studied as separate outcomes rather than as empirically related adaptive resources within one analytical model. In addition, existing evidence is uneven across contexts. Recent higher education evidence spans European, North American, Chinese, and Southeast Asian settings; however, the studies vary considerably in their focal outcomes and learning contexts, while comparable direct evidence from Central Asian university populations remains scarce.

This gap is particularly relevant in the context of Kazakhstan, where university students are navigating changing academic expectations, greater responsibility for independent learning, and expanding institutional attention to student well-being. Yet little empirical evidence explains whether SRL and resilience are related among Kazakhstani university students, and whether this relationship remains stable after accounting for basic sociodemographic characteristics. Such evidence is needed before universities can design support practices that treat

learning self-management and psychological adaptation as connected, rather than separate student needs. The present study addresses this gap by examining undergraduate students at L. N. Gumilyov Eurasian National University in Astana, Kazakhstan. The study investigated the relationship between SRL and psychological resilience using observed-score analyses, including correlation and hierarchical regression after accounting for relevant sociodemographic characteristics.

The study was guided by two research questions designed to distinguish group-level sociodemographic variation from the central SRL–resilience association:

RQ1: Do SRL and psychological resilience differ by gender, year of study, and parental education?

RQ2: What is the magnitude and direction of the association between SRL and psychological resilience, and does this association remain evident after accounting for the measured sociodemographic characteristics?

Based on the theoretical link between learning self-management and adaptive recovery under stress, the study hypothesised that SRL would be positively associated with psychological resilience.

The principal contribution of this study is empirical and contextual rather than a claim of theoretical novelty. Previous research has already established meaningful connections between SRL and psychological adaptation; however, direct evidence on the SRL–resilience association remains limited in Central Asian higher education. By examining this relationship among university students in Kazakhstan and testing whether it remains evident after adjustment for basic sociodemographic characteristics, the study extends the geographical and institutional scope of the existing evidence. Its contribution therefore lies in establishing whether patterns reported in other higher education contexts are also observable in an underrepresented Central Asian setting.

2. Literature Review

2.1 Self-Regulated Learning as an Academic Resource in Higher Education

SRL is commonly understood as a goal-directed process through which students plan, monitor, control, and evaluate their learning. In classical SRL models, learners are treated as active agents who regulate cognition, motivation, behaviour, time, and effort rather than simply responding to external academic demands (Pintrich & De Groot, 1990; Pintrich & Zusho, 2002; Zimmerman, 1990). This view is especially relevant in higher education, where students are expected to organise independent learning, sustain motivation, and adjust strategies when academic tasks become difficult.

Empirical work has shown that SRL-related constructs are associated with academic functioning and performance. Wolfe and Johnson (1995), for example, demonstrated that self-regulation contributes to explaining variation in college performance alongside cognitive ability and personality. Demircan (2014) similarly showed that self-regulation strategies and motivational beliefs differentiate students in relation to classroom participation and academic

achievement. From an instructional perspective, Çiltaş (2011) argued that self-regulation should not be viewed as an automatic outcome of schooling; it requires deliberate pedagogical support. Lüftenegger et al. (2012) also linked autonomy and self-regulation with readiness for lifelong learning, suggesting that SRL has value beyond immediate academic achievement.

For the present study, SRL was operationalised using the full Self-Regulated Learning Perception Scale (SRLPS) (Turan et al., 2009). The instrument encompasses four dimensions: motivation and action to learn, planning and goal setting, strategies for learning and assessment, and lack of self-directedness. The principal analyses in this study use the overall SRL score rather than treating selected regulatory dimensions as separate outcome variables.

2.2 Psychological Resilience and Student Adaptation under Stress

Psychological resilience refers to the capacity to recover from stress, adversity, or negative experiences and to maintain adaptive functioning under pressure. Carver (1998) described resilience in relation to recovery and adaptation after stressful experiences, while Smith et al. (2008) operationalised resilience through the BRS as the ability to “bounce back” from difficulty. This definition is particularly useful for student populations because academic life frequently involves failure, uncertainty, workload pressure, and the need to continue functioning after setbacks.

Recent higher education research has linked resilience with psychological well-being, self-esteem, perceived stress, social support, academic self-efficacy, and mental health. For example, Al Omari et al. (2023) identified well-being, self-esteem, stress, and academic indicators as significant correlates of resilience among university students, while Cassaretto et al. (2024) showed that resilience, social support, and academic self-efficacy were associated with lower psychological distress in a large university sample. Recent reviews likewise confirm the importance of resilience as a protective resource in higher education (Ansari & Iqbal, 2025; Celbis et al., 2025).

In the present study, SRL and psychological resilience are treated as conceptually distinct but potentially associated resources. SRL concerns the regulation of learning itself: students plan, monitor, motivate, and adjust their cognition and behaviour while pursuing academic goals. Psychological resilience concerns a different adaptive function: the capacity to recover and maintain functioning following stress, difficulty, or setback. Thus, SRL primarily describes how students manage the learning process, whereas resilience describes how they adapt when that process occurs under challenge or is disrupted by adversity.

