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Moral Foundations as Predictors of Academic Success: Examining GPA and Subject Preferences in Middle Adolescents

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Abstract: This study explores relationships between adolescents' moral foundations and academic outcomes, extending existing psychological frameworks into educational research. A sample of 192 German high school students (aged 15–17) completed the Moral Foundations Questionnaire, although the analyses specifically focused on the Care, Fairness, and Authority foundations based on theoretical relevance to educational contexts. Academic achievement (grade point average, GPA) and subject preferences were measured through self-reported grades and subject rankings. Data were analyzed using non-parametric correlations, ordinal logistic regression, and group comparisons. Results indicated that higher scores in the Care foundation were significantly associated with better GPA, whereas Fairness showed no significant correlation. Moreover, students expressing dislike for natural sciences displayed significantly higher Authority foundation scores. These results suggest that specific moral foundations may be relevant in shaping academic performance and subject preferences among adolescents. Future studies should further explore underlying mechanisms to inform targeted educational practices.

Keywords: Moral Foundations Theory; academic achievement; adolescents; Educational Psychology; subject preferences.

I. Introduction

What role does morality play in shaping educational outcomes? While morality has long been acknowledged as foundational to fostering ethical behavior, interpersonal respect, and community cohesion within educational environments, its role in shaping academic performance and subject preference remains on the margins of mainstream educational research. Although increasing attention is being given to social-emotional learning and student motivation (Durlak 2013; Tlapa et al. 2013), the influence of underlying moral intuitions on educational processes has yet to be fully integrated into educational psychology and pedagogy.

Morality has been examined through a range of theoretical lenses, including cognitive, emotional, dual-process, neuroscientific, and spiritual perspectives. Cognitive approaches – most notably those of Kant (1997/1785), Kohlberg (Kohlberg 1984), and Rest (Rest 1986) – emphasize rational deliberation and the development of structured

moral reasoning. In contrast, intuitionist perspectives, as developed by thinkers such as Hume (2000/1739) and Haidt (Haidt 2012), argue that moral judgments are primarily driven by automatic emotional responses. Dual-process theories, such as those presented by Greene (Greene 2013) propose that moral evaluation results from the interaction between fast, intuitive processes and slower, analytical reasoning. Neuroscientific contributions to this field further substantiate the role of moral cognition as biologically grounded. Researchers (e.g., Churchland 2019) have demonstrated that processes related to empathy, fairness, and cooperation are supported by distinct neural systems, suggesting that moral behavior is not only socially constructed but also neurobiologically embedded. Additionally, the spiritual dimension of morality is emphasized by religious thinkers such as Ratzinger, who argue for the importance of conscience and divine guidance in moral actions (Aquinas 1265-1274/2006; Ratzinger 2007).

This study adopts the framework of Moral Foundations Theory (MFT), developed by Graham, Haidt, and Nosek (Graham, Haidt, & Nosek 2007), which identifies several core moral dimensions: care, fairness, loyalty, authority, and purity. Moral foundations are the basic psychological systems that underlie intuitive ethical reasoning, guiding judgments of right and wrong across cultures and individuals. Haidt (Haidt 2012) later added liberty as a sixth foundation. These moral foundations are typically divided into two categories: individualizing foundations (care and fairness), which focus on the protection and well-being of individuals, and binding foundations (loyalty, authority, and purity), which emphasize group cohesion, tradition, and order. More recent developments in MFT, notably by Graham and colleagues (2023), have refined the fairness foundation by identifying two subdimensions: equality and proportionality. This refinement reflects a growing recognition of the complexity within moral domains and their differentiated roles in social and academic contexts.

Numerous studies have investigated Moral Foundations Theory (MFT), demonstrating its relevance across political ideologies, cultural norms, and social behaviors (e.g., Landowska, Budzynska, & Zhang 2024; Crone & Laham 2015). However, the theory has also been critiqued for its limited dimensional structure, cultural generalizability, and reliance on self-report measures (e.g., Suhler & Churchland 2011; Davis et al. 2016; Schein & Gray 2015; Janoff-Bulman & Carnes 2016). Although MFT has traditionally been applied in the context of moral and civic education to understand, how are individuals reasoning about ethical issues, its implications for academic motivation and achievement have received comparatively less attention (Maxwell & Narvaez 2013). Recent research has begun to address this gap by examining how alignment between students' moral values and the moral climate of educational environments – termed "moral fit" – can influence engagement and academic expectations (Ongis & Kidd 2025). These findings suggest that moral foundations, beyond shaping social and political attitudes, may also function as motivational factors within academic settings. Building on this emerging line of inquiry, the present study seeks to further explore how specific moral foundations

relate to students' academic performance and subject preferences.

