

Influence of Academic Resilience and Learning Styles on Temperament among Adolescents



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Abstract

Adolescents face constant academic pressure, and how they handle it often says a lot about who they are becoming emotionally. This paper looks at whether two things — how resilient a student is academically, and how they prefer to learn — line up with their overall temperament. One hundred school-going adolescents (50 boys, 50 girls, aged 13 to 18) were surveyed using an academic resilience scale, the VARK learning-style questionnaire, and a temperament inventory. The numbers told a fairly clear story: resilience and temperament moved together in a strong, positive way ($r = .667$, $p < .001$), so the more resilient a student was, the steadier their temperament tended to be. Grouping students by their dominant learning style also mattered — an ANOVA showed real differences in temperament across the four VARK groups ($F(3, 96) = 3.15$, $p = .029$), with Read/Write learners coming out on top. Boys and girls, interestingly, did not differ much on temperament at all ($t(98) = 0.45$, $p = .650$). When all the predictors were entered into a regression model together, resilience was really the only one carrying weight ($\beta = .43$, $p < .001$), accounting for close to half the variance ($R^2 = .456$). Taken together, the results point to resilience, more than learning-style preference on its own, as the variable schools should be paying attention to if temperament and emotional steadiness are a concern.

Keywords: academic resilience; learning styles; VARK; temperament; adolescent development; emotional regulation

Introduction

The teenage years bring a lot of change at once — the brain is still wiring itself, emotions run high, and school life adds a steady stream of pressure. Somewhere in the middle of all this sits temperament: the fairly consistent way a person reacts emotionally and manages themselves day to day. It has usually been treated as something a child is simply born with, fixed early and carried forward largely unchanged. But that view has been softening. There is a reasonable case, backed by a fair amount of developmental research, that experience — especially the sustained kind that comes from years of schooling — can nudge temperament's outward expression even if its roots stay biological.

Two experiences stand out during adolescence: dealing with academic setbacks, and figuring out how one best absorbs new information. The first is captured by the idea of academic resilience — a student's ability to keep functioning, and even grow, when schoolwork gets hard or results disappoint. Resilient students don't avoid stress; they tend to have better tools for working through it, and that usually shows up as steadier self-efficacy and fewer emotional swings after failure. The second experience is learning style, most commonly discussed through the VARK lens — Visual, Auditory, Read/Write, and Kinesthetic. Whether matching teaching to a student's preferred style actually improves learning outcomes is still debated in the literature, but the

preference itself remains a useful marker of how a student engages with information, and plausibly with related traits like attention span and emotional control.

What's missing from most of the existing work is a study that puts these two factors — resilience and learning style — in the same frame and checks how each relates to temperament using actual data rather than theory alone. That is the gap this paper tries to fill, using a sample of 100 adolescents and a fairly standard quantitative approach.

1.1 Theoretical Framework

This study draws on three established theoretical strands. First, Rothbart's psychobiological model treats temperament as a constitutionally-based individual difference in reactivity and self-regulation — reactivity referring to the speed and intensity of emotional, motor, and attentional responses, and self-regulation referring to processes such as attention control that modulate that reactivity. Although Rothbart's model locates the origins of temperament in early neurobiology, it explicitly allows regulation to be shaped by ongoing experience, which is the theoretical opening this study relies on when asking whether academic experience — specifically resilience — relates to temperament scores in adolescence.

Second, Masten's resilience framework describes resilience as the product of ordinary adaptive

systems (supportive relationships, cognitive appraisal, self-regulatory capacity) rather than an extraordinary trait possessed only by a few. Framed this way, academic resilience is not simply the absence of stress reactivity but an active regulatory process — which conceptually overlaps with the self-regulatory component of Rothbart's temperament model. This overlap is what motivates Hypothesis 1: if resilience and temperament regulation draw on shared underlying processes, the two should correlate positively.