This distinction is practically relevant to the present university context: students across different years and programmes must manage coursework, independent learning, deadlines, and academic setbacks, yet effective regulation of learning does not necessarily imply an equally strong capacity to recover from difficulty, or vice versa. SRL and resilience are therefore examined as complementary but non-equivalent resources involved in students’ adaptation to university demands.

2.3 Bridging SRL, Resilience, and Related Motivational-Emotional Mechanisms

The rationale for examining SRL and resilience together is therefore not that they represent the same adaptive process, but that regulation of learning and recovery from difficulty may function as complementary resources under academic demands. Although SRL and resilience have often been studied in separate research traditions, a growing body of work suggests that learning self-management and psychological adaptation are connected. Pedditz and Marcello (2018) showed that students' self-efficacy and school social context are related to school satisfaction, while Pedditz (2024) linked school satisfaction and self-efficacy with dropout intention. More directly, Pedditz and Scalas (2024) found that psychological well-being is associated with self-efficacy for SRL, indicating that students' perceived ability to manage learning demands is connected with broader psychological functioning.

Research in digital and higher education contexts supported the same general pattern. Xu et al. (2022) examined self-efficacy for online SRL among university students and found that students' confidence in managing digital learning is shaped by both individual and contextual factors. Zhen et al. (2017) proposed a model in which basic psychological needs, academic emotions, self-efficacy, and engagement are connected, suggesting that learning involvement and well-being-related outcomes form part of a wider motivational-emotional system. Recent higher education research adds a more practice-oriented layer to this argument. De la Fuente et al. (2020) found that university students' level of self-regulation, together with the regulatory quality of teaching, was associated with the coping strategies students used under academic stress. By linking self-regulation to the coping strategies students use under academic stress, this finding shows that SRL is relevant, not only to learning performance, but also to how students manage demanding academic experiences.

Theobald's (2021) meta-analysis further demonstrated that SRL training programmes in higher education improve academic performance, SRL strategies, and motivation, with particularly relevant effects on metacognitive and resource-management strategies. More directly, Imhof et al. (2024) examined resilience and SRL together in university students and found that SRL strategies were more predictive of competence gain than resilience in an emergency remote teaching context. Longitudinal evidence also suggests that resilience may support academic functioning through self-regulatory behaviour: Li et al. (2024) found that weekly self-regulation mediated the relationship between resilience and academic performance among college students. SRL and resilience are therefore related without being interchangeable: SRL concerns how students regulate the learning process, whereas resilience concerns how they recover and maintain functioning when difficulties occur. Their distinction is therefore conceptual rather than a claim that the constructs are unrelated; the empirical analysis estimates the magnitude of their association, which is reported in the Results section.

Social-emotional learning research also points in this direction. Yıldız and Kahraman (2021) reported relationships among psychological resilience, social-emotional learning skills, and life satisfaction. Toraman et al. (2023) found that resilience, self-efficacy, and social-emotional learning skills are interconnected among adolescents in institutional care. Söner et al. (2024) similarly showed that self-learning mastery is associated with emotional and psychological well-being among gifted students. Recent evidence from university settings further supported examining these constructs jointly while maintaining their conceptual separation. In a large sample of Chinese college students, resilience was positively related to SRL efficacy and regulatory strategies within a model of online learning engagement (Ge, 2025). Similarly, among first-year university students in Malaysia, autonomous self-regulation and resilient coping were strongly associated while remaining separate predictors of psychological well-being (Lo et al., 2025).

Together, these findings suggest that regulatory and resilience-related processes may interact within student adaptation without constituting a single psychological resource. Taken together, this literature suggests meaningful connections between learning regulation and psychological adaptation; however, the evidence remains fragmented. Much of the existing research examines SRL in relation to adjacent constructs such as self-efficacy, coping, engagement, psychological well-being, or social-emotional learning rather than testing its direct association with resilience. Moreover, several studies involve adolescent or highly context-specific samples, which limits their direct applicability to general university populations. Even research examining SRL and resilience within the same study has often focused on other outcomes, such as competence development under emergency remote teaching conditions (Imhof et al., 2024).

Thus, existing evidence is broadly convergent in linking self-regulatory and resilience-related resources; however, it remains heterogeneous in constructs, outcomes, and educational contexts, limiting direct conclusions about the SRL-resilience association in general university populations. Table 1 summarises selected recent higher education studies most directly relevant to the present research question.