Given that moral foundations function as stable psychological predispositions, they may serve as intrinsic motivators influencing students' academic achievement, including grade point average (GPA), as well as their subject preferences. The present study investigates the relationship between specific moral foundations, academic performance, and subject preference to provide a more nuanced understanding of the role of morality in educational outcomes. The findings are intended to inform pedagogical approaches that are responsive to the moral orientations of students across different academic domains.

II. Theoretical Background

Adolescence is a developmental stage marked by increasing cognitive complexity, a growing desire for autonomy, and evolving moral reasoning. During this period, peer influence strengthens, romantic relationships emerge, and independence from authority figures becomes more pronounced, all of which contribute to shifts in decision-making and academic engagement. Peer relationships play a crucial role in shaping adolescents' identities and behaviors, often influencing academic motivation and ethical considerations (Brown & Larson 2009). Additionally, the onset of romantic relationships provides a context for exploring emotional and moral values, further shaping social interactions (Collins, Welsh, & Furman 2009). Given these developmental dynamics, examining the relationship between moral foundations and academic outcomes in this age group offers valuable insights into how moral intuitions influence students' academic success and subject preferences.

The relationship between adolescents' moral foundations and their academic outcomes remains underexplored, though emerging evidence suggests important connections. For example, Goff and colleagues (Goff et al. 2022) found that adolescents who prioritize individualizing moral foundations – specifically care and fairness – tend to report higher levels of academic orientation, including commitment, interest, and the perceived importance of education. This association was independent of parental influence, suggesting that intrinsic moral orientations may motivate students to engage with academic tasks. Their study, which included a sample of 10,525 upper secondary school students (ages 16–21) in Iceland, employed the Moral Foundations Questionnaire (MFQ) to assess moral orientation and used survey measures to evaluate academic engagement.

However, to date, no studies – including the aforementioned work – have examined whether moral foundations directly relate to concrete academic outcomes such as grade point average (GPA) or subject preference. This limitation leaves unclear how moral intuitions might affect not just students' attitudes but also their measurable academic performance and educational choices. Insights from studies conducted with adult samples may nevertheless inform this research gap by illuminating broader cognitive-

moral mechanisms potentially relevant to adolescent academic contexts.

Pennycook and colleagues (Pennycook et al. 2014) examined the relationship between moral foundations and cognitive abilities in a sample of 505 U.S. residents (ages 18–69), using numeracy and vocabulary tests along with a cognitive reflection test. While this study did not focus specifically on adolescents, its findings provide insight into general patterns of cognitive processing and moral orientation. Notably, they observed a negative correlation between analytic thinking and binding moral foundations (loyalty, authority, and purity), suggesting that individuals who engage more in analytical reasoning tend to prioritize individualizing foundations. These cognitive-moral associations may also be relevant for understanding adolescents, as cognitive development continues throughout this stage and shapes moral reasoning.

In contrast, research by Kawamoto and colleagues (2019) emphasizes the role of cultural context in shaping moral foundations. In a study of 4,863 Japanese adults (ages 20–70), the authors found that higher cognitive ability was positively associated with the moral foundations of care, fairness, and purity. Unlike previous Western studies that reported a negative association between cognitive ability and binding foundations, Kawamoto and colleagues (Kawamoto et al. 2019) identified a positive link between cognitive ability and the purity foundation. These results suggest that purity may function differently in Japanese cultural contexts, aligning more closely with individualizing foundations rather than binding ones. Additionally, participants under the age of 50 were more likely to prioritize loyalty and authority, underscoring the significance of sociopolitical and cultural factors in moral orientation.

An essential factor in academic achievement is interest. Lavrijsen and colleagues (Lavrijsen et al. 2021) examined "trait interest" and its influences, including cognitive ability and teacher impact. The role of cognitive and emotional dimensions in shaping students' engagement with academic subjects was also emphasized by Hidi (Hidi 2006). Many researchers have drawn on Holland's RIASEC model (Holland 1997), which categorizes interests into six domains: Realistic, Investigative, Artistic, Social, Enterprising, and Conventional. These categories help explain why individuals gravitate toward specific career paths and academic subjects.

