CHAPTER - V

DISCUSSION OF THE FINDINGS

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5.1 Discussion on the findings of Objective 1

Objective 1: To find out the school climate, scientific reasoning, procrastination tendency, parent autonomy support, and academic achievement levels in physics of senior secondary school students.

School Climate: Most students in the study rated school climate as "average." One of those factors where school climate influences students' experience in their learning environment and relationships, safety, and support systems. 39.28% of students consider their school climate average, and there are various reasons for their variance in response which can be attributed due to differences in environmental factors like the schools' infrastructure, teaching quality, peer relationships, and student-teacher interactions. Students in schools that are high-pressure or lack adequate resources may feel less supported, which can lead to lower perceptions of school climate.

Scientific Reasoning: Majority of the students were average as consist of 40.89% while 33.75% students in below average. This is because you not only have to think logically while studying physics but this subject also demands thorough knowledge of its theoretical principles. In a physics context, many students might find the abstract nature of scientific reasoning difficult to achieve. The percentages of students who fall within the high or extremely high group are fairly low, which could indicate a need to adjust instructional methods or that increased personalized attention may be required to engage students in higher levels of understanding and critical analysis.

Procrastination Tendency: By far a considerable ratio of students (33.93%) had average level procrastination tendency, the next group were the below-average with a frequency of 26.61%. Procrastination has usually been associated with time management, motivation, and personal discipline. Senior secondary students first, as the pressure rises to get high marks in exams they tend to procrastination, they can put studying off until the last minute causing stress due to procrastination or procrastination due to lack of self-regulation. Additionally, the discovery of a very low tendency of procrastination among students (2.14%) indicates that a few students are highly motivated and tend to complete the task in the time allotted. Such

interventions at inducing better study habits and reducing stress may be useful for ameliorating this problem.

Parent Autonomy Support: Most (41.79%) students reported receiving an average level of parent autonomy support. This outcome is in alignment with findings showing that parental participation in education is essential, but the level of assistance differs. This is because in numerous families, particularly in rural and semi-urban regions such as Kangra, individuals — right from the parent level — don't possess much knowledge regarding the academic expectations students have in subjects such as physics, amongst others. The small percentage of students (0.71%) reporting extremely high levels of parental support may also reflect the socio-economic and cultural factors that drive parental support. Motivation is greatly influenced by the level of academic achievement support that students receive from their parents, which may not be sufficient in terms of autonomy provisions where students have to make choices about their learning path.

Academic Achievement: The academic achievement shows 32.32% of students were average and 29.29% of student were below average. School climate, scientific reasoning skills, procrastination tendencies and parenting help are all closely tied to academic performance. Low achievement levels can be attributed to empty school infrastructure and lack of resources like labs, and lack of interaction between teacher-student. When parents are absent and some teachers become inconsistent, the tone for the way school will be engaged is set. However, creating a better school environment, providing students with practical learning opportunities in science, and implementing more parent interaction programs may help improve the academic performance of a majority of students in the senior secondary school.

5.2 Discussion on the findings of Objective 2

Objective 2: To study and compare school climate, scientific reasoning, procrastination tendency, and parent autonomy support of senior secondary school students in relation to their gender, locality, and type of institution.

5.2.1 Discussion on the findings of Objective 2 Gender wise

The results showed that there is a significant difference between the perceptions of male and female senior secondary schools physics students on school climate. The

mean school climate score for female students was higher (female students: 218.20, male students: 211.46) with a mean difference of 6.735. The t-value of 2.797, which is greater than the critical value of 1.965 at a significance level of 0.05, as well as the p-value of 0.005, highlight the significance of this difference. These results are indicative of the fact that female students experience the school climate as more positive than do male students. The findings of this study is consonance with the findings of Ahmad (2018) who also concluded in his study that female students perceived school climate more favourably than males, and this perception positively correlated with their academic performance. It suggests that this is more due to differences in socialisation and/or social networks, and/or responsiveness to educational environments, by gender. For example, schools that focus on gender-sensitive policy and initiatives may help improve the climate for girls, positively impacting their overall experience.

