Journal of International Scholarship, 2026, Volume 1, Issue 1, e011005
https://doi.org/10.65030/jis.011005
www.idrjournal.com/jis

What Drives Interest in Astronomy Content? Evidence for the Primacy of Domain Specific Interest Over Personality

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Abstract

This study examined whether engagement with astronomy content is better explained by domain specific interest than by broad personality traits. Thirty-five undergraduate students read a brief astronomy passage, and rated their interest in the passage material, psychological absorption, science fiction interest, interest in watching the night sky and the Ten Item Personality Inventory. Correlational analyses indicated that passage interest was positively associated with absorption and night sky interest, but not with personality traits. In regression analyses, only interest in the night sky showed a significant association with passage interest, whereas personality traits did not account for additional variance. These findings support a proximal–distal framework in which domain specific interests more directly drive engagement with scientific content than global personality traits. Implications for science education and engagement are discussed.

Keywords: Astronomy interest; domain specific interest; personality traits; psychological absorption; student engagement; science education

Received: 2026-03-11
Accepted: 2026-03-27

1. Introduction

Interest in astronomy represents one of the most enduring forms of human curiosity, rooted in both scientific inquiry and aesthetic experience. Across history, the night sky has served not only as an object of observation but also as a source of wonder, reflection, and meaning [1]. Contemporary research suggests that this sense of "wonder about the universe" plays a central role in motivating engagement with astronomy. For example, Barragan and Meltzoff [2] found that greater visibility of the night sky was associated with increased feelings of wonder, which in turn predicted behavioral interest in astronomy. These findings underscore the importance of affective and experiential processes in shaping engagement with astronomical content.

Within science education research, interest has been identified as a key driver of engagement, persistence, and identity formation. Recent work situates astronomy within an identity framework in which affective, cognitive, and motivational variables jointly influence how individuals relate to the domain. In this framework, interest plays a central role, both directly and indirectly influencing astronomy identity through pathways such as perceived value and confidence [3]. Although much of this work has focused on developmental populations, it highlights a broader principle: individuals differ in their attraction to astronomy, and these differences are tied to underlying dispositional factors. While broad personality traits such as openness to experience are linked to intellectual curiosity and aesthetic

ISSN: 3142-9033

engagement [4], their predictive utility may be limited when more proximal, domain relevant dispositions are considered [5].

One class of such proximal dispositions involves interest in astronomy related experiences and content, including both observational engagement (e.g., watching the night sky or learning about the night sky) and imaginative engagement with astronomical themes (e.g., astronomy related science fiction). These interests appear to reflect curiosity, aesthetic responsiveness, and attentional engagement with large scale or abstract phenomena, and have been linked to broader patterns of exploratory and intellectual activity [6–8]. Although both astronomy content interest and night sky interest reflect engagement, they represent conceptually distinct levels: interest in astronomy related content could reflect immediate engagement with specific content, whereas night sky watching interest reflects a broader, preexisting domain specific disposition [6]. Such domain specific interests may therefore capture motivational processes more directly than global personality traits when predicting responses to specific content.

Closely related to these tendencies is psychological absorption, defined as a disposition toward becoming deeply immersed in perceptual and imaginative experiences [9]. Absorption has been associated with fantasy proneness and attentional engagement [10], and individuals higher in absorption may be more responsive to evocative material, including descriptions of cosmic phenomena [11].

At the same time, theories of interest development emphasize that domain specific interests are often stronger predictors of engagement than global traits [12]. In the context of astronomy, individuals with a preexisting interest in the night sky may be especially likely to engage with astronomy related material.

The present study contributes to the literature by directly comparing domain specific interest and broad personality traits as predictors of engagement with astronomy related scientific content, thereby testing a proximal–distal framework of motivational influence. Specifically, it was examined whether engagement with a brief astronomy passage is associated with (a) broad personality traits, (b) imaginative involvement (absorption), and (c) domain specific interests, including science fiction preference and interest in watching the night sky. It was expected that domain specific interest in the night sky would be the strongest predictor of engagement, whereas broad personality traits would show weaker associations when considered alongside more proximal predictors.

2. Methods

2.1 Participants

Participants were 35 undergraduate students enrolled in social science courses at a university. The sample consisted of 14 men and 21 women, with a mean age of 25.09 years (SD = 9.38). Participants were recruited through course based convenience sampling and completed the study voluntarily.

2.2 Measures

2.2.1 Passage and Comprehension Quiz

Participants read ~ 600-word passage describing basic astronomical concepts, including stars, galaxies, and observational features of the night sky. To assess attention to the material, participants completed an 8-item true-false quiz based on passage content. Quiz scores were used as an indicator that participants had attended to and understood the passage.

2.2.2 Interest in Passage

Interest in the material was assessed using a single-item measure ("How interesting did you find this passage?"), rated on a 10-point Likert-type scale ranging from 1 (Strongly disagree) to 10 (Strongly agree).