While cognitive, emotional, and external influences on subject interest have been widely studied, the potential connection between moral foundations and subject preferences remains underexplored. Although Napier and Luguri (Napier & Luguri 2013) did not examine moral foundations, their findings on abstract thinking and identity salience may align with theoretical patterns described in moral foundations theory (Haidt 2012). Individuals who engage in abstract thinking may be more open to individualizing concerns, while those with a preference for concrete thinking may value order and tradition, often reflected in binding moral foundations. Similarly, Pennycook and colleagues (Pennycook et al. 2014) identified associations between thinking styles and moral foundations, suggesting that cognitive tendencies influence moral orientation.

Based on these insights, this study proposes that moral foundations may influence students' intrinsic motivation toward specific types of academic subjects. Observationally, students who appear more socially engaged and express strong concern for fairness and empathy can often prefer socially oriented subjects such as languages, civics, or literature – fields involving interpersonal communication and social understanding. In contrast, students who exhibit greater independence, value analytical reasoning, or express skepticism toward authority may be more drawn to naturally oriented subjects such as mathematics, physics, chemistry, biology, informatics, and computer science, which emphasize abstraction, critical thinking, and problem-solving.

IV. Hypotheses

Hypothesis 1: Students who score higher on individualizing moral foundations (care and fairness) will achieve better Grade Point Averages (GPA). This hypothesis is based on previous research indicating that individualizing moral foundations positively influence academic outcomes by enhancing intrinsic motivation, academic engagement, and commitment toward educational goals (Goff, Silver, & Sigfusdottir 2022).

Hypothesis 2: Students who score higher on the Authority moral foundation will be less inclined toward subjects that emphasize abstract and independent reasoning (mathematics, physics, chemistry, biology, informatics, technology, and computer science). This prediction draws on Haidt's (Haidt 2012) characterization of the Authority foundation, which values tradition, hierarchy, and social conformity – traits that may conflict with the openness and critical thinking typical of abstract disciplines. While Napier and Luguri (Napier & Luguri 2013) did not study moral foundations, their findings suggest that abstract construals interact with identity in ways that may influence cognitive engagement, providing a complementary lens for interpreting how moral and cognitive styles shape academic preferences.

V. Sample

The study comprised 192 adolescents aged 15 to 17 years, including 104 females, 81 males, and 7 non-binary individuals. Participants were recruited from a state gymnasium in eastern Germany that follows the Saxony state curriculum. The student body is diverse, consisting primarily of German and Czech students, along with a smaller proportion of students with a migration background. The school was selected due to its comprehensive academic curriculum, which includes both socially and naturally oriented subjects. This structure provides a relevant context for examining how students' moral foundations relate to academic performance and subject preferences. In particular, the availability of naturally oriented disciplines – such as mathematics, physics, biology, and informatics – supports the second hypothesis, which posits that students who score higher on the

authority moral foundation may be less inclined toward subjects requiring abstract and independent reasoning. Furthermore, the school's consistent grading practices and academically engaged student population offer a reliable foundation for analyzing the relationship between individualizing moral foundations and overall academic achievement, as reflected in students' Grade Point Averages (GPA). While findings may not be generalizable to all educational settings, institutions with comparable curricular structures and academic standards – common in many Western European education systems – are likely to demonstrate similar patterns. Therefore, this school was deemed a strategically appropriate research site.

VI. Ethical Considerations

The study adhered to ethical research standards. Informed consent was obtained from all participants, their legal guardians, and the school administration. In accordance with regional research practices, formal approval from an ethics board was not required, as the study involved non-invasive data collection within an educational context and was conducted with full parental and institutional consent. All procedures ensured voluntary participation and maintained strict confidentiality in line with established ethical guidelines.

VII. Data Collection and Management

Data were collected in March 2024 during regular class sessions. With the approval of the school principal, the author distributed questionnaires to 195 students. Students were asked to fulfill the questionnaire comprised three sections: The Moral Foundations Questionnaire (MFQ), a Grade Point Average (GPA) scale, and questions regarding subject preferences. The data collection process required approximately 15 minutes. Following collection, the data were compiled, cleaned, and prepared for analysis. Specific steps, such as removing incomplete responses (3 questionnaires) and verifying data entry, were taken to ensure data accuracy and consistency during the cleaning process. Data confidentiality and anonymity were strictly maintained throughout the study to protect the privacy of all participants.