Table 1: Selected recent studies relevant to self-regulation, resilience, and student adaptation in higher education

Study	Context / sample	Main focus	Main finding relevant to the present study	Remaining limitation for the present research question
De la Fuente et al. (2020)	University students; N = 944	Self-regulation, regulatory teaching, and coping with academic stress	Higher levels of student self-regulation were associated with more adaptive coping strategies under academic stress.	Examined coping rather than psychological resilience as the focal outcome.
Imhof et al. (2024)	United States and Germany; N = 333 university students	Resilience, SRL strategies, and competence gain during emergency remote teaching	Both resilience and SRL contributed to competence gain, with SRL strategies showing particularly important predictive value.	Focused on competence gain under emergency remote teaching rather than the direct SRL-resilience association.
Ge (2025)	China; N = 2,182 college students	Resilience, self-regulated learning efficacy, regulation strategies, and online emotional engagement	Resilience was positively associated with SRL-related efficacy and regulatory processes, which mediated its relationship with online learning engagement.	Focused on online learning and mediation mechanisms rather than the direct association between overall SRL and resilience.
Lo et al. (2025)	Malaysia; N = 404 first-year EFL university students	Autonomous self-regulation, resilient coping, and psychological well-being	Autonomous self-regulation and resilient coping were positively associated and both contributed to psychological well-being.	Used a specialised first-year EFL population and examined well-being as the primary outcome.
Bagdžiūnienė et al. (2025)	Lithuania; N = 350 university students	Academic resilience, study resources, self-efficacy, engagement, and well-being	Academic resilience was associated with study-related and personal resources and with positive student outcomes.	Examined academic resilience within a broader resource model rather than its direct relationship with SRL.
Wang et al. (2026)	China; N = 1,068 undergraduates from 21 universities, plus 15 qualitative interviews	Teaching and learning environments and resilience	Active learning, clear goals and standards, coping strategies, and peer support were linked to student resilience.	Focused primarily on environmental antecedents of resilience rather than SRL as the focal correlate.

Note. The table summarises selected recent higher education studies that are especially relevant to the present research question; it is not intended as an exhaustive systematic review of all studies on SRL and resilience.

As Table 1 shows, recent higher education research provides converging evidence that self-regulatory processes and resilience-related resources are relevant to student adaptation; however, the studies differ substantially in their focal constructs, outcomes, populations, and educational settings. Among these closely related studies, SRL and resilience are often examined as predictors of competence, well-being, engagement, coping, or adaptation rather than as the two focal variables the direct association of which is estimated within the same general university-student sample.

The available evidence also spans emergency remote teaching, online learning, first-year EFL education, and institutionally distinct European and Chinese higher education settings. Consequently, the transferability of these patterns to Kazakhstan cannot be assumed. The present study therefore addresses a narrower empirical gap by estimating the direct association between overall SRL and psychological resilience among university students in Kazakhstan and testing whether that association remains evident after adjustment for basic sociodemographic characteristics.

2.4 Sociodemographic and Family Background Correlates: Relevance and Inconsistency

Recent studies indicate that university resilience is associated with both personal and contextual resources, including self-efficacy, social support, study resources, perceived stress, and well-being (Al Omari et al., 2023; Bagdžiūnienė et al., 2025; Cassaretto et al., 2024). Collectively, this evidence suggests that background conditions may be relevant to resilience, although broad demographic indicators alone provide only a partial account of students' academic and social contexts.

Gender is similarly complex. Bekker and Boselie (2002) cautioned against simplified assumptions about gender and stress, showing that gendered expectations and stress processes may operate in non-uniform ways. Other studies have also reported context-dependent patterns in resilience, self-efficacy, social-emotional skills, and well-being-related indicators (Toraman et al., 2023; Yıldız & Kahraman, 2021; Zhen et al., 2017). This makes it important to test gender differences empirically rather than assuming them.

Parental education and year of study also require cautious interpretation. Recent higher education evidence reinforces the need for such caution. In Lithuanian university students, academic resilience was more strongly associated with study-related resources and self-efficacy than with basic demographic controls (Bagdžiūnienė et al., 2025). A recent systematic review likewise found that gender differences in SRL were not consistent across studies and that self-regulatory capacities did not necessarily increase linearly with academic progression (Verdugo & Martínez-Líbano, 2026). These findings argue against assuming uniform demographic or year-of-study effects in advance.

2.5 Synthesis and Research Gap

The literature reviewed above establishes a plausible connection between SRL and psychological resilience; however, it leaves an important empirical question unresolved. SRL research has primarily examined how students regulate

cognition, motivation, behaviour, and effort in relation to achievement, engagement, coping, and well-being, whereas resilience research has focused more directly on recovery and adaptive functioning under stress. Consequently, evidence that these constructs are theoretically connected does not establish that they represent the same underlying resource, nor does it clarify the magnitude of their direct association in university populations.

The central gap is therefore not simply the absence of studies mentioning both SRL and resilience. Rather, there is limited evidence directly examining the magnitude and consistency of the association between learning regulation and psychological recovery within the same university-student sample. Existing studies also vary substantially in population and context, while evidence from Central Asian higher education remains comparatively limited. This makes it unclear whether patterns reported elsewhere extend to students studying within Kazakhstan's higher education environment. Demographic correlates add a further source of uncertainty because associations involving gender, stage of study, and family-background indicators have not been consistent across previous research.