The findings indicate a discrepancy in the perception of school climate between the male and female senior secondary school physics students. It shows that male students have better sense of physical and socio-emotional security, support in learning, interpersonal relationships (t=2.826, p<.05), and school connectedness (t=2.373, p<.05), compared to their female counterparts as t-values (2.826, 2.650, 2.741, 2.373) exceeded the critical value (1.965) at the 0.05 significance level. For example, the Sense of physical and socio-emotional security reveals a cohort difference in a specific one, which might indicate a gendered experience of safety and belonging in school contexts when mean values of female and male students are compared with each other, in which females have a higher mean value in comparison to males. No other statistically significant difference was having in the dimension of Rules and norms (t-value -0.480 < 1.965), indicating a common understanding of the policies and rules promoted by the school and expected of their behaviour. The dimensions of school climate among senior secondary school physics students also follow the same pattern, which could be accounted based under contextual socio-cultural and institutional situations. As a semi-urban district, Kangra has numerous schools with diverse educational setups and different levels of awareness on the part of student on school climate. The cultural emphasis on collective belonging and support systems can lead to stronger positive social interactions and attachment to school in this district among female students. This is consistent with their overall higher mean

scores in these dimensions. Schools in Kangra have also been more oriented towards the creation of a safe space and the gender positive interface within the school which would have translated to the self perception of physical and socio-emotional security experienced by their female students. Yet the millennials and others in the 21st century – their attempts to advance gender equality notwithstanding – are even more resistant, as the rudimentary ruling leaves no significant gender-effect on the "rules and norms" (with the possible exception of extended coverage by gender-neutral approaches). This image would be much more troublesome in schools in a place like Kangra, where schools tend to enforce uniform rules through morning assemblies and classroom discipline while fostering an egalitarian approach to presentation (there's no conception of the uniform as reinforcing the stereotype of the boys being 'cooler' than the girls).

These differences in the scientific reasoning scores of male and female senior secondary school physics students could also be attributed to social, educational as well as environmental factors. The significant difference in scientific reasoning scores - with male students scoring higher on average (mean: 7.60) than female students (mean: 6.72), suggesting differential access to resources or encouragement in science subjects or different school climate perceptions - may also contribute to this discrepancy. The findings of the study are consonance with Iyappan (2021); Ranjusha A. (2021) and Jaleel, S., Premachandran, P. (2017); Ma et al. (2021). These findings are particularly noteworthy (t-value: 4.420, $p < 0.05$) and highlight the importance of targeted interventions to close these gaps and promote equitable educational experiences for both genders.

It is noted from the analysis that there is dependence and significant difference between male and female senior secondary students as females are found to have more procrastination tendencies than males as obtained mean score of females is 64.25 whereas males obtained 62.56. Similarly, the mean difference of 1.685 and t-value of 2.612 being greater than the critical t-value of 1.965 and a p-value of 0.009 (at the 0.05 significance level for df 558) imply a high level of statistical significance. The findings of the study are consonance with Babu et al., (2019) which shows that gender differences were observed in procrastination tendencies, with female students exhibiting higher levels than males It could be due to female students falling under more academic pressures and societal expectations and needing to multi-task, which

exacerbates their tendency to procrastinate. There might be cases where for example, female students are doing work at home as well along their studies. This might be a reason why female students have higher procrastination scores as they have more things to do than their male counter parts.

Based on the results, it shows that there is a significant difference in procrastination scores between male and female senior secondary school students in dimensions 4 and 5. Both the t-values of 2.643 and 3.335 lie above the critical value of 1.965 for a significance level of 0.05, suggesting that females are more likely to procrastinate regarding both good and poor time management. It is congruent with the findings of Babu, Chandra, Vanishree, and Amritha (2019). This can be due to multiple aspects like high pressure in society being multitasking, academic expectations usually more for women students. On the other hand the dimension 1 Good Planning, dimension 2 Delay, and dimension 3 Doing Things at the Last Moment indicate t-values below 1.965, thus there is no significant difference between gender. While clearly showing the trend in procrastination related to time management, they also highlight that how students plan and execute their studies is relatively consistent, irrespective of gender influence.

The findings underscore the influence of the psychological control imposed by parents and the (fathers') support for autonomy on students studying physics at the senior secondary level. The f-value for paternal psychological control is 2.399 which is beyond than 1.965 at df=46, which indicates the difference between male and female students is significant, hence, female students are facing more psychological control from parents. This can likewise arise from the reality that the majority of the moment, ladies are subjected to even more factors like parental supervision and discipline imposed by the household in order to guarantee their safety and adherence to family worths in life. The t-value of paternal autonomy support of 0.688 fails to reach the significance cutoff (1.965), indicating that there are no significant differences between male and female students' parent autonomy support. Perhaps this is due to parents working toward independence not just for sons or daughters, but for both --setting parents up to encourage strength and self-reliance in the area of skill regardless of any differences in men versus women.