VIII. Methodology

Participants completed the full 30-item version of the Moral Foundations Questionnaire (MFQ), developed by Graham, Haidt and Nosek (2008). The MFQ is a self-report instrument grounded in Moral Foundations Theory, which identifies five core moral domains: Care/Harm, Fairness/Cheating, Loyalty/Betrayal, Authority/Subversion, and Purity/Sanctity (Haidt 2012). Each domain is assessed using six items, rated on a

6-point Likert scale ranging from 0 (strongly disagree) to 5 (strongly agree). The official German translation of the MFQ, provided by the original authors (Moral Foundations Project, n.d.), was used in this study. Two attention-check items were included as part of the official version, in accordance with the authors' instructions, and were not included in scoring or analysis.

Internal consistency of the subscales was evaluated using Cronbach's alpha and McDonald's omega. Although widely used, these coefficients have been critiqued in the context of the MFQ, as the subscales reflect multifaceted constructs rather than unidimensional traits (Graham et al. 2011). The MFQ's suitability for adolescent populations is supported by De Angelis and colleagues (De Angelis et al. 2023), whose confirmatory factor analysis in a sample of 925 Italian high school students supported the original five-factor structure (*CFI*=0.91, *TLI*=0.90, *RMSEA*=0.06, *SRMR*=0.07).

To assess the factor structure of the MFQ in the present sample, a confirmatory factor analysis (CFA) was conducted using the theorized five-factor model. Additionally, a three-factor model, focusing on Care, Fairness, and Authority, was tested. This alternative model was selected based on the theoretical relevance of these foundations to academic outcomes and subject orientation in educational contexts. Academic performance was measured via self-reported Grade Point Average (GPA), based on students' most recent report cards (*Zeugniss*e), which had been issued approximately three weeks before data collection. Participants selected their GPA from an ordinal scale with the following categories: A (1.0–1.5), B (1.6–2.5), C (2.6–3.5), D (3.6–4.0), E (4.1–5.0), and F (5.1 and above).

Participants were also asked to list their three most preferred and three most disliked school subjects. Based on their responses, students were categorized into three groups:

• Socially oriented group: Students who selected only subjects from the following: languages, history, ethics, religion, politics, music, art, and physical education.

• Naturally oriented group: Students who selected only subjects from the following: mathematics, physics, chemistry, biology, informatics, technology, and geography.

• Mixed orientation group: Students who selected subjects from both the socially and naturally oriented categories.

All statistical analyses were conducted using Jamovi (The Jamovi Project 2024), with the significance level set at α=.05. As part of data preparation, negatively worded items in the MFQ were reverse-coded following the instrument's official scoring protocol. This procedure ensures that all items within each moral foundation are directionally consistent – that is, higher scores uniformly reflect stronger endorsement of the corresponding moral domain.

The Shapiro-Wilk test was used to assess the normality of distributions for moral foundation scores and GPA. As several variables deviated from normality, non-parametric methods were employed where appropriate.

To test Hypothesis 1 – that higher scores on individualizing moral foundations (Care and Fairness) are associated with higher GPA – Spearman's rank-order correlation was used to examine bivariate relationships. Additionally, an ordinal logistic regression was conducted with GPA as the dependent variable and Care and Fairness scores as predictors, given the ordinal nature of GPA. Model fit and effect size were evaluated using McFadden's R^2.

To test Hypothesis 2 – that higher endorsement of the Authority foundation is associated with lower preference for abstract and independent-reasoning subjects – differences in Authority scores across subject-preference groups were examined using the Kruskal-Wallis H test. Where statistically significant differences were observed, post hoc comparisons were conducted using Dunn's test with Bonferroni correction. Descriptive statistics, including means, medians, and distributional properties, were reported to aid interpretation. The same analytic procedures were applied to subject groups based on students' most disliked subjects to provide a complementary perspective on academic preferences. Effect sizes were reported where appropriate, including epsilon-squared (ε^2) for Kruskal-Wallis tests.

IX. Results

Psychometric Properties of the Moral Foundations Questionnaire (MFQ)

The internal consistency of the Moral Foundations Questionnaire (MFQ) subscales was evaluated using Cronbach's alpha (α) and McDonald's omega (ω). Prior to the analyses, negatively worded items were reverse-coded. As shown in Table 1, the Care/Harm and Purity/Sanctity subscales demonstrated acceptable reliability, while the Fairness/Reciprocity, Loyalty/In-group, and Authority/Respect subscales exhibited moderate internal consistency.

Foundation	**Cronbach's α**	**McDonald's ω**
Care/Harm	0.68	0.70
Fairness/Reciprocity	0.63	0.67
Loyalty/In-group	0.52	0.56
Authority/Respect	0.56	0.60
Purity/Sanctity	0.63	0.64

Table 1: Internal Consistency of Moral Foundation Subscales.