Accordingly, the present study addresses primarily an evidence and population-context gap rather than a theoretical gap. It estimates the association between SRL and psychological resilience among university students in Kazakhstan and tests whether this association remains evident after adjustment for basic sociodemographic characteristics. Sociodemographic variables are treated as contextual covariates rather than primary explanatory factors. The study does not claim that the SRL-resilience relationship is theoretically novel; rather, its contribution is to extend existing evidence to a Central Asian higher education context in which this relationship has received comparatively limited direct investigation.

3. Methodology

3.1 Research Design and Participants

The study used a quantitative cross-sectional survey design. This design was appropriate because the aim was to estimate the association between SRL and psychological resilience at one point in time, rather than testing an intervention or inferring developmental change. The study also examined whether the two constructs differed by gender, year of study, and parental education.

A priori power analysis was conducted in G*Power 3.1.9 for a two-tailed Pearson correlation, with $\alpha = .05$, statistical power of .80, and an anticipated small-to-moderate association of $r = .22$. The analysis indicated a minimum required sample size of 160 participants. The final sample comprised 177 undergraduate students aged 18–22 years from L. N. Gumilyov Eurasian National University in Astana, Kazakhstan, thereby exceeding the minimum required for the primary correlational analysis. Participants were recruited using a non-probability convenience sampling strategy across different undergraduate programmes at the university. Recruitment information was distributed through teaching staff, university student groups and messaging chats, email announcements, general

university notices, and direct invitations during scheduled classes. A total of 223 students were invited to participate. Participation was voluntary, and no financial or academic incentives were provided. Students who agreed to participate completed a paper-based questionnaire.

Data collection was conducted in December 2025, following ethics approval being granted on November 4, 2025. Complete data for the sociodemographic variables used in the group comparisons and hierarchical regression were available for 173 participants; the gender distribution was 56 males and 117 females. Participants represented the first to fourth years of study. Sociodemographic information included age, gender, year of study, maternal education, and paternal education. Students were included if they were undergraduate students, were within the target age range, and provided informed consent. Cases with missing responses on the main measurement scales were excluded from scale-level analyses. Scale-level analyses used participants with usable scale data, whereas analyses involving sociodemographic variables used the available cases for the variables required in each analysis; the corresponding effective sample sizes are reported in the Results tables.

3.2 Measures

SRL was assessed using the full 41-item Self-Regulated Learning Perception Scale (SRLPS) (Turan et al., 2009). The instrument comprises four dimensions: motivation and action to learning (7 items), planning and goal setting (8 items), strategies for learning and assessment (19 items), and lack of self-directedness (7 items). Illustrative item content concerns maintaining motivation for learning, setting and planning learning goals, selecting and evaluating learning strategies, and independent management of learning. In the original development work, the 41-item four-factor solution explained 47.10% of the variance, with Cronbach's α values of .88, .91, .83, and .76 across the four dimensions (Turan et al., 2009). Items are rated on a five-point Likert-type scale.

For data entry, the five response categories were initially coded from 0 to 4. Negatively oriented items within the lack-of-self-directedness dimension were reverse-scored within this coding metric so that higher scores represented stronger SRL. For reporting and interpretation, item scores were subsequently expressed on the original 1–5 response metric by adding one point to each item score. This transformation is equivalent to adding 41 points to the initially computed 0–164 total score. Accordingly, the reported SRLPS total score has a theoretical range of 41–205, with higher scores indicating stronger self-regulated learning. All 41 items of the instrument were retained; no items were added or removed. In the present study, the full 41-item instrument was administered and total SRL scores were used in the principal group-comparison, correlational, and regression analyses.

Psychological resilience was assessed using the six-item BRS (Smith et al., 2008). Responses were recorded on a five-point Likert-type scale ranging from 1 to 5. All six original items were retained without substantive modification. Illustrative item content concerns the perceived ability to recover or “bounce back” after

stressful or difficult experiences. In its original validation across four samples, including two student samples, the BRS demonstrated a unidimensional structure and satisfactory reliability (Smith et al., 2008). Negatively worded items were reverse scored before calculation of the scale score. Following the standard scoring procedure, the BRS score was calculated as the mean of the six item responses after reverse scoring, producing a possible score range from 1 to 5, with higher scores indicating greater psychological resilience.

The paper questionnaire was available in Russian and Kazakh. Both language versions were prepared by the authors for local administration. A formal back-translation procedure was not conducted. Before the main data collection, the wording was checked for comprehensibility; detailed records of the number of individuals involved in this preliminary check were not retained, and no item wording was subsequently changed. No items were added, removed, or substantively altered in either instrument; adaptation was limited to preparing Russian- and Kazakh-language versions for local administration. Additional details on measurement, recruitment, variable coding, and analytical treatment are provided in Supplementary Tables S1–S3.