Third, the VARK model (Fleming & Mills, 1992) provides the framework for classifying learning-style preference. While VARK was developed as a reflective tool rather than a strict psychological typology, it is used here descriptively — as a way of grouping adolescents by their preferred mode of engaging with academic material — to test whether this grouping corresponds with any observable difference in temperament (Hypothesis 2), without assuming a causal mechanism connecting the two.

1.2 Statement of the Problem

Academic resilience and learning-style preference have each been researched fairly extensively on their own, but almost always in relation to academic achievement or satisfaction, not in relation to temperament. Temperament research, in turn, has largely developed independently of the academic-resilience literature, with its roots in early-childhood developmental psychology rather than school-based research. The problem this study addresses, then, is a fairly specific one: whether — within a single adolescent sample, using a single set of instruments — resilience and learning-style grouping actually show a measurable relationship with temperament, or whether the assumed connection is weaker or more selective than the surrounding literature implies.

1.3 Significance of the Study

Beyond its contribution to the literature, this study has direct relevance for schools and counsellors. If resilience is confirmed as a meaningful correlate of temperament, then resilience-focused interventions already common in schools (coping-skills training, growth-mindset workshops) may carry a secondary benefit for emotional stability that is rarely measured directly. Similarly, evidence on learning-style grouping and temperament, even if modest, adds a small but useful piece to how teachers think about individual differences in the classroom.

1.4 Objectives

- Objective 1: To find out whether academic resilience is related to temperament among adolescents.

- Objective 2: To check whether temperament differs across adolescents with different dominant learning styles (Visual, Auditory, Read/Write, Kinesthetic).

1.5 Hypotheses

- H1: Academic resilience will be positively and significantly correlated with temperament scores among adolescents.
- H2: Temperament scores will differ significantly across adolescents grouped by their dominant learning style.

1.6 Operational Definitions

- Academic Resilience: An adolescent's self-reported capacity to persist, adapt, and recover in the face of academic setbacks or stress, as measured by the Academic Resilience Scale used in this study.
- Learning Style: An adolescent's preferred mode of processing academic information, classified into one of four VARK categories (Visual, Auditory, Read/Write, Kinesthetic) based on the highest-scoring modality on the VARK inventory.
- Temperament: A composite score reflecting an adolescent's relatively stable pattern of emotional reactivity and self-regulation, as measured by the Temperament Scale used in this study.
- Adolescent: For the purposes of this study, any participant aged 13 to 18 years.

2. Review of Literature

2.1 Studies on Academic Resilience

Martin and Marsh (2006) were among the first to give academic resilience a distinct empirical footing, separate from general psychological resilience, by tying it specifically to the ordinary, everyday setbacks students face — poor grades, difficult subjects, performance pressure — rather than to major life adversity. Their work established that academically resilient students share a cluster of traits: higher self-efficacy, better planning and persistence, and lower academic anxiety. Wang, Haertel, and Walberg (1994), working from an educational-resilience angle, emphasized the protective role of supportive school environments, suggesting resilience is not purely an individual trait but also a product of context — a point that matters when interpreting any resilience score as partly reflecting the adolescent's surrounding environment, not personality alone. Rutter (2012) reframed resilience as a dynamic process rather than a fixed capacity, arguing it emerges differently depending on the specific stressor and the resources available at the time — a view that cautions against treating a single resilience score as a permanent trait marker. Werner's (1993)

long-running Kauai study remains one of the most cited demonstrations that resilient outcomes in adolescence can be traced to earlier protective factors, reinforcing the idea that resilience has developmental roots worth accounting for Kumari (2025).