The mean academic achievement scores are reported for male (34.41) and female (34.83) students of senior secondary school physics, with the male standard deviation being 5.31 and for female 4.88 with the means showing they are very close. A p-value of 0.34 indicates that the difference in scores is not statistically significant, as it is greater than the significance level of 0.05. This indicates that male and female students perform equally well in the subject area of physics which suggests a relatively equitable learning environment and teaching practices were employed in schools throughout the district. There may not have been a statistically significant difference at the time because variables such as equal access to resources or a general feeling of school climate and a similar amount of interest or effort by both genders for the participants, could have been factors.

5.2.2 Discussion on the findings of Objective 2 Type of Locality wise

It implies that the senior secondary students enrolled in physics from the rural and urban areas have almost same school climate scores as there is a difference of just 3.57 in mean value of school climate scores as more for rural students (217.24) as compared to urban students (213.67). The difference in mean is 3.568, which is not statistically significant (the t-calculated value of 1.630 is smaller than the critical value of 1.965, and the significance (sig = 0.104) is greater than 0.05 with 558 degrees of freedom) This suggests that variables impacting school climate, such as teacher relationships, peer support, and total institutional environment, remain alike in rural and urban contexts. One reason might be that local government enacting similar educational initiatives and policies to close differences in infrastructure, teacher or learning resources so that students in both regions can share a similar school climate experience.

The outcomes underscore major insights into the perceptions of school climate amongst senior secondary physics students. In dimensions 3 (2.122) and 5 (2.593), the t-values are higher than the specified level of significance of 0.05 (1.965), meaning that there is a significant difference between the responses of rural and urban students regarding "support for learning" and "school connectedness". Reasons for this include the more supportive environment with close-knit communities in rural schools, where students feel that they have the personal attention of staff. On the contrary; dimensions 1, 2 and 4 have t-value (0.297, 1.502 and 0.101) are below 1.965 which

means that they do not have significant difference in school climate perceptions of rules and norms, physical and socio-emotional security and interpersonal relationship perception. This indicates that, in these places, rural and urban students are experiencing similar school climates, which are probably due to similar institutional policies and peer relationships within those institutions.

The findings further revealed, as it can be observed utilizing the post mean values for senior secondary school, that students that belongs to rural area (6.97) and urban area (7.15) of the school has insignificant difference of (0.179) in the mean scientific reasoning scores with reference to rural and urban area. The mean and standard deviations of rural (2.090) and urban (2.319), with a t-value of -0.959 which is smaller than the critical value of 1.965, and significance value of 0.338 apply to searching for statistical significance according to this method. This is consistent with the results of Iyappan (2021). These findings can be rationally explained by the equal distribution of quality educational resources, teachers, and learning resources across rural and urban schools, thanks to the government scheme and policies in implementation in Himachal Pradesh. Furthermore, the impact of local educational initiatives and support systems might have mitigated the educational disparity, leading to similar cognitive and critical thinking growth in the realm of scientific reasoning among students from various regions.

For the result (mean score of urban students is 62.86, mean score of rural students is 64.20) depicting that urban students have more tendency to procrastination as compare to the rural students can be justified based upon different reasons. Students in this environment see far more distraction through a plethora of activities and social media, as well as a faster-paced life, leading to an increase in procrastination tendency. On the other hand, rural students tend to have less of these distractions and more focus on their studies. In addition, the higher standard deviation of procrastination tendency scores of urban students (7.694) indicates higher disparity, possibly due to diversity of conditions relating to socio-economic status, availability of resources and parental influences. The significant mean difference (t-value 2.181, p = 0.030) validates the Hypothesis since these differences are highly significant and aren't due to chance, so it can be concluded that urban students tend to be more procrastinative than rural students.

The results show a remarkable contrast in tendencies towards procrastination between rural and urban students on the senior secondary school level. The t-value of dimensions 1 (3.961) and 4 (2.966) are greater than the critical value of 1.965 at 0.05 level of significance, which shows a significant difference, indicating that the rural students are higher on good planning and time management. This is due to socio-economic and educational inequality, where students in remote settlements may not have access to a wealth of educational resources, have no clearly defined peers and receive less parental support, making it difficult for them to plan their time. On the other hand, dimensions 2, 3, and 5 (t-values: -0.579, -0.641, and -1.458) revealed no significant difference as their t-values remained below 1.965, indicating that delaying tasks, procrastination, and poor time management are not significantly different in response to procrastination between rural and urban students. This shows that although good planning and time management do differ, behaviours indicative of procrastination are similarly distributed between the groups.