3.3 Ethical Considerations

The study was approved by the Ethics Committee of L. N. Gumilyov Eurasian National University, Astana, Kazakhstan (Approval No. 3, November 4, 2025). The study followed the principles of voluntary participation, informed consent, anonymity, and confidential data handling. Before completing the questionnaire, participants received written information about the study purpose, procedures, their right to withdraw, and the use of anonymised data for research purposes only.

3.4 Data Screening and Preliminary Analysis

Before hypothesis testing, the dataset was screened for missing values, out-of-range responses, and distributional anomalies. Descriptive statistics, histograms, Q–Q plots, skewness, and kurtosis were examined for the main variables. Standardised scores and scatterplots were used to detect possible univariate and bivariate outliers. No extreme outliers requiring exclusion were identified. Because the distributions did not show severe violations of normality and the sample size was adequate, parametric analyses were retained. Internal consistency was assessed using Cronbach’s alpha.

Assumptions relevant to parametric analyses were evaluated before inferential testing. Independence of observations was supported by the study design, with one response per participant. Visual inspection of histograms and Q–Q plots indicated no severe departures from normality, while scatterplots showed no marked non-linearity or major bivariate outliers. Levene’s tests were non-significant for the gender, year-of-study, maternal-education, and paternal-education comparisons for both BRS and SRLPS scores (all $p > .05$), supporting the homogeneity-of-variance assumption.

For the hierarchical regression, inspection of the standardised residual-versus-predicted plot showed no systematic pattern or evident funneling, supporting linearity and homoscedasticity. Residuals were approximately normally distributed, and no highly influential observations were identified, with all Cook's distance values below 1. Multicollinearity was low, with tolerance values ranging from .78 to .97 and variance inflation factor (VIF) values ranging from 1.04 to 1.28. Overall, the assumptions underlying the reported parametric analyses were considered adequately satisfied.

3.5 Statistical Analysis

Descriptive statistics were calculated to summarise the distributions of the main study variables. Given the approximately normal distributions identified during preliminary screening, parametric procedures were used for the inferential analyses.

Independent-samples t-tests were used to compare SRL and resilience scores between male and female students because gender comprised two independent groups. Cohen's *d* was reported to quantify the magnitude of these between-group differences. One-way analyses of variance (ANOVAs) were used for year of study, maternal education, and paternal education because each of these variables contained more than two independent categories. Eta squared (η^2) was reported as an effect-size estimate for the ANOVA comparisons. Pearson correlation was used to estimate the direction and magnitude of the linear association between the SRLPS total score and the BRS mean score.

Hierarchical linear regression was subsequently used to determine whether SRL accounted for additional variance in resilience after adjustment for the measured sociodemographic characteristics. Multicollinearity among the predictors was assessed using tolerance and variance inflation factor (VIF) statistics. Gender, year of study, maternal education, and paternal education were entered in Step 1, followed by the SRLPS total score in Step 2. The incremental contribution of SRL was evaluated using ΔR^2 and the F-change statistic, while regression coefficients, standard errors, standardised beta coefficients, *p* values, and 95% confidence intervals were used to evaluate individual predictors. Because the study was cross-sectional, regression coefficients were interpreted as adjusted associations rather than as evidence of causal effects.

All statistical analyses were performed in IBM SPSS Statistics 25.0. Categorical parental education variables were dummy-coded, with high school used as the reference category. Gender was coded as 0 = female and 1 = male, and year of study was entered as an ordinal covariate in the regression model. Statistical significance was evaluated at $p < .05$.

4. Results and Findings

4.1 Quantitative Findings

The reliability indicators supported the internal consistency of both instruments. The SRLPS showed high internal consistency, with Cronbach's $\alpha = .91$. The BRS also demonstrated good internal consistency, with Cronbach's $\alpha = .88$. Group Comparisons were conducted to examine whether resilience and SRL differed by gender, year of study, or parental education. These analyses were used as preliminary comparisons before testing the main SRL-resilience association. All SRLPS descriptive scores reported below are expressed on the original 1–5 item-response metric, corresponding to a total-score range of 41–205. Because the study was cross-sectional, the group comparisons were interpreted descriptively and not as evidence of developmental or causal differences. Table 2 reports the gender-based comparisons for resilience and SRL. The results show whether male and female students differed significantly in the two main study variables.

Table 2: Gender differences in resilience and self-regulated learning

Variable	Gender	N	M $\pm$ SD	t	p	Cohen's d
BRS	Male	56	3.46 $\pm$ 0.56	0.867	.387	0.141
BRS	Female	117	3.39 $\pm$ 0.51			
SRLPS	Male	56	103.87 $\pm$ 8.24	-0.352	.725	-0.057
SRLPS	Female	117	104.29 $\pm$ 6.98			

Note. BRS = Brief Resilience Scale; SRLPS = Self-Regulated Learning Perception Scale. BRS values are mean scores on the 1–5 response metric. SRLPS scores are reported on the 41–205 total-score metric. Higher scores indicate greater resilience and stronger self-regulated learning.