2.2.3 Domain Specific Interests

Three single-item measures were used to assess domain relevant dispositions. These included a measure of absorption ("I find it easy to become deeply absorbed in things that I do and/or my fantasies"), a measure of science fiction interest ("I enjoy science fiction books and/or movies"), and a measure of

interest in watching the night sky ("I am interested in watching the night sky"). All items were rated on the same 10-point scale as above, with higher scores indicating greater endorsement.

2.2.4 Personality

Broad personality traits were assessed using the Ten Item Personality Inventory (TIPI) [13], a brief measure of the Five Factor Model domains: extraversion, agreeableness, conscientiousness, neuroticism, and openness to experience. Participants respond to items using a 7-point scale from 1 (Strongly disagree) to 7 (Strongly agree). Although the TIPI is intentionally brief and therefore yields lower internal consistency coefficients than longer measures, prior research has demonstrated acceptable convergent validity with standard Big Five instruments and adequate test-retest reliability, supporting its use in research contexts where brevity is required [13].

2.3 Procedure

Participants completed the study in an online format. After providing consent, they read the astronomy passage and immediately completed the comprehension quiz. They then rated their interest in the passage and completed the domain specific interest items, followed by the TIPI. The study required approximately 10 minutes to complete. The study was conducted in accordance with ethical standards.

2.4 Statistical Analyses

Descriptive statistics were computed for all study variables, followed by Pearson correlation analyses to examine bivariate associations among interest in the passage, quiz performance, domain specific interest variables, and personality traits.

To examine the relative contribution of predictors, hierarchical multiple regression analyses were conducted with interest in the passage as the dependent variable. Domain specific variables (absorption, science fiction interest, and interest in watching the night sky) were entered in the first step. In the second step, the five personality traits were added to determine whether they accounted for additional variance beyond the domain specific predictors. Statistical significance was evaluated using two-tailed tests with $p < .05$.

3. Results

Descriptive statistics of variables and Pearson correlations are presented in Tables 1 and 2, respectively. As indicated in Table 1, the average quiz score was 6.80 out of 8 points, indicating adequate attention and comprehension of the passage. Other variables were near the midpoint of their scales, though positively valanced TIPI scales (e.g., conscientiousness) were slightly higher than the expected midpoint.

Table 1: Variable Descriptive Statistics

Variable	M	SD
1. Quiz	6.80	1.26
2. Interest	5.89	2.30
3. Absorbed	6.71	1.76
4. Science fiction	5.74	2.45
5. Night sky	6.63	2.66
6. Extraversion	10.00	2.54
7. Agreeableness	10.34	2.17
8. Conscientiousness	11.49	2.20
9. Neuroticism	6.29	2.40
10. Openness	10.69	1.86

As presented in Table 2, interest in the passage was positively associated with absorption and interest in watching the night sky. Science fiction interest was not significantly related to passage interest. None

of the Big Five personality traits were significantly associated with interest in the passage. Absorption was positively associated with science fiction interest and interest in watching the night sky, suggesting overlap among these domain relevant dispositions. Interest in watching the night sky was negatively associated with neuroticism. Quiz performance was not significantly related to most study variables, although it was negatively associated with agreeableness. Overall, the pattern of correlations suggests that engagement with the passage is more strongly associated with domain specific interests and imaginative involvement than with broad personality traits.

Table 2: Correlations Among Study Variables

Variable	1	2	3	4	5	6	7	8	9
1. Quiz	—								
2. Interest	.16	—							
3. Absorbed	−.05	.35*	—						
4. Science fiction	.19	.15	.50**	—					
5. Night sky	.08	.37*	.41*	.06	—				
6. Extraversion	−.17	.06	−.16	−.04	.02	—			
7. Agreeableness	−.37*	−.04	.08	−.04	.33	.32	—		
8. Conscientiousness	.04	−.21	.13	.08	.02	−.23	.19	—	
9. Neuroticism	.17	.13	−.18	−.12	−.35*	−.25	−.39*	−.11	—
10. Openness	.07	.14	−.02	.10	−.07	.40*	.11	−.25	−.18

Note: N = 35. *p < .05, **p < .01

Hierarchical multiple regression analyses were conducted to examine predictors of interest in the passage (see Table 3). In Model 1, domain specific variables (absorption, science fiction interest, and interest in watching the night sky) were entered as predictors. This model accounted for 18.4% of the variance in passage interest, although the overall model did not reach statistical significance, $R^2 = .18$, $F(3, 31) = 2.32$, $p = .094$, and no predictors were significant.