2.2 Studies on Learning Styles

Fleming and Mills (1992) introduced VARK explicitly as a reflective, not diagnostic, instrument — a distinction that is often lost in later applied literature. Cassidy (2004) reviewed the broader learning-styles field and noted that dozens of competing models exist, with VARK among the more practically usable because of its simplicity, even though its predictive validity for actual learning outcomes is weaker than its popularity suggests. Coffield, Moseley, Hall, and Ecclestone's (2004) systematic review was considerably more critical, concluding that evidence for matching instruction to learning style improving achievement is thin at best — a finding this study takes seriously by treating learning style here purely as a descriptive grouping variable rather than assuming it drives outcomes. Cassidy and Eachus (2000), by contrast, found that learning style did relate modestly to self-reported academic confidence, which is closer to the kind of psychological correlate (rather than achievement outcome) that the present study is interested in Mustafa (2026).

2.3 Studies on Temperament

Rothbart and Derryberry's (1981) early work laid the groundwork for treating temperament as a set of measurable individual differences in reactivity and regulation rather than a vague personality descriptor, and this framework was later extended by Rothbart and Bates (2006) into the developmental model this study draws on. Chess and Thomas (1996), from an earlier and more clinically-oriented tradition, classified temperament into broad types (easy, difficult, slow-to-warm-up) based on longitudinal observation — a categorical approach that contrasts with the dimensional, composite-score approach used in the present study, but which nonetheless established temperament as a legitimate, measurable construct in developmental research. Zeidner and Matthews (2011) connected temperament-related reactivity to anxiety outcomes, providing indirect support for the idea that anything which reduces reactivity — such as resilience — should correspond with better regulated, less anxious temperament profiles Devi and Singh (2026).

2.4 Interrelationship between the Constructs

Very little existing work brings resilience, learning style, and temperament together in one design. Rosander and Bäckström (2014) came closest,

examining how personality-adjacent traits interacted with resilience-related factors in predicting academic outcomes, but temperament itself was not a direct variable in their model. This absence of direct evidence is precisely the gap the present study responds to.

2.5 Research Gap

Taken together, the literature supports two things clearly — that resilience relates to better emotional and academic outcomes, and that learning-style preference relates to academic satisfaction — but it does not directly establish either variable's relationship with temperament, measured as a composite score, in a single adolescent sample. This study's contribution is narrow but concrete: it tests both relationships empirically, in the same group of adolescents, using the same statistical framework.

3. Methodology

3.1 Research Design

A quantitative, correlational design was used, since the aim here was to test relationships between existing variables rather than manipulate anything experimentally. Correlational and comparative techniques (Pearson correlation, ANOVA, regression) were considered the most suitable given that the objectives ask about association and group difference rather than causation.

3.2 Population and Sample

The target population for this study was school-going adolescents aged 13 to 18 years. From this population, a sample of 100 adolescents was drawn — 50 boys and 50 girls — ranging in age from 13 to 18 years ($M = 15.43$, $SD = 1.63$). Table 1 later in this paper presents the full descriptive breakdown of the sample.

3.3 Sampling Technique

Participants were selected through purposive sampling, a non-probability technique in which participants are chosen based on their fit with the study's inclusion criteria (age range, current school enrolment, willingness to participate) rather than random selection. This technique was considered appropriate given the exploratory, correlational nature of the study, though it does carry the limitation of restricting generalizability, which is addressed later in Section 6.2.

3.4 Tools and Measures

Academic Resilience Scale — measures how well a student holds up and adapts when facing academic setbacks or pressure, yielding a single composite resilience score per participant.

VARK Learning Style Inventory — scores preference across four modes (Visual, Auditory, Read/Write, Kinesthetic); whichever mode scored highest for a student was taken as their dominant

learning style.

Temperament Scale — a standardized measure yielding a single composite temperament score per participant.

All three instruments were administered as self-report questionnaires, a format commonly used in adolescent psychosocial research because it is efficient to administer at scale and does not require trained observers, though it does carry the general limitation of being subject to self-perception and social-desirability effects (discussed in Section 6.2).

3.5 Procedure for Data Collection

Data collection followed a standard three-step procedure. First, participants and, where applicable, their schools were informed of the purpose of the study and consent was obtained. Second, the three instruments were administered together in a single sitting to reduce participant fatigue and dropout. Yadav and Arya (2025) Third, responses were scored according to each instrument's standard scoring procedure and compiled into a single dataset for analysis, with each participant assigned an anonymized identifier (IND-001 through IND-100) to protect confidentiality.