The gender comparisons did not show statistically significant differences in either resilience or self-regulated learning. Male and female students reported similar BRS scores, namely $t(171) = 0.867$, $p = .387$, with a very small effect size, Cohen's $d = 0.141$. The same pattern was observed for SRLPS scores, $t(171) = -0.352$, $p = .725$, $d = -0.057$. These results indicate that gender was not associated with meaningful differences in the two main constructs in the present sample. Table 3 presents the differences in resilience and SRL across the four years of study. These comparisons were used to determine whether students' scores varied according to their position in the undergraduate programme.

Table 3: Differences in resilience and self-regulated learning by year of study

Variable	Year of study	N	M $\pm$ SD	F	p
BRS	1	50	3.48 $\pm$ 0.57	1.041	.378
BRS	2	39	3.32 $\pm$ 0.50		
BRS	3	37	3.47 $\pm$ 0.52		
BRS	4	47	3.38 $\pm$ 0.50		
SRLPS	1	50	105.3 $\pm$ 8.17		
SRLPS	2	39	103.3 $\pm$ 6.88		
SRLPS	3	37	103.5 $\pm$ 6.53		
SRLPS	4	47	104.1 $\pm$ 7.66		

Note. BRS = Brief Resilience Scale; SRLPS = Self-Regulated Learning Perception Scale.

No statistically significant differences were found across the four years of study. Resilience did not differ significantly by year of study, $F(3, 169) = 1.041$, $p = .378$, $\eta^2 = .018$. SRL also remained comparable across year groups, $F(3, 169) = 0.608$, $p = .611$, $\eta^2 = .011$. The uniformly small effect sizes indicate that year of study was not a meaningful differentiating factor for either resilience or SRL in the present sample.

Table 4 presents the differences in resilience and SRL according to maternal and paternal education.

Table 4: Differences in resilience and self-regulated learning by maternal and paternal education

Variable	Parent	Educational status	N	M $\pm$ SD	F(2, 170)	p	η^2
BRS	Maternal	High school	74	3.37 $\pm$ 0.54	0.636	.531	.007
BRS	Maternal	Associate degree	28	3.45 $\pm$ 0.49			
BRS	Maternal	Bachelor's degree	71	3.47 $\pm$ 0.54			
BRS	Paternal	High school	69	3.37 $\pm$ 0.51	0.638	.531	.007
BRS	Paternal	Associate degree	25	3.50 $\pm$ 0.58			
BRS	Paternal	Bachelor's degree	79	3.43 $\pm$ 0.52			
SRLPS	Maternal	High school	74	104.0 $\pm$ 7.66	1.529	.222	.018
SRLPS	Maternal	Associate degree	28	102.6 $\pm$ 7.52			
SRLPS	Maternal	Bachelor's degree	71	105.3 $\pm$ 6.90			
SRLPS	Paternal	High school	69	103.5 $\pm$ 7.76	0.890	.415	.010
SRLPS	Paternal	Associate degree	25	104.4 $\pm$ 7.87			
SRLPS	Paternal	Bachelor's degree	79	105.1 $\pm$ 6.53			

Parental education was not associated with statistically significant differences in resilience or SRL. Mean BRS scores were comparable across maternal education groups, $F(2, 170) = 0.636$, $p = .531$, $\eta^2 = .007$, and paternal education groups, $F(2, 170) = 0.638$, $p = .531$, $\eta^2 = .007$. Similarly, SRLPS scores did not differ significantly by maternal education, $F(2, 170) = 1.529$, $p = .222$, $\eta^2 = .018$, or paternal education, $F(2, 170) = 0.890$, $p = .415$, $\eta^2 = .010$. The consistently small effect sizes indicate limited group-level variation associated with parental education.

The correlation analysis based on participants with usable scale data ($N = 177$) showed a moderate positive association between SRL and psychological resilience, $r = .522$, $p < .001$. Thus, students reporting stronger SRL also tended to report greater resilience. The two measures shared approximately 27% of their variance ($r^2 = .272$), indicating meaningful covariation while also retaining substantial non-shared variance. Diagnostic checks indicated that the assumptions of the hierarchical regression were adequately satisfied.

To examine whether the association between SRL and resilience remained stable after accounting for basic sociodemographic characteristics, a hierarchical linear regression model was estimated. Psychological resilience was entered as the

dependent variable. Gender, year of study, maternal education, and paternal education were entered in Step 1. SRL was then entered in Step 2.

In Step 1, the sociodemographic variables did not explain a statistically significant proportion of variance in resilience, $R^2 = .05$, adjusted $R^2 = .02$, $F(6, 166) = 1.46$, $p = .196$. After SRL was added in Step 2, the model fit improved substantially. The inclusion of SRLPS increased the explained variance by 23%, $\Delta R^2 = .23$, $F\text{-change}(1, 165) = 52.71$, $p < .001$. The final model explained 28% of the variance in resilience, $R^2 = .28$, adjusted $R^2 = .25$, $F(7, 165) = 9.17$, $p < .001$. In the final model, SRL remained a significant positive predictor of resilience, $\beta = .49$, $p < .001$, whereas the sociodemographic covariates did not reach statistical significance.

