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Media Literacy and Scientific Thinking: The Mediating Role of Science Learning Motivation among Lower Secondary School Students

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ABSTRACT

Media-rich environments have expanded adolescents' access to scientific information while also increasing exposure to unsupported claims and misinformation. This exploratory pilot study examined associations among self-reported media literacy, science learning motivation, and scientific-thinking tendencies in 31 students in Grades 7–9. Participants completed an anonymous online 65-item researcher-developed questionnaire comprising media literacy (20 items), scientific-thinking tendencies (25 items), and science learning motivation (20 items), each rated on a five-point scale. Pearson correlations, simple and multiple linear regression, and a 5,000-resample bootstrap analysis were used. Media-literacy scores correlated with science-learning-motivation scores ($r = .730$) and scientific-thinking scores ($r = .799$); motivation also correlated with scientific-thinking scores ($r = .767$), all $p < .001$. Media literacy predicted motivation ($B = .554$, $\beta = .730$, $t = 5.755$, $p < .001$, $R^2 = .533$). In the adjusted model, media literacy ($B = .392$, $\beta = .510$, $p = .002$) and motivation ($B = .400$, $\beta = .395$, $p = .013$) were associated with scientific-thinking scores ($R^2 = .710$). The estimated indirect association was .221 (95% bootstrap CI [.020, .447]). Because the sample was small and non-probability based, all measures were collected concurrently by self-report, and the newly assembled instrument had not undergone full psychometric validation, these estimates should be interpreted as preliminary score associations rather than causal or population-level effects.

Keywords: *media literacy; scientific thinking; science learning motivation; lower secondary education; mediation analysis*

1. Introduction

Digital media have altered where and how adolescents encounter science. Textbooks and classroom instruction remain important, but students now obtain explanations about health, climate, technology, nutrition, and the natural world from search engines, social media, video platforms, online communities, and generative systems. This expansion of access is educationally valuable, yet access alone does not guarantee understanding. Online scientific content varies greatly in accuracy, evidentiary quality, transparency, and purpose. A learner may encounter a carefully sourced explanation, a commercial claim presented as evidence, and an emotionally persuasive piece of misinformation within the same browsing session. The central educational challenge is therefore not simply to provide information, but to help students judge what information deserves confidence and how it should be used.

Media literacy provides a useful framework for addressing this challenge. It extends beyond technical competence with devices and applications to include accessing information strategically, identifying authorship and purpose, recognizing persuasive techniques, comparing sources, evaluating evidence, detecting bias, and creating or sharing content responsibly. Livingstone (2004) described media literacy as a multidimensional capacity involving access, analysis, evaluation, and content creation (Livingstone, 2004). Hobbs (2010, 2017) similarly emphasized inquiry, critical analysis, communication, reflection, and responsible action (Hobbs, 2010, 2017). Potter (2019) argued that media literacy depends on actively applying knowledge structures and personal goals to interpret messages rather than consuming them passively (Potter, 2019). Taken together, these perspectives position media literacy as both a practical and epistemic competence: it concerns not only how media are used, but also how claims are warranted and meanings are constructed.

This epistemic dimension closely overlaps with scientific thinking. Scientific thinking refers to coordinated cognitive practices used to formulate questions, generate hypotheses, design or interpret investigations, evaluate evidence, draw warranted inferences, consider alternative explanations, and revise conclusions. It is not equivalent to recalling scientific facts. A student may know many facts yet still struggle to distinguish correlation from causation, recognize uncontrolled variables, or evaluate whether a conclusion follows from data. Developmental research indicates that the foundations of scientific reasoning emerge during childhood and can be strengthened through explicit opportunities to coordinate theory and evidence, compare explanations, and reflect on reasoning strategies (Kuhn & Franklin, 2006; Zimmerman, 2007). Lower secondary education is therefore a consequential period: students are gaining cognitive independence while being asked to reason about increasingly complex scientific and social issues.

The connection between media literacy and scientific thinking becomes especially visible when students assess science-related claims online. Judging a post about a medical intervention or environmental phenomenon requires the reader to identify the source, separate observation from interpretation, examine the quality of cited evidence, recognize missing information, and remain willing to revise an initial judgment. These actions draw simultaneously on media-literacy skills and scientific reasoning. Media environments can therefore provide contexts for science learning when students possess the interpretive tools needed to evaluate what they encounter.