3.6 Ethical Considerations

- Informed consent was obtained from participants (and parental/guardian consent where age-appropriate) prior to

data collection.

- Participation was voluntary, and participants were free to withdraw at any stage without consequence.
- All responses were anonymized prior to analysis, with no personally identifying information retained in the working dataset.
- Data were used strictly for the stated academic purpose of this study.

3.7 Statistical Techniques

Descriptive statistics were computed first, followed by Pearson product-moment correlation (Objective 1), one-way ANOVA with Tukey HSD post-hoc comparisons (Objective 2), an independent-samples t-test (gender comparison), and multiple linear regression (combined predictive contribution of resilience and VARK sub-scores). Effect sizes (Cohen's *d*, eta-squared) were computed alongside significance tests to gauge the practical magnitude of each finding, and normality was checked using skewness, kurtosis, and the Shapiro-Wilk test prior to running parametric analyses. All analyses were conducted at a significance threshold of $\alpha = .05$.

4. Results

4.1 Descriptive Statistics

Table 1 presents the descriptive statistics for the study variables.

Table 1: Descriptive Statistics of Study Variables

Variable	N	Mean	SD	Min	Max
Age	100	15.43	1.63	13	18
Academic Resilience Score	100	102.35	13.19	72	140
Visual Score	100	32.91	3.82	24	42
Auditory Score	100	31.96	3.28	24	42
Read/Write Score	100	32.53	3.74	23	42
Kinesthetic Score	100	33.13	3.72	25	42
Temperament Score	100	78.63	8.55	58	95

The sample was evenly split by gender (50 boys, 50 girls). By age group, 31 participants were 13–14 years old, 37 were 15–16, and 32 were 17–18; mean temperament scores across these three age bands were broadly comparable (78.13, 77.16, and

80.81 respectively), suggesting age was not a major driver of temperament variation within this sample. With respect to dominant learning style, 31 students were classified as Kinesthetic, 30 as Visual, 24 as Read/Write, and 15 as Auditory (Figure 1).

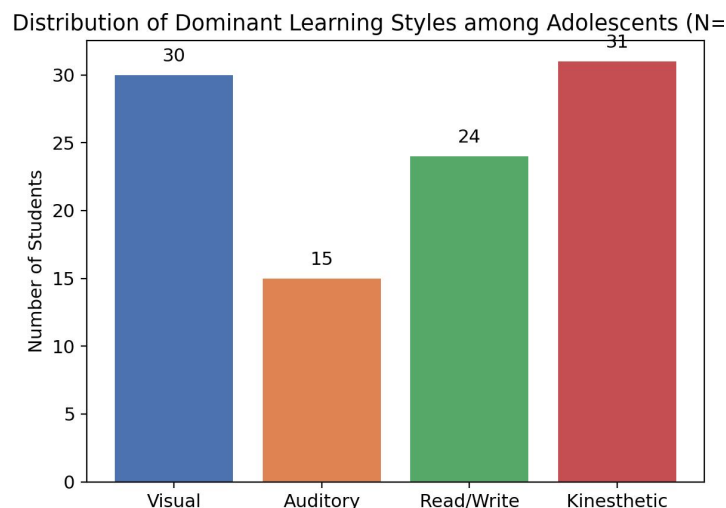


Figure 1: Distribution of Dominant Learning Styles among Adolescents (N = 100)

Before running parametric tests, the distributional properties of the key study variables were examined. Temperament scores showed only mild skew (0.22) and were close to a normal distribution on visual inspection (Figure 2), though a Shapiro-Wilk test indicated a small but

statistically significant departure from normality ($W = .966$, $p = .012$) — a common occurrence in samples of this size and not considered a serious threat to the validity of the parametric tests used, given ANOVA and regression are reasonably robust to mild non-normality at $N = 100$.