A confirmatory factor analysis (CFA) was conducted to evaluate the five-factor structure of the MFQ. Although the model produced a statistically significant chi-square value, $\chi^2(395)=1226$, $p<.001$, the fit indices indicated a modest fit: *CFI*=0.779, *TLI*=0.756, *RMSEA*=0.081 (90% *CI* [0.074, 0.088]), and *SRMR*=0.093 (see Table 2). In addition, an alternative three-factor CFA model including Care, Fairness, and Authority – estimated using diagonally weighted least squares – was tested. The model yielded improved fit statistics: $\chi^2(132)=343$, $p<.001$, *CFI*=0.870, *TLI*=0.849, *RMSEA*=0.091 (90% *CI* [0.080, 0.103]), and *SRMR*=0.079, indicating an adequate model fit (see Table 2). Although the *CFI* and *TLI* values were slightly below the conventional threshold of 0.90, the *RMSEA* and

SRMR values suggested acceptable model fit.

Model	χ^2 (df)	CFI	TLI	RMSEA (90% CI)	SRMR
5-Factor	1226 (395)	0.779	0.756	0.081 [0.074, 0.088]	0.093
3-Factor	343 (132)	0.870	0.849	0.091 [0.080, 0.103]	0.079

Table 2: Confirmatory Factor Analysis (CFA).

Correlations among the three latent factors in the alternative model are presented in Table 3. Care and Fairness were strongly positively correlated (r=0.80, p<.001), while Authority showed weak negative correlations with both Care (r=–0.20, p=.017) and Fairness (r=–0.16, p=.092).

Factor Pair	R	p-value
Care – Fairness	0.80	< .001
Care – Authority	–0.20	0.017
Fairness – Authority	–0.16	0.092

Table 3: Latent Factor Correlations (3-Factor Model).

Descriptive statistics for each MFQ subscale are provided in Table 4. Shapiro–Wilk tests indicated significant deviations from normality for all subscales except Purity, justifying the use of non-parametric analyses in subsequent tests.

Subscale	Mean	SD	Kurtosis	Shapiro–Wilk p
Care	22.0	4.32	1.00	< .001
Fairness	22.0	3.77	–0.63	0.003
Loyalty	17.7	4.29	0.19	0.009
Authority	17.7	4.28	0.25	0.027
Purity	15.3	4.87	–0.20	0.127

Table 4: Distributional Properties of Moral Foundation Subscales.

Hypothesis 1 Testing: Moral Foundations and Academic Performance (GPA).

Spearman's rank-order correlation was conducted to assess the relationships between moral foundation scores and academic performance, measured by GPA. This method was selected due to the ordinal nature of GPA and the non-normal distribution of the moral foundation variables.

A significant negative correlation was found between Care and GPA, ρ=–.26, p<.001, indicating that higher Care scores were associated with better academic performance (i.e., lower GPA values, where lower scores reflect higher achievement). No significant correlation was observed between Fairness and GPA, ρ=–.09, p=.232 (see Table 5).

Foundation	P	p-value
Care	–0.26	< .001
Fairness	–0.09	0.232

Table 5: Spearman's Correlation Between Moral Foundations and GPA.

An ordinal logistic regression was conducted to examine whether Care and Fairness predicted academic performance. The model accounted for a small proportion of the

variance in GPA, McFadden's R^2=.040. Care significantly predicted higher GPA outcomes, *B*=0.153, *SE*=0.040, *p*<.001, odds ratio (*OR*)=1.17, indicating that higher Care scores were associated with better academic performance. Fairness was not a significant predictor, *B* =0.037, *SE*=0.043, *p*=.390 (see Table 6; Figures 1 and 2).

Predictor	**B**	**SE**	**p-value**	**OR**
Care	0.153	0.040	< .001	1.17
Fairness	−0.037	0.043	0.390	0.96

Table 6: Ordinal Logistic Regression Predicting GPA.