Cognitive competence, however, does not ensure that students will invest the effort required for careful evaluation. Scientific inquiry is demanding: it involves sustained attention, uncertainty, revision, and sometimes the abandonment of an appealing explanation. Science learning motivation may therefore help explain when media-literacy skills are translated into scientific thinking. Motivation includes the processes that initiate, direct, and sustain learning behavior. Pintrich (2003) emphasized that motivation influences learners' goals, strategic engagement, persistence, and self-regulation (Pintrich, 2003). Students who value science, feel capable of learning it, and prefer mastery over superficial performance are more likely to seek clarification, compare evidence, and remain engaged when a problem is difficult.

Self-determination theory offers a complementary explanation. When learners experience autonomy, competence, and relatedness, they are more likely to internalize learning goals and participate with higher-quality motivation (Deci & Ryan, 2000; Ryan & Deci, 2020). Media-literate students may feel more competent and autonomous when navigating scientific information because they can search purposefully, select credible sources, and exercise informed judgment. That experience may strengthen curiosity and perceived control over learning. Motivation may then support the sustained cognitive engagement needed for scientific thinking. This pathway is theoretically plausible without implying that media literacy automatically causes motivation or that motivation necessarily causes reasoning, particularly in a cross-sectional design.

Research on science motivation supports the importance of treating motivation as multidimensional. The Science Motivation Toward Science Learning framework includes self-efficacy, active learning strategies, the value of science learning, achievement and performance goals, and stimulation from the learning environment (Tuan et al., 2005). Analysis of large-scale assessment data likewise indicates that science motivation is better represented through multiple related dimensions than as a single undifferentiated trait (Zhang et al., 2023). Kubsch et al. (2023) showed that distinct motivational profiles are associated with students' engagement and science-learning experiences (Kubsch et al., 2023). These findings imply that motivation may function as a bridge between having the capacity to evaluate information and choosing to apply that capacity persistently.

Recent work also connects digital literacy, science motivation, and science-learning competence. In a sample of 471 middle school students, Nacaroğlu et al. (2025)

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reported positive relations among science learning motivation, digital literacy, and science-learning competence, with digital literacy partially mediating the relation between motivation and competence (Nacaroğlu et al., 2025). Although that model differs directionally and conceptually from the present study, it supports examining contemporary literacies and motivation within the same explanatory framework. It also cautions against treating access to technology as a substitute for the ability to evaluate and use information.

Despite these conceptual links, relatively few studies have examined media literacy, science learning motivation, and self-reported scientific-thinking tendencies within the same model among lower secondary students. Existing studies frequently address related but non-equivalent constructs, including digital literacy, scientific literacy, or science-learning competence. The present exploratory pilot study specified media-literacy score as the predictor, scientific-thinking score as the outcome, and science-learning-motivation score as the statistical intervening variable. Because all variables were self-reported at one time point, the indirect path is interpreted only as a model-based association and not as evidence of temporal or causal mediation.

The study tested four prespecified score-level hypotheses: (H1) media-literacy score would positively predict science-learning-motivation score; (H2) media-literacy score would be positively associated with scientific-thinking score; (H3) science-learning-motivation score would positively predict scientific-thinking score after adjustment for media-literacy score; and (H4) media-literacy score would have a positive indirect association with scientific-thinking score through science-learning-motivation score. The analyses were intended as an exploratory assessment of the proposed score relationships, not as validation of a population-level latent-variable model.

2. Methods and Materials

2.1. Design

A quantitative, cross-sectional, descriptive-correlational pilot design was used. Media-literacy score was specified as the predictor, science-learning-motivation score as the statistical intervening variable, and scientific-thinking score as the outcome. No variable was manipulated, and all observations were collected during one period. Accordingly, the coefficients represent contemporaneous associations and statistical prediction; they do not establish temporal ordering, developmental change, or causal effects.