Table 3: Regression Predicting Interest in Reading Passage

Predictor	Model 1 β	Model 2 β
Absorption	.23	.28
Science fiction	.02	.03
Night Sky	.28	.42*
Extraversion		.12
Agreeableness		−.10
Conscientiousness		−.13
Neuroticism		.34
Openness		.16
Model Statistics Model 1: $R^2 = .18$, Adj. $R^2 = .11$, $p = .094$. Model 2: $R^2 = .36$, Adj. $R^2 = .16$, $\Delta R^2 = .18$, $p = .247$		
Note: $p < .05$		

In Model 2, the Big Five personality traits were added. The inclusion of personality traits did not result in a significant increase in explained variance, $\Delta R^2 = .18$, F change (5, 26) = 1.43, $p = .247$, indicating that personality did not contribute meaningfully beyond the domain specific variables. The full model accounted for 36.0% of the variance in passage interest (adjusted $R^2 = .16$).

In the final model, interest in watching the night sky emerged as the only significant predictor. Neuroticism showed a trend level positive association, whereas absorption, science fiction interest, and the remaining personality traits were not significant predictors.

4. Discussion

The present study examined individual differences in engagement with a brief astronomy passage, focusing on the relative contributions of broad personality traits, imaginative involvement, and domain specific interests. The present findings provide a direct test of the relative predictive utility of domain specific interest versus broad personality traits in shaping engagement with scientific material. Consistent with expectations, interest in the passage was associated primarily with domain specific interest in the night sky and, to a lesser extent, absorption. In contrast, broad personality traits were not significantly related to engagement and did not account for additional variance beyond domain proximal predictors. Importantly, this pattern emerged despite the inclusion of both general personality traits and a measure of imaginative involvement, suggesting that domain specific interest operates as a uniquely proximal predictor.

These findings support the hypothesis that domain specific interest would be the strongest predictor of engagement with astronomy related material. Participants who reported greater interest in watching the night sky also reported greater interest in the passage, and this variable emerged as the only significant predictor in the regression model. Although the overall regression models did not reach statistical significance, the pattern of coefficients was consistent with the hypothesized role of domain specific interest. This pattern aligns with theoretical models emphasizing the proximal role of content specific interest in shaping engagement [12,14]. It is also consistent with evidence that personal relevance enhances attention, processing, and persistence [15]. Moreover, these findings are consistent with research linking engagement with astronomy to domain relevant interest structures [3]. In the present context, preexisting interest in astronomy related experiences appears to provide the most direct pathway to engagement with related content.

Absorption showed a moderate bivariate association with passage interest but did not remain a significant predictor when considered alongside domain specific interest. This suggests that absorptive involvement may contribute to engagement in a more indirect or overlapping manner. Individuals high in absorption are more likely to become immersed in evocative material, including descriptions of large scale or abstract phenomena [9,10]. However, the present findings indicate that this general tendency does not uniquely predict interest in astronomy content once domain specific interest is considered. This interpretation is consistent with research suggesting that experiential traits influence the intensity of engagement, whereas content specific interests determine its direction [16].

Science fiction interest was not significantly associated with engagement, suggesting that preference for fictional or speculative content does not necessarily translate into interest in real world scientific material. Although both domains involve imaginative themes, this finding highlights the importance of distinguishing between general imaginative preferences and specific interest in scientific content when predicting engagement.

Broad personality traits, including openness to experience, were not significantly related to passage interest and did not improve the predictive model beyond domain proximal interests. This is notable given established links between openness and intellectual curiosity, aesthetic engagement, and night sky interest [4,6]. However, it is consistent with prior work demonstrating that global personality traits often have limited predictive utility for specific behaviors when more proximal variables are included [5].

Taken together, these findings support a proximal–distal model in which domain specific interests directly guide engagement, whereas broader traits operate more indirectly. Broad personality traits may provide a general predisposition toward curiosity, and traits such as absorption may facilitate immersive experiences. However, domain specific interests, such as interest in observing the night sky, function as the most immediate predictors of engagement. This framework is in line with broader perspectives emphasizing the role of intrinsic interest and personal relevance in guiding attention and learning [14,15].

Several limitations of the present study should be noted. The sample size was small, limiting statistical power and the stability of estimates. Key constructs were assessed using single-item measures, which may have attenuated observed relationships due to reduced reliability and potentially underestimated associations among constructs. Personality was assessed using a brief instrument, which may constrain precision. Future research should incorporate larger samples, multi-item measures, and more comprehensive assessments of both personality and domain specific interest. Future work may also examine how domain specific interests develop over time and whether experiential interventions, such as increased exposure to the night sky, can enhance engagement with scientific content.

Despite these limitations, the present findings provide a clear pattern indicating that engagement with astronomy content is driven primarily by domain specific interest rather than broad personality traits or general imaginative tendencies. These results have implications for science education and outreach, suggesting that fostering direct interest in astronomy, particularly through experiences that connect individuals to observable phenomena, may be an effective strategy for enhancing engagement.

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