This indicates that the SRL–resilience association was not attributable to gender, year of study, or parental education in the present sample. Table 5 reports the hierarchical regression model predicting psychological resilience. The table shows the variance explained by sociodemographic variables in the first step and the additional variance explained after SRL was added in the second step.

Table 5: Hierarchical regression predicting resilience

Step	Predictors entered	R^2	Adjusted R^2	ΔR^2	F (df1, df2)	p	F-change (df1, df2)	p-change
1	Gender, year of study, maternal education, paternal education	.05	.02	—	1.46(6, 166)	.196	—	—
2	Step 1 + SRL	.28	.25	.23	9.17(7, 165)	< .001	52.71(1, 165)	< .001

Note. Dependent variable: mean BRS score. SRLPS= Self-Regulated Learning Perception Scale. ΔR^2 reflects the additional variance explained after self-regulated learning was entered in Step 2.

Table 6 presents the regression coefficients for the final hierarchical model. The results showed the unique contribution of each predictor to psychological resilience after all variables were entered into the model.

Table 6: Regression coefficients for the final hierarchical model predicting resilience

Predictor	B	SE	β	t	p	95% CI for B
Gender	0.048	0.083	.04	0.58	.563	[-0.117, 0.213]
Year of study	-0.017	0.030	-.04	-0.56	.576	[-0.077, 0.043]
Maternal education: associate degree	0.037	0.105	.03	0.35	.727	[-0.170, 0.243]
Maternal education: bachelor's degree	0.030	0.077	.03	0.39	.697	[-0.122, 0.182]
Paternal education: associate degree	0.072	0.110	.04	0.65	.517	[-0.145, 0.288]
Paternal education: bachelor's degree	0.015	0.075	.01	0.20	.842	[-0.133, 0.163]
Self-regulated learning	0.035	0.005	.49	7.26	< .001	[0.025, 0.045]

Note. Dependent variable: mean BRS score. Gender was coded as 0 = female and 1 = male. High school was used as the reference category for maternal and paternal education. B = unstandardised coefficient; SE = standard error; β = standardised coefficient; CI = confidence interval.

The coefficient-level results confirmed that SRL was the only statistically significant predictor in the final model. After adjustment for gender, year of study, and parental education, higher SRLPS scores were associated with higher resilience scores, $B = 0.035$, $SE = 0.005$, $\beta = .49$, $t = 7.26$, $p < .001$, 95% CI [0.025, 0.045]. None of the sociodemographic covariates reached statistical significance. Given the cross-sectional design, this coefficient is interpreted as an adjusted association rather than evidence of a causal effect.

5. Discussion

The central finding of this study is that self-regulated learning and psychological resilience were moderately and positively associated; this relationship remained evident after adjustment for the measured sociodemographic characteristics.

The positive SRL–resilience association suggested that students' capacity to manage their learning and their capacity to recover from difficulty may operate as complementary aspects of academic adaptation. This interpretation is consistent with classical SRL theory, in which planning, monitoring, motivational control, strategy adjustment, and reflection supported adaptive responses to demanding learning situations (Pintrich & De Groot, 1990; Pintrich & Zusho, 2002; Zimmerman, 1990). The observed SRL–resilience association was moderate ($r = .522$), indicating meaningful covariation but substantial non-shared variance.

Conceptually, SRL concerns regulation of the learning process, whereas resilience concerns recovery and continued functioning following difficulty. Ge (2025) likewise reported positive connections between resilience and self-regulated learning processes among Chinese college students, while Lo et al. (2025) identified an association between autonomous self-regulation and resilient coping among first-year university students in Malaysia. The present findings extended this pattern to Kazakhstan and suggested that the connection between learning regulation and psychological adaptation is observable across different higher education contexts.

The hierarchical regression further showed that the SRL–resilience association was not accounted for by the measured demographic characteristics. This finding did not imply that social background is unimportant; rather, it suggested that gender, year of study, and parental education were comparatively weak explanatory factors in this sample once SRL was considered. The absence of a gender difference is also consistent with evidence that gender patterns in SRL are not uniform across university samples, suggesting that gender may be less informative than more proximal educational and psychological resources in this context (Verdugo & Martínez-Líbano, 2026).

This pattern is compatible with recent evidence indicating that more proximal educational and psychological resources may be more informative than broad demographic indicators. For example, Bagdžiūnienė et al. (2025) found academic resilience among university students to be closely associated with study-related resources and self-efficacy, while recent international research has similarly emphasised the role of the learning environment in student resilience (Wang et

al., 2026). The present results therefore supported examining SRL alongside more proximal contextual and psychological factors rather than assuming strong effects from demographic characteristics alone. Similarly, parental education may be too distant a proxy for the resources that shape students' actual academic adaptation. More proximal variables, such as perceived family support, financial stress, quality of feedback, academic self-efficacy, and satisfaction with the learning environment, may explain student adaptation more precisely than parental education alone.