2.2. Participants and Sampling

The analytic sample comprised 31 lower secondary school students enrolled in Grades 7–9. Eighteen participants (58.1%) were girls and 13 (41.9%) were boys; 18 (58.1%) were in Grade 9, seven (22.6%) in Grade 7, and six (19.4%) in Grade 8. Participants were recruited by convenience sampling and completed the electronic questionnaire voluntarily through the Digiform platform. Eligibility required enrollment in Grade 7, 8, or 9, ability to read Persian-language items, access to the online form, and willingness to participate. Because the available study record did not contain age, location, school-type, recruitment-period, invitation, response-flow, or exclusion-count data, the sample cannot be characterized beyond the reported grade and sex distributions.

With 31 participants for a 65-item instrument, the study was not designed or powered for psychometric validation, stable subgroup comparisons, or latent-variable modeling. No exploratory or confirmatory factor analysis was conducted. The estimates are sensitive to individual observations and cannot be generalized beyond this convenience sample. The present report therefore treats the questionnaire totals as preliminary composite scores and the inferential analyses as hypothesis-generating.

2.3. Measures

Data were collected with a 65-item researcher-developed questionnaire assembled from established conceptual frameworks. All items used a five-point Likert-type scale from 1 (strongly disagree) to 5 (strongly agree), and all items were positively worded. Construct scores were calculated as the mean of the corresponding items, giving a possible range of 1–5. Formal expert-based content validation, cognitive interviewing, factor analysis, and complete internal-consistency estimates were not available for this pilot dataset. The scores must therefore be interpreted as provisional composite indicators rather than validated measurements of distinct latent constructs.

2.3.1. Media Literacy

Media literacy was assessed with 20 items organized conceptually into five four-item domains: access and information needs; source location and selection; analysis

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and evaluation of message credibility; organization and purposeful use of information; and media production, exchange, and ethics. The domains addressed whether students could identify an information need, locate and compare sources, examine purpose and credibility, detect bias, organize information for a learning goal, and share content responsibly. The conceptual basis drew on multidimensional approaches to media literacy emphasizing access, analysis, evaluation, and creation (Hobbs, 2010; Livingstone, 2004; Potter, 2019).

2.3.2. *Scientific Thinking*

Scientific thinking was assessed with 25 items distributed across five five-item domains: questioning and hypothesis generation; research design and control of variables; evidence evaluation; inference and logical reasoning; and scientific metacognition and revision of beliefs. The items were intended to capture students' reported tendency to frame answerable questions, consider competing hypotheses, identify confounding influences, judge whether evidence is sufficient, derive conclusions from data, detect weaknesses in reasoning, and reconsider a belief when new evidence becomes available. The conceptualization was informed by research on the development of scientific reasoning and critical evaluation (Kuhn & Franklin, 2006; Zimmerman, 2007).

2.3.3. *Science Learning Motivation*

Science learning motivation was measured with 20 items representing five four-item domains: intrinsic motivation and scientific curiosity; perceived value and utility of science learning; science self-efficacy; mastery and growth orientation; and persistence and active engagement. The content was conceptually adapted from research on motivation toward science learning, particularly the multidimensional framework developed by Tuan et al. (2005) (Tuan et al., 2005). The adaptation was intended to make the language appropriate for lower secondary students; it was not treated as a direct administration of the original scale. This distinction is important because adaptation may alter a measure's factor structure and psychometric properties.

2.4. *Data Collection and Ethical Procedures*

The questionnaire was administered electronically. Before participation, students received information about the study purpose, voluntary participation, confidentiality, anonymous handling of responses, and the right to discontinue without penalty. No names, national identification numbers, telephone numbers, or school names were collected, and responses were analyzed in aggregate. Informed consent was reported as having been obtained before questionnaire completion. No institutional ethics committee name or approval number was recorded in the study documentation available for this report.

2.5. *Statistical Analysis*

Means were calculated for the three composite scores. Pearson product–moment correlations were used to examine bivariate associations. A simple linear regression evaluated the association between media-literacy score and science-learning-motivation score. A multiple regression evaluated the independent associations of media-literacy and motivation scores with scientific-thinking score. Unstandardized coefficients (B), standardized coefficients (β), standard errors derived from the reported coefficients and t statistics, 95% confidence intervals, t values, p values, R^2, adjusted R^2, and overall model F statistics are reported where derivable from the available summary statistics. The dataset documentation did not provide complete residual, influence, or multicollinearity diagnostics; consequently, model estimates are interpreted cautiously.