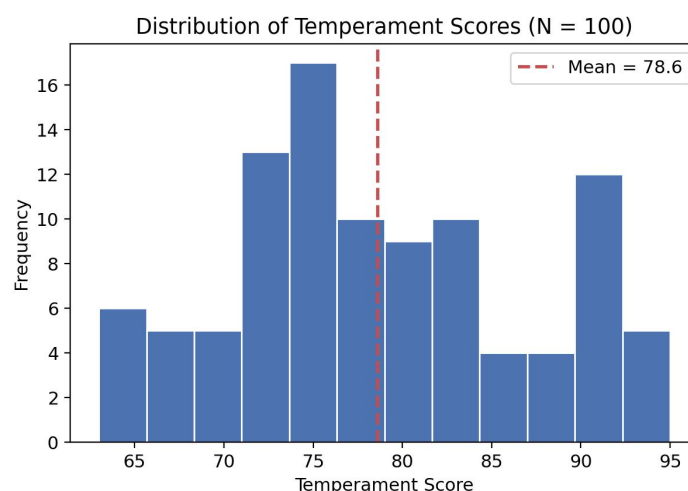


Figure 2: Distribution of Temperament Scores (N = 100)

4.2 Correlations among Study Variables

Table 2 and Figure 3 present the full correlation matrix among all continuous study variables. Academic resilience showed the strongest

association with temperament of any variable in the matrix ($r = .667$), considerably stronger than any of the individual VARK sub-scores, none of which exceeded $r = .25$ in magnitude with temperament.

Table 2: Pearson Correlation Matrix among Study Variables

Variable	Resilience	Visual	Auditory	Read/Write	Kinesthetic	Temperament
Resilience	1.00	-.08	.05	.25	-.15	.67
Visual	-.08	1.00	-.14	-.21	-.25	-.02
Auditory	.05	-.14	1.00	-.22	-.21	-.05

Read/Write	.25	-.21	-.22	1.00	-.37	.22
Kinesthetic	-.15	-.25	-.21	-.37	1.00	-.15
Temperament	.67	-.02	-.05	.22	-.15	1.00

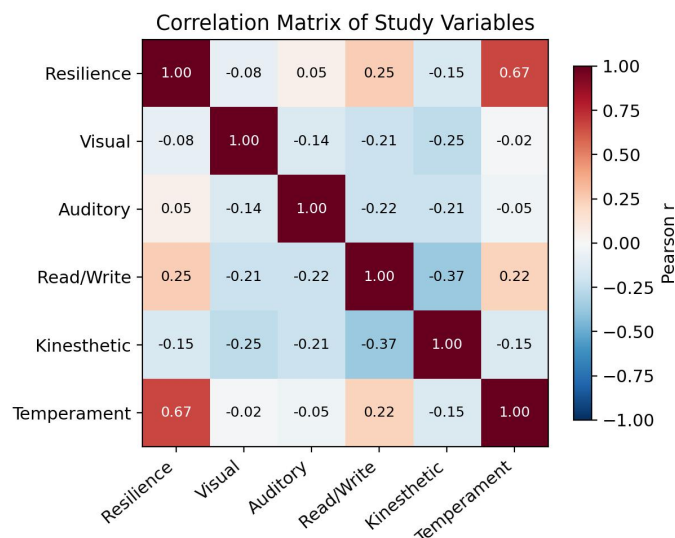


Figure 3: Correlation Heatmap of Study Variables

4.3 Academic Resilience and Temperament (Objective 1 / H1)

A Pearson correlation was computed to assess the relationship between academic resilience and temperament scores. The analysis revealed a strong, statistically significant positive correlation, $r(98) = .667$, $p < .001$, indicating that as academic resilience increases, temperament scores also increase — that is, more resilient adolescents display more stable and adaptive temperament profiles. This finding supports Hypothesis 1.