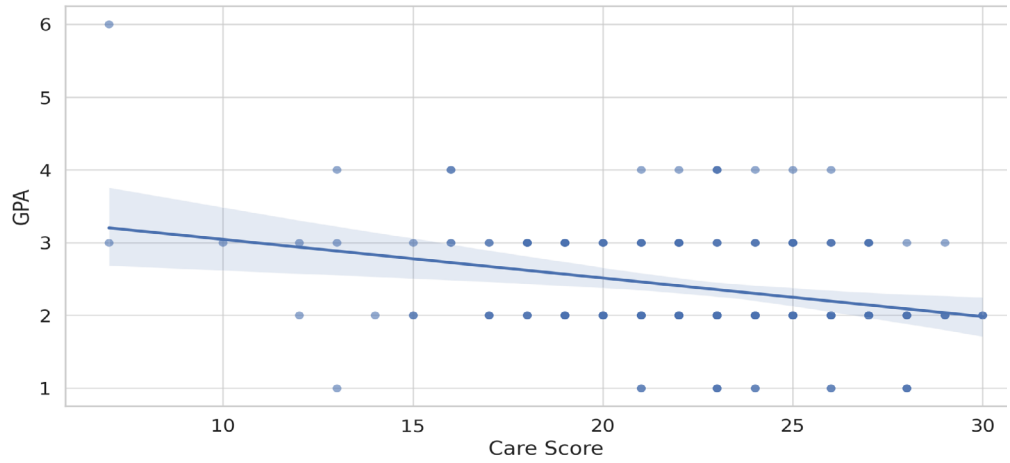

Figure 1: Relationship Between GPA and Care Score.

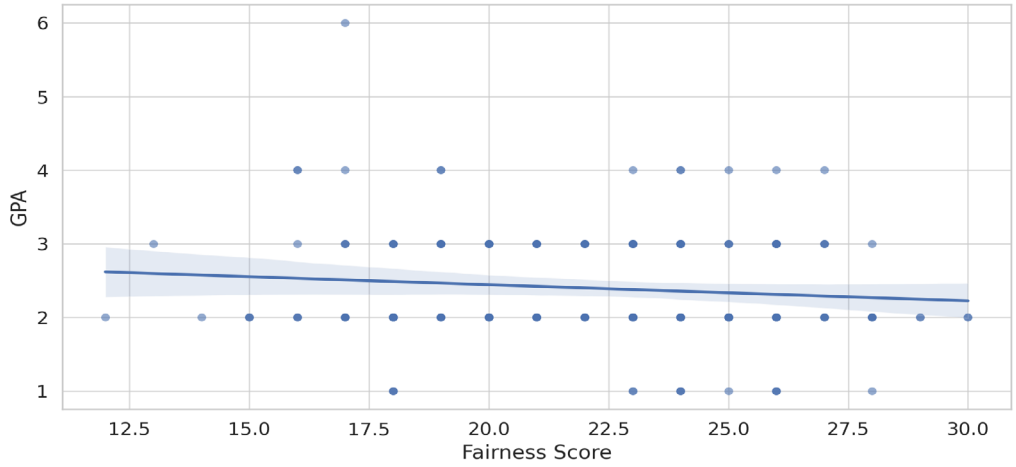

Figure 2: Relationship Between GPA and Fairness Score.

Hypothesis 2: Testing: Authority Scores and Subject Preferences.

To examine whether Authority scores varied according to disliked subject orientation, a Kruskal-Wallis H test was conducted across three groups: socially oriented, naturally oriented, and mixed. The analysis revealed a statistically significant difference in Authority scores among the groups, $\chi^2(2)=7.22$, *p*=.027, with a small effect size, $\varepsilon^2=.039$. Students who disliked naturally oriented subjects (e.g., mathematics, biology, chemistry) had the highest Authority scores (*Mdn*=19.0, *IQR*=4.0, *SD*=3.69), followed by those who

disliked mixed subjects (*Mdn*=17.0, *IQR*=6.0, *SD*=4.15), and those who disliked socially oriented subjects (*Mdn*=17.0, *IQR*=7.0, *SD*=4.90; see Table 7 and Figure 3).

Group	Mean Authority	Median Authority	IQR	SD	**Pairwise W / p**
Socially Oriented	17.10	17.0	7.0	4.90	Natural vs Social: W= 3.308, p= .051
Naturally Oriented	19.50	19.0	4.0	3.69	Natural vs Mixed: W= -3.496, p= .036
Mixed Subjects	17.44	17.0	6.0	4.15	Social vs Mixed: W= 0.899, p= .801

Table 7: Authority Scores by Disliked Subject Orientation (Kruskal-Wallis Test); $\chi^2(2)=7.22$, p=.027, $\varepsilon^2=.039$.