The indirect association between media-literacy and scientific-thinking scores through science-learning-motivation score was estimated with 5,000 bootstrap resamples. The reported 95% bootstrap confidence interval was used to determine whether the indirect estimate excluded zero. The available analysis record did not identify the software, package, random seed, or bootstrap interval type. The analysis is therefore reported as an observed-score, cross-sectional indirect-effect model rather than a causal mediation analysis.

3. Findings and Results

Mean scores were 3.81 for media literacy, 3.84 for scientific-thinking tendencies, and 3.91 for science learning motivation. The available summary output did not include standard deviations, observed ranges, or confidence intervals. These means describe only the 31-person pilot sample and cannot be interpreted as population prevalence or as evidence that any construct was objectively high.

Table 1 presents the zero-order correlations among the three self-reported composite scores. Media-literacy score

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was positively associated with science-learning-motivation score ($r = .730$, $p < .001$) and scientific-thinking score ($r = .799$, $p < .001$). Motivation score was also positively associated with scientific-thinking score ($r = .767$, $p < .001$). These large coefficients may partly reflect conceptual overlap, uniformly positive item wording, acquiescent responding, and common-method variance because all constructs were assessed in the same self-report instrument.

Table 1

Pearson correlation matrix for the principal constructs

Variable	1	2	3
1. Media literacy	1		
2. Science learning motivation	.730***	1	
3. Scientific thinking	.799***	.767***	1

Note. N = 31. ***p < .001.

As reported in Table 2, media-literacy score was positively associated with science-learning-motivation score ($B = .554$, $SE = .096$, 95% CI [.357, .751], $\beta = .730$, $t(29) = 5.755$, $p < .001$). The model was significant, $F(1, 29) = 33.10$, $p < .001$, $R^2 = .533$, adjusted $R^2 = .517$. These results support H1 at the score-association level but do not show that increasing media literacy would cause motivation to increase.

Table 2

Simple regression predicting science learning motivation

Predictor	B	SE	95% CI	β	t(df)	p
Media literacy	.554	.096	[.357, .751]	.730	5.755 (29)	< .001

Note. N = 31. $F(1, 29) = 33.10$, $p < .001$, $R^2 = .533$, adjusted $R^2 = .517$. SEs and confidence limits were derived from the reported B and t statistics.

As shown in Table 3, media-literacy score remained positively associated with scientific-thinking score after science-learning-motivation score was included ($B = .392$, $SE = .114$, 95% CI [.158, .626], $\beta = .510$, $t(28) = 3.429$, $p = .002$). Motivation score also contributed independently ($B = .400$, $SE = .151$, 95% CI [.091, .709], $\beta = .395$, $t(28) = 2.652$, $p = .013$). The overall model was significant, $F(2, 28) = 34.28$, $p < .001$, $R^2 = .710$, adjusted $R^2 = .689$. These findings are consistent with H2 and H3 as score-level associations. However, the high R^2 may be unstable in a 31-person convenience sample and may be inflated by conceptual overlap and common measurement method.

Table 3

Multiple regression predicting scientific thinking

Predictor	B	SE	95% CI	β	t(df)	p
Media literacy	.392	.114	[.158, .626]	.510	3.429 (28)	.002
Science learning motivation	.400	.151	[.091, .709]	.395	2.652 (28)	.013

Note. N = 31. $F(2, 28) = 34.28$, $p < .001$, $R^2 = .710$, adjusted $R^2 = .689$. SEs and confidence limits were derived from the reported B and t statistics.

Figure 1

Association between media-literacy and self-reported scientific-thinking scores. The scatterplot shows a positive sample-level trend: participants with higher media-literacy scores tended to have higher scientific-thinking scores (N = 31, r = .799, p < .001). The cross-sectional pattern does not represent within-person change or a causal effect.