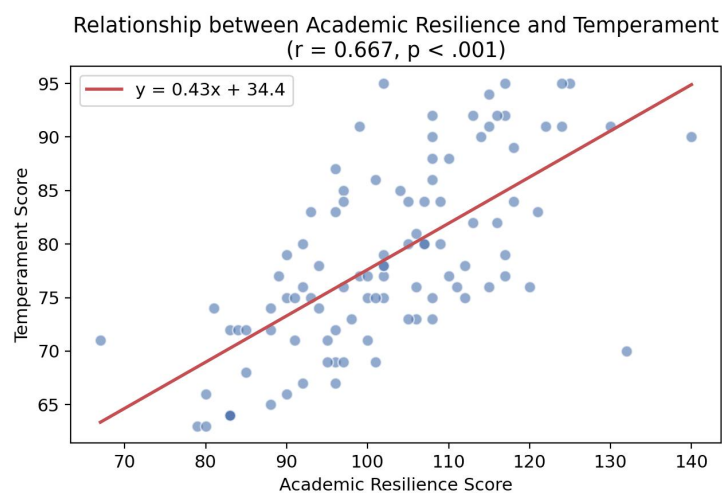


Figure 4: Scatter Plot showing the Relationship between Academic Resilience and Temperament Scores

To illustrate this relationship in categorical terms, participants were additionally split into three resilience-level groups (Low, Moderate, High) using a tertile split. As shown in Table 3 and Figure 5, mean temperament rose steadily from the Low to the High resilience group, reinforcing the linear pattern already established by the correlation coefficient.

Table 3: Mean Temperament Score across Academic Resilience Levels (Tertile Split)

Resilience Level	N	Mean Temperament	SD
Low	35	71.94	6.08
Moderate	35	79.71	6.66
High	30	85.17	7.37

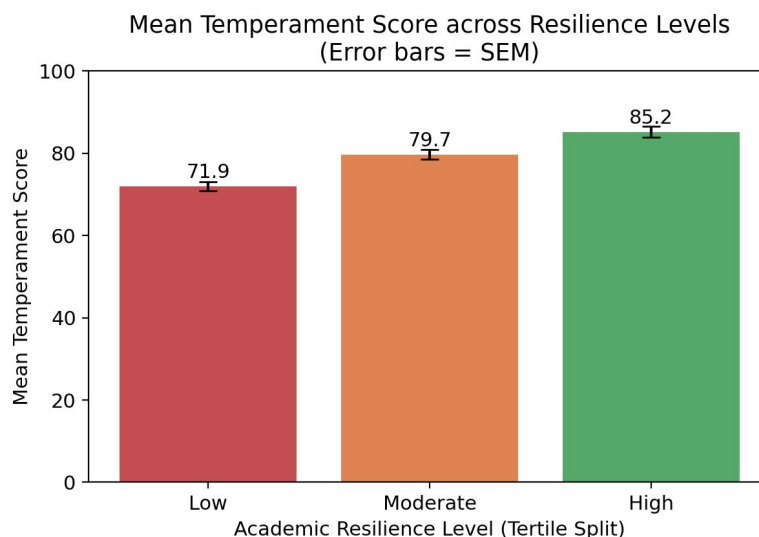


Figure 5: Mean Temperament Score across Resilience Levels (Error Bars = SEM)

4.4 Learning Style and Temperament (Objective 2 / H2)

A one-way ANOVA was conducted to compare temperament scores across the four dominant learning style groups. The results indicated a statistically significant difference, $F(3, 96) = 3.15$, $p = .029$, $\eta^2 = .089$ — a small-to-moderate effect size, indicating that dominant learning style accounted

for roughly 9% of the variance in temperament scores. As shown in Table 4 and Figure 6, adolescents with a Read/Write dominant learning style reported the highest mean temperament score ($M = 82.79$, $SD = 8.05$), followed by Visual ($M = 78.73$, $SD = 9.52$), Auditory ($M = 76.60$, $SD = 7.72$), and Kinesthetic ($M = 76.29$, $SD = 7.37$) groups. This finding supports Hypothesis 2.