The findings extended earlier work in two directions. First, they connect SRL research, which has often focused on achievement, motivation, and lifelong learning readiness (Lüftenegger et al., 2012; Wolfe & Johnson, 1995), with resilience research, which has more often examined well-being, social support, life satisfaction, and risk-related factors (Al Omari et al., 2023; Cassaretto et al., 2024; Yıldız & Kahraman, 2021). Second, they added evidence from Kazakhstan, a higher education context that remains less visible in international research on student adaptation. The results therefore supported a more integrated understanding of student development in which learning regulation and psychological resilience are examined together.

5.1 Theoretical and Practical Implications

The findings support viewing SRL and psychological resilience as related but non-equivalent resources. Their moderate positive association suggests that effective management of learning tends to accompany a greater capacity to recover from difficulty, while the substantial non-shared variance indicates that the constructs retain distinct functions. The persistence of this association after adjustment for gender, year of study, and parental education further suggests that it cannot be reduced to these basic sociodemographic characteristics. In this respect, the study extends evidence on student adaptation to an underrepresented Central Asian higher education context.

Practically, universities may benefit from coordinating academic self-management support with broader student well-being provision. SRL-oriented practices may include explicit goal setting, study planning, progress monitoring, strategy evaluation, structured feedback, and opportunities for reflection. These practices can be incorporated into teaching, academic advising, and first-year support. However, the cross-sectional findings do not demonstrate that strengthening SRL causes greater resilience. SRL-oriented support should therefore complement, rather than replace, counselling and other well-being services (Theobald, 2021; Simón-Grábalos et al., 2025; Wang et al., 2026).

5.2 Limitations

Because the study was cross-sectional, the findings indicated association rather than causation and did not determine whether SRL supported resilience, resilience helped students sustain SRL, or whether both were shaped by shared psychological and contextual factors. The study also relied on self-report measures, which may be affected by response style and shared method variance. Finally, the sample was drawn from one university, which limits generalisation to the wider Kazakhstani higher education sector. The Russian and Kazakh

versions prepared by the authors were not subjected to formal backtranslation or separate psychometric validation; therefore, possible language-related measurement differences cannot be excluded.

5.3 Future Research

Future research should therefore use longitudinal and intervention designs to clarify directionality. It would also be useful to include behavioural indicators of SRL, academic performance data, learning analytics, and more precise measures of perceived support, academic stress, and self-efficacy. Multi-institutional studies across Kazakhstan and other Central Asian contexts would help determine whether the SRL–resilience association observed here is stable across disciplines, regions, and institutional conditions.

6. Conclusion

This study examined the association between SRL and psychological resilience among university students in Kazakhstan using a cross-sectional survey design. The findings showed that students reporting higher levels of SRL tended to report higher psychological resilience, while gender, year of study, or parental education did not explain meaningful differences in either construct. This pattern supports a more integrated understanding of student adaptation in higher education. These findings are relevant for higher education institutions because they suggest that academic self-management and psychological adaptation should not be treated as separate areas of student support.

Programmes that develop goal setting, planning, monitoring, motivational regulation, feedback use, and reflective learning may also be useful for helping students respond more effectively to academic setbacks. At the same time, the cross-sectional design does not allow causal conclusions. Replication across institutions would help establish the robustness of this pattern. Taken together, the results indicate that learning self-management and psychological adaptation should be understood as connected but non-equivalent resources. The study's principal contribution is empirical and contextual: it extends evidence on the SRL–resilience association to an underrepresented Central Asian higher education setting and shows that the association remains evident beyond the measured demographic characteristics.

Conflict of Interest

The authors declare no conflicts of interest.

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8. Author Contributions

The five-author structure reflects the distribution of work across the study design, data collection, methodological preparation, statistical analysis, interpretation of findings, and manuscript revision. N.K. contributed to the conceptualisation of the study and coordination of the research process. P.S. contributed to the literature review and methodological framing. K.K. contributed to the research design, interpretation of the findings, and correspondence with the journal, while V.Y. contributed to data preparation, analysis, and verification of statistical reporting. Finally, G.Z. contributed to manuscript editing, reference checking, and final revision. All authors read and approved the final version of the manuscript.

9. Declaration of Generative AI and AI-Assisted Technologies in the Writing Process

During revision of this manuscript, ChatGPT (OpenAI) was used to assist with language editing, stylistic refinement, and drafting of revision wording. All AI-assisted output was reviewed, verified, and edited by the authors, who take full responsibility for the content, interpretation, and final text. Generative AI was not used to generate empirical data or conduct the statistical analyses reported in the study.

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