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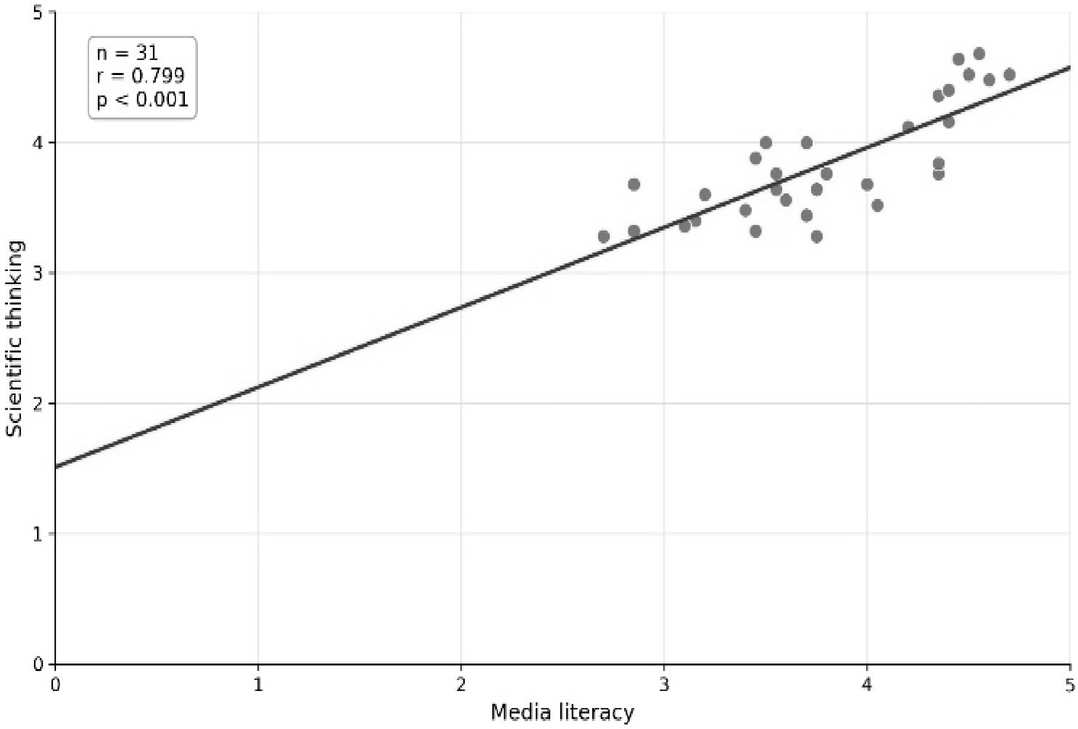

As reported in Table 4, the estimated indirect association of media-literacy score with scientific-thinking score through science-learning-motivation score was .221 (95% bootstrap CI [.020, .447]). Because the interval excluded zero, the specified model was consistent with H4 at the score-association level. The adjusted direct coefficient remained positive (B = .392), and the total coefficient was .613. The pattern is consistent with a statistically detectable indirect path under the specified cross-sectional model, but it does not establish temporal precedence, causal mediation, or exclusion of alternative variable orderings.

Table 4

Bootstrap mediation analysis

Effect	Path	Coefficient	95% CI lower	95% CI upper
Adjusted direct	Media literacy → Scientific thinking	.392	.158	.626
Indirect	Media literacy → Motivation → Scientific thinking	.221	.020	.447
Total	Media literacy → Scientific thinking	.613	—	—

Note. The direct-effect confidence limits were derived from B = .392 and t(28) = 3.429. The reported indirect interval was obtained from 5,000 bootstrap resamples. A confidence interval for the total effect was not available.

Figure 2

Cross-sectional indirect-effect model linking media-literacy, science-learning-motivation, and self-reported scientific-thinking scores. The estimated indirect association was .221 (95% bootstrap CI [.020, .447]); this model-based result does not establish temporal or causal mediation.

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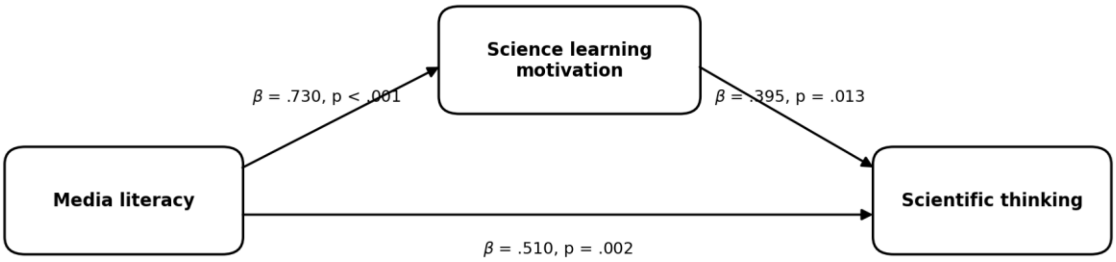

Note. Standardized regression coefficients are shown on the paths. The indirect effect is unstandardized and was estimated using 5,000 bootstrap resamples.