Table 4: Mean Temperament Scores by Dominant Learning Style

Learning Style	N	Mean Temperament	SD
Read/Write	24	82.79	8.05
Visual	30	78.73	9.52
Auditory	15	76.60	7.72
Kinesthetic	31	76.29	7.37

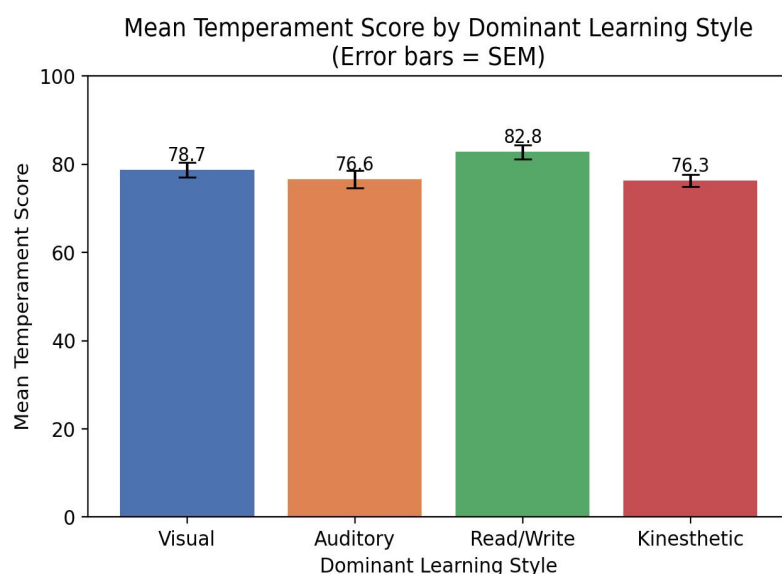


Figure 6: Mean Temperament Score by Dominant Learning Style (Error Bars = SEM)

A Tukey HSD post-hoc test was run to identify which specific group pairs differed. Only one pairwise comparison reached statistical significance: Kinesthetic vs. Read/Write learners (mean difference = 6.50, $p = .024$), with Read/Write learners scoring higher. None of the remaining pairwise comparisons (Auditory–Kinesthetic, Auditory–Read/Write, Auditory–Visual, Kinesthetic–Visual, Read/Write–Visual) reached significance, indicating that the overall ANOVA effect is being driven primarily by the gap between these two specific groups rather than a uniform difference across all four.

4.5 Supplementary Analyses

An independent-samples t-test found no significant difference in temperament scores between boys ($M = 79.02$, $SD = 8.42$) and girls ($M = 78.24$, $SD = 8.72$), $t(98) = 0.45$, $p = .650$, Cohen's $d = 0.09$ — a negligible effect size, suggesting that temperament

in this sample was not meaningfully influenced by gender.

A multiple linear regression was conducted with temperament score as the dependent variable and academic resilience along with the four VARK sub-scores as predictors. The overall model was significant, $F(5, 94) = 15.77$, $p < .001$, $R^2 = .456$, accounting for approximately 46% of the variance in temperament. Academic resilience emerged as the only statistically significant predictor ($\beta = 0.43$, $t = 8.33$, $p < .001$); none of the individual VARK sub-scores (Visual, Auditory, Read/Write, Kinesthetic) significantly predicted temperament once academic resilience was controlled for, indicating that resilience — rather than modality preference per se — is the primary driver of temperament in this sample, while learning style differences (Section 4.4) may instead reflect group-level tendencies rather than independent predictive strength.