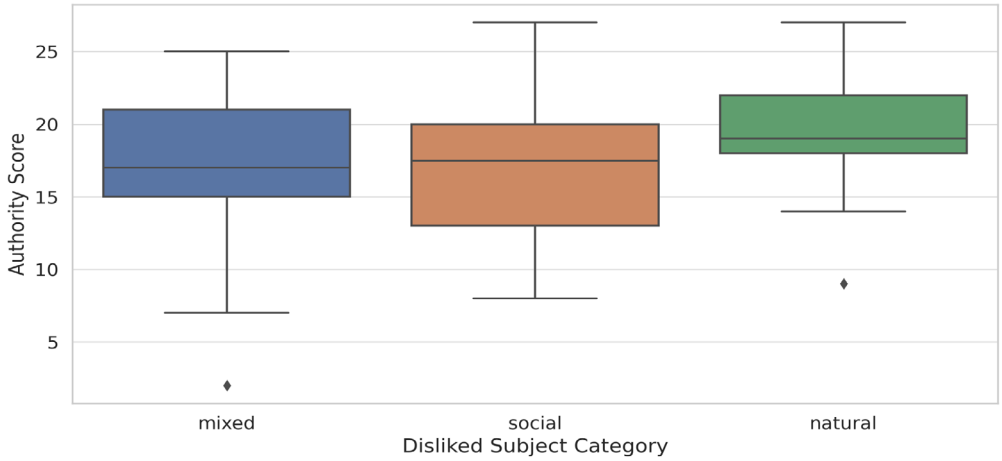

Figure 3: Authority Scores by Disliked Subject Category.

To further explore whether students who disliked natural sciences exhibited higher Authority scores, a Mann-Whitney U test was conducted comparing students who reported disliking natural sciences with those who did not (i.e., students who disliked socially oriented or mixed subjects). The results showed a statistically significant difference, U= 3232.00, *p*= .009. Students who disliked natural sciences had significantly higher Authority scores (M=19.52, *SD*=3.69, *Mdn*=19.0, *IQR*=4.0) compared to those who did not (M=17.38, *SD*=4.31, *Mdn*=18.0, *IQR*=6.0; see Table 8).

Group	**Mean Authority**	**Median Authority**	**IQR**	**SD**
Dislikes Natural Sciences	19.52	19.0	4.0	3.69
Does Not Dislike Natural Sciences (Social and Mixed groups)	17.38	18.0	6.0	4.31

Table 8: Authority Scores by Natural Science Dislike (Mann-Whitney U Test): U=3232.00, p=.009.

X. Discussion

This study examined potential associations between adolescents' moral foundations and their academic outcomes, specifically GPA and subject preferences. The findings provide preliminary yet informative insights, particularly concerning the Care and Authority foundations, and suggest that moral orientations may modestly influence students' academic engagement and subject-specific attitudes.

Hypothesis 1 was partially supported. A statistically significant positive association was observed between the Care foundation and academic performance (Spearman's ρ=-0.26, p<.001; ordinal logistic regression B=0.153, p<.001). Students who reported higher levels of Care were more likely to fall within better GPA categories. Core attributes of the Care foundation – including kindness, gentleness, and nurturance – may promote behaviors conducive to academic success, such as prosocial classroom interactions and adherence to cooperative norms. Thapa and colleagues (Thapa et al. 2013) found that prosocial school climate reforms promote both well-being and academic achievement. Similarly, Durlak and colleagues (Durlak et al. 2011), through a meta-analysis of 213 school-based social and emotional learning (SEL) programs, demonstrated that social-emotional development significantly contributes to academic success.

According to Holland's RIASEC model (1997), care-oriented motivations align with the Social interest category, which emphasizes interpersonal engagement and helping others. This alignment suggests a potential link between social concern and academic engagement. While academic achievement is frequently associated with personal goals, prosocial motivation – such as the desire to contribute to a positive learning environment – may also play a role in fostering conditions that support academic performance.

The Fairness foundation was not significantly associated with GPA. This finding contrasts with prior research, such as Goff and colleagues (Goff et al. 2022), who identified a positive association between fairness-related moral orientations and academic engagement. One possible explanation for this discrepancy lies in the differences in outcome measures: the present study used GPA as a direct indicator of academic performance, whereas Goff and colleagues (Goff et al. 2022) assessed broader academic orientation, which may be more sensitive to fairness-related motivations.

Another potential explanation for the absence of a significant relationship between the Fairness foundation and GPA relates to recent theoretical developments in Moral Foundations Theory. Graham and colleagues (Graham et al. 2023) refined the Fairness foundation by dividing it into two subdimensions: equality (the belief that all individuals should be treated the same) and proportionality (the belief that individuals should be rewarded according to their effort or merit). It is plausible that only one of these subdimensions – particularly proportionality, which aligns more closely with academic effort and merit-based evaluation – is related to academic performance. However, the standard Moral Foundations Questionnaire (MFQ) does not distinguish between these two

subdimensions. Future research should explore how each subdimension independently relates to academic outcomes such as GPA.