4. Discussion

This exploratory pilot study identified large positive associations among self-reported media-literacy, science-learning-motivation, and scientific-thinking scores. Media-literacy score predicted motivation score, and both scores contributed to scientific-thinking score in the adjusted model. The bootstrap indirect estimate excluded zero. These results apply to contemporaneously collected questionnaire scores in this 31-person sample and do not demonstrate effects on objectively measured scientific-reasoning ability.

The strong media literacy–scientific thinking association is conceptually coherent. Evaluating a scientific media message requires many of the same epistemic operations involved in scientific reasoning: checking the provenance of a claim, judging the adequacy of evidence, distinguishing data from interpretation, identifying omitted variables, considering alternative explanations, and adjusting confidence when evidence is weak. Zimmerman (2007) described scientific thinking as the coordination of hypotheses, evidence, and metacognitive monitoring (Zimmerman, 2007). Media literacy frameworks likewise emphasize active analysis and evaluation rather than passive exposure (Hobbs, 2010; Livingstone, 2004). The overlap suggests that media-literacy activities may offer authentic contexts in which students can practice evidence evaluation.

At the same time, conceptual overlap may have inflated the observed correlation. Both constructs were measured through positively worded self-report items within one questionnaire. A participant who generally describes themself as careful or competent may respond favorably across domains, producing shared method variance. Some scientific-thinking items may also capture perceived reasoning habits rather than demonstrated reasoning performance. Future work should therefore combine self-report media-literacy measures with performance tasks—for example, asking students to compare competing online claims—and should assess scientific thinking through open-ended evidence-evaluation or investigation-design tasks.

The positive prediction of science learning motivation by media literacy is also plausible. Learners who can navigate information effectively may experience greater control and competence when engaging with scientific content. These experiences align with basic psychological needs highlighted by self-determination theory (Deci & Ryan, 2000; Ryan & Deci, 2020). Students may be more willing to explore a topic when they know how to locate credible explanations and less likely to disengage because of informational confusion. However, the reverse direction is equally plausible: highly motivated students may seek information more often and consequently develop stronger media-literacy practices. Longitudinal data are needed to distinguish these possibilities.

The motivational findings are broadly compatible with research treating science motivation as multidimensional. Kubsch et al. (2023) identified longitudinal motivational profiles associated with learning across a 10-week science unit (Kubsch et al., 2023), while Zhang et al. (2023) examined the multidimensional factor structure of science-learning motivation (Zhang et al., 2023). Nacaroğlu et al. (2025) reported associations among science-learning motivation, digital literacy, and science-learning competence in 471 middle school students, but their constructs and proposed direction differed from those in the present study (Nacaroğlu et al., 2025). These studies provide conceptual context rather than direct confirmation of the present cross-sectional indirect-effect model.

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The indirect estimate requires particularly cautious interpretation. Cross-sectional indirect-effect analysis cannot establish that media literacy preceded motivation or that motivation preceded scientific thinking. Reverse and competing models remain plausible: motivated students may seek information more actively; scientific-thinking tendencies may encourage critical media evaluation; or classroom climate and general academic self-efficacy may influence all three scores. The result should therefore be treated as hypothesis-generating and tested with temporally ordered or experimental data.

The high R^2 of .710 also warrants caution. Although it indicates that the two predictors accounted for a large proportion of observed variation in this sample, estimates from small convenience samples can be unstable and may not replicate. Overlap among questionnaire domains and common response formats can further raise explained variance. Replication should use a prespecified analysis, a substantially larger sample, separate administration of predictors and outcomes where practical, and cross-validation or an independent validation sample.

4.1. Educational Implications

The results provide a rationale for testing, rather than implementing on the basis of this study alone, integrated media-literacy activities in science instruction. A future intervention could ask students to identify the source of a science claim, locate corroborating evidence, specify the data needed to test it, and justify a confidence judgment. Such instruction should be evaluated against an active control condition using validated self-report measures and performance-based scientific-reasoning outcomes.