Table 5: Multiple Regression Predicting Temperament Score (* $p < .05$)

Predictor	B	β	t	p
(Constant)	42.64	—	1.92	.058
Academic Resilience	0.43	.66	8.33	<.001*
Visual Score	0.04	.02	0.20	.845
Auditory Score	−0.22	−.08	−0.95	.347
Read/Write Score	0.06	.03	0.27	.792
Kinesthetic Score	−0.12	−.05	−0.53	.597

5. Discussion

The present findings offer clear support for both hypotheses. The strong positive correlation between academic resilience and temperament (Objective 1) aligns with the broader literature suggesting that resilience functions as a protective psychological resource, buffering adolescents against emotional volatility and fostering more stable, adaptive temperamental expression. Resilient adolescents likely engage in more effective coping and appraisal strategies when confronted with academic stressors, which over time may generalize into a more even-tempered behavioural style. This pattern also fits neatly within the theoretical framework outlined in Section 1.1: if resilience and temperament regulation draw on overlapping self-regulatory processes, as Masten's (2001) and Rothbart's (Rothbart & Bates, 2006) frameworks separately suggest, a correlation of this magnitude is exactly what would be expected.

The significant difference in temperament across learning style groups (Objective 2) suggests that modality preference is associated with, though not necessarily causal of, temperamental differences. The comparatively higher temperament scores

among Read/Write-dominant learners may reflect this group's tendency toward reflective, structured engagement with material, which could correspond with greater self-regulation. The post-hoc analysis narrows this further: the overall ANOVA effect is really being carried by the Kinesthetic–Read/Write contrast specifically, not a broad four-way separation. However, the regression results indicate that this relationship is considerably weaker than that of resilience — learning style explained a small-to-moderate share of variance on its own ($\eta^2 = .089$) but dropped out entirely as a significant predictor once resilience was included in the regression model — and should therefore be interpreted as an associative, group-level pattern rather than an independent predictive one.

The absence of a significant gender difference in temperament ($d = 0.09$, a negligible effect) is consistent with contemporary views that temperament, while biologically rooted, is not strongly gender-differentiated in adolescence once academic and coping-related variables are accounted for. Age group also showed no meaningful separation in mean temperament, suggesting that within the 13–18 window sampled here, resilience and learning style matter considerably more for temperament than either

gender or age.

5.1 Educational Implications

These findings carry practical implications for educators and school counsellors. Resilience-building interventions — such as growth-mindset training, structured feedback, and coping-skills programmes — may yield benefits that extend beyond academic performance into broader emotional and temperamental stability, given how strongly resilience tracked with temperament in this sample. Additionally, awareness of learning style diversity in classrooms, and particularly the modest but real difference observed between Kinesthetic and Read/Write learners, may support more inclusive pedagogy, with potential secondary benefits for students' emotional wellbeing. School counselling programmes might consider incorporating brief resilience-screening alongside routine academic monitoring, given the size of the effect observed here ($R^2 = .456$ in the combined regression model).

5.2 Limitations and Future Directions

- The cross-sectional design precludes causal inference; longitudinal designs are needed to establish directionality between resilience and temperament.
- The sample was drawn through purposive sampling from a limited geographic context, which may limit generalizability.
- Self-report measures may be subject to social desirability bias.
- The Shapiro-Wilk test indicated a mild departure from normality in temperament scores; while not considered a serious threat at this sample size, replication with larger samples would strengthen confidence in the parametric results.
- Future research could examine mediating variables (e.g., coping style, self-efficacy) that may explain the resilience-temperament relationship.
- Future studies could also employ a stratified random sampling design across multiple schools and regions to improve external validity.

6. Conclusion

This study demonstrates that academic resilience is strongly and positively associated with temperament among adolescents, and that temperament also varies meaningfully across dominant learning style groups, with Read/Write learners showing the highest temperament scores and Kinesthetic learners the lowest. Academic resilience emerged as the strongest overall predictor of temperament, accounting for the majority of explained variance in the combined

regression model, while gender and age showed negligible influence. These findings highlight academic resilience as a key psychosocial factor in adolescent emotional development and support the integration of resilience-focused strategies within educational settings, while suggesting that learning-style-sensitive pedagogy may offer a smaller, secondary benefit worth further investigation.

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