It is also possible that fairness-related moral orientations influence academic behaviors not directly reflected in GPA. For instance, students who highly value fairness may be more inclined to uphold academic integrity, advocate for equitable treatment of peers, or contribute to a just classroom environment, socially constructive behaviors that may not directly impact individual academic performance. Disaggregating the equality and proportionality components in future studies could yield more granular insights into the role of fairness in educational contexts.

Furthermore, the Care foundation may be reinforced in educational settings that emphasize fairness as a guiding principle. A school culture grounded in fairness can foster a sense of safety, inclusion, and justice, thereby strengthening prosocial dispositions such as empathy and cooperation. This interpretation aligns with broader institutional research, including the 2024 Nobel Prize in Economic Sciences (Royal Swedish Academy of Sciences, 2024), awarded to Acemoglu, Johnson, and Robinson for demonstrating that inclusive institutions promote participation, accountability, and long-term development. By analogy, fairness and inclusivity in educational environments may foster trust, engagement, and a sense of belonging – key conditions for both moral development and academic success. In this way, fairness may serve as a foundational moral climate that indirectly supports the development of other moral orientations – particularly Care – and contributes to students' holistic growth and flourishing within the school context.

Hypothesis 2 was supported, as higher Authority scores were significantly related to disliking natural science subjects (Mann-Whitney U=1759, p=.009). The data revealed that students who expressed aversion to natural sciences tended to score higher on the Authority foundation. This suggests that specific features of natural science education may be less compatible with the preferences of students who strongly endorse values such as structure, tradition, and respect for hierarchical order.

This pattern may reflect a perceived mismatch between the open-ended, inquiry-based nature of science education and the structured, rule-based expectations often associated with high Authority orientations. Haidt (Haidt 2012) conceptualizes the Authority foundation as emphasizing deference to legitimate authority, social order, and tradition. Natural science curricula – especially at advanced levels – often prioritize critical thinking, tolerance for ambiguity, and the questioning of established knowledge, which may challenge students who value predictability and stability. Cognitive psychology offers additional support for this interpretation. According to Cattell's (Cattel 1963) theory, students who prefer highly structured subjects may rely more on crystallized intelligence, while those drawn to mathematics and science engage more with fluid intelligence. Lavrijsen and colleagues (Lavrijsen et al. 2021) similarly suggest that subject preference is influenced by underlying cognitive styles.

It is noteworthy that this relationship is correlational and specifically applies to

students who reported subject aversion; it should not be generalized to all students with high Authority orientations. This association was not observed in students' favorite subject choices, indicating that expressions of preference may be shaped by diverse factors such as teaching methods, classroom dynamics, or personal interests. In contrast, subject aversions may be more emotionally salient and reflect stronger affective responses.

Several limitations should be considered when interpreting these findings. First, the cross-sectional design restricts causal inferences. The observed associations between moral foundations and academic outcomes may be influenced by unmeasured variables or bidirectional relationships. Second, both GPA and subject preferences were self-reported, which may introduce response bias or inaccuracies. Third, the sample was drawn from a single school, limiting the generalizability of results to other educational or cultural contexts. Fourth, although confirmatory factor analysis supported the three-factor model of moral foundations, the overall model fit was modest, and the sample size was relatively small for robust structural modeling. Finally, internal consistency for some subscales – particularly Loyalty and Authority – was only moderate (Cronbach's α=0.52 and 0.56, respectively), which may have affected the reliability of those measures. Although the MFQ is a well-established instrument, it may not fully capture the situational or developmental nuances of adolescents' moral reasoning.

Future research should consider longitudinal designs, objective academic performance measures, and more diverse samples to better understand the dynamic interplay between moral foundations and academic life. Additionally, future studies could explore how moral foundations interact with various instructional approaches, classroom climates, and cultural frameworks. A more comprehensive understanding of these dynamics could inform inclusive pedagogical strategies that recognize and support students' moral orientations alongside their cognitive development.

XI. Conclusion

This study provides initial evidence that adolescents' moral foundations may relate to academic outcomes and subject attitudes. Higher Care scores were linked to better academic performance, while higher Authority scores were associated with dislike of natural science subjects. No significant association was found between Fairness and GPA. The findings suggest that moral orientations may play a modest role in shaping how students engage with academic content. Future research should explore these relationships in diverse educational contexts and consider how moral foundations interact with teaching practices and school environments to inform more inclusive approaches to learning.

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