Instruction should also be motivationally supportive. Choice among topics can promote autonomy; tasks of graduated difficulty and formative feedback can strengthen competence; and collaborative source evaluation can foster relatedness. The goal is not to make science entertaining at the expense of rigor, but to create conditions in which students see inquiry as manageable, valuable, and personally relevant. Teachers should explicitly model uncertainty, show why changing one's mind in response to evidence is a strength, and distinguish responsible skepticism from indiscriminate distrust.

Curriculum research may also examine whether socio-scientific issues—such as health claims, environmental controversies, and emerging technologies—provide effective contexts for jointly teaching source evaluation and scientific reasoning. Controlled studies should specify credibility criteria, address conflicts of interest and persuasive design, and assess whether students can transfer evaluation skills to unfamiliar claims.

4.2. Limitations and Directions for Future Research

Several limitations materially constrain interpretation. First, the convenience sample of 31 students was too small for stable psychometric validation, subgroup analysis, or broad generalization. Second, all data were cross-sectional, preventing temporal or causal inference. Third, all constructs were assessed by positively worded self-report items within one session, creating risks of acquiescence, social desirability, conceptual overlap, and common-method variance. Fourth, the 65-item questionnaire had no reported expert-based content validation, factor structure, or complete reliability estimates. Fifth, standard deviations, observed score ranges, complete regression diagnostics, and full recruitment-flow information were unavailable. Sixth, the software and bootstrap interval method were not documented. These limitations mean that the findings concern preliminary questionnaire-score associations only.

Future studies should begin with rigorous instrument development. Expert review and cognitive interviews with students can assess content coverage and comprehension. Pilot data from a sufficiently large and diverse sample should be used for exploratory factor analysis, followed by confirmatory factor analysis in an independent sample. Reliability should be reported with coefficients appropriate to the measurement model and accompanied by uncertainty estimates. Criterion validity can be examined by comparing questionnaire scores with performance-based tasks.

A longitudinal design would allow researchers to test whether earlier media literacy predicts later motivation and scientific thinking after controlling for baseline levels. Experimental work could compare a structured media-evaluation intervention with an active control condition and measure both immediate and delayed outcomes. Multilevel designs would be valuable because students are nested within classrooms and schools; teacher practices, digital access, and classroom climate may influence all three constructs. Larger samples would also permit examination of whether relationships vary by grade, gender, socioeconomic context, or access to digital resources.

5. Conclusion

In this exploratory pilot sample of 31 lower secondary students, self-reported media-literacy, science-learning-motivation, and scientific-thinking scores were strongly and positively associated. The specified model yielded a positive indirect estimate through motivation, while the adjusted media-literacy coefficient remained positive. Because the instrument was not psychometrically validated, all measures were self-reported concurrently, and the sample was small and non-probability based, the findings do not demonstrate causal mediation, objective scientific-thinking ability, or population-level effects. Replication requires a validated instrument, performance-based outcomes, complete ethical and sampling documentation, a substantially larger sample, and temporally ordered or experimental data.

Authors' Contributions

V.S.: conceptualization, methodology, supervision, writing—original draft, and writing—review and editing. Z.T.: data collection, data curation, formal analysis, and writing—original draft. Both authors reviewed and approved the final manuscript and accept responsibility for its content.

Declaration

A generative artificial intelligence tool was used for English translation, language refinement, structural editing, and consistency checking. The authors reviewed the resulting text and remain responsible for the accuracy of the study description, statistical results, references, and final manuscript. No artificial intelligence system is listed as an author.

Transparency Statement

De-identified data may be made available by the corresponding author upon reasonable request, subject to ethical and institutional restrictions applicable to research involving minors.

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Declaration of Interest

The authors report no conflict of interest.

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Ethics Considerations

Participation was voluntary, and the anonymous electronic questionnaire collected no directly identifying information. Participants received information about the study purpose, confidentiality, and their right not to participate or to discontinue. Informed consent was reported before questionnaire completion, and data were analyzed in aggregate. No institutional ethics committee name or approval number was recorded in the study documentation available for this report.

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