Such findings draw attention to the dynamics between paternal psychological control, autonomy support, and senior secondary school students. As presented in Table 3, the calculated t-value for paternal psychological control (5.227) is higher than the table value of 1.965 with the significant level of 0.05, which shows a significant difference between the rural and urban students, where rural students have higher paternal psychological control. The rigid parental authority and control within traditional familial structures in rural areas, in an effort to promote discipline and responsibility in children, may be behind this phenomenon. On the contrary, the calculated t-value obtained for paternal autonomy support (-0.980) is less than the tabulated value of 1.965, which indicates that there is no significant difference in parental autonomy support between rural and urban students. The implication of this finding is that although autonomy of control explanations differ with respect to parents of both rural and urban areas, they provide similar levels of support to their children for autonomy which is conducive to self-reliance and making decisions as opposed to being lead solely by peer pressure or external influences on healthy development, indicating that parents, regardless of their socioeconomic environment during the senior secondary years provide an adequate amount of support for promoting autonomy in their children which would help further develop self-reliance.

Several reasons can account for the finding of no significant difference in the academic achievement scores of rural and urban senior secondary school physics students (Mean scores: Rural = 34.93, Urban = 34.33; p-value = 0.159). Firstly, progress in educational infrastructure and schemes like RMSA and Samagra Shiksha Abhiyan have hugely bridged the rural-urban education gap by helping rural areas access quality resources, better teachers and good facilities in schools. Further initiatives such as Digital India have ensured the presence of digital platforms and online learning tools, allowing students from remote areas access to the same content as their peers in urban settings. The standard deviation shows a relatively small value (4.96 for rural and 5.14 for urban) reflecting not only a marginal level of performance across both groups but also indicating that environmental or geographic factors can no longer be seen as residual factors for academic achievement.

5.2.3 Discussion on the findings of Objective 2 Type of Institution wise

The additional finding of the difference between private and government school students' school climate scores (mean scores 223.19 vs. 210.10; t = 5.856, p = 0.000) also contributes to explain this conclusion. This is consistent with the findings of Nikhat et al (2015). Researches have shown that on an average, private schools are more equipped, have better facilities and resources, less students and focus on each students development which all make it look good. In contrast, government schools may face overcrowding, with fewer resources and a lower ratio of teachers to students, which may negatively impact how their students perceive the climate in their schools. Thus, the higher mean score of private school students indicates that these factors have a significant impact on the way they perceive the school as more supportive and better learning environment.

Results show calculated t-values for five dimensions of school climate (1, 2, 3, 4 and 5) being higher than the critical tabulated value at the 0.05 level of significance: 1.965. For instance, the computed t-value of 5.517 for Dimension 2 (sense of socio-emotional security) denotes a significant difference between the perceptions of the students of private and government schools. This means that students in private schools enjoy overall stronger support and better conditions in the areas of rules, norms, socio-emotional security, learning support, interpersonal relationships, and school connectedness. One of the reasons for this could be that private schools in the

government schools of the Kangra district of Himachal Pradesh provide comparatively better infrastructure, class sizes are small, individual attention and other resources are available. These additional measures contribute to the overall school climate and have the potential to positively affect students' perceptions and experiences.

The mean scientific reasoning scores of the students from the private schools (6.90) and government schools (7.16) with a tiny difference of -0.263 with t-value of -1.408 (p = 0.160) were statistically insignificant. This is consistent with the results of Iyappan (2021). It means that teaching methods, curriculum implementation, and student support systems in both private and government schools are equally effective for developing scientific reasoning skills in senior secondary school students. The trained teachers were able to teach the prescribed curriculum uniformly which could have standardized and enriched the knowledge content of both the groups in the same manner —possibly with equal contribution from both innovative initiatives like NISHTHA in Himachal Pradesh in the effective development of scientific reasoning among grade 12th students from Private and Government Schools thus bringing comparable performance outcome of students in both types of schools.

The significant difference in procrastination tendency scores of the senior secondary school students of private and government schools in the district of Kangra found in the present study could be attributed to a variety of socio-economic and educational factors. Private school students may also be placed under higher academic workload and performance standards so may procrastinate more due to stress and competitiveness. For students at private institutions, their high-achieving environment could cause them to procrastinate out of fear of failure or burnout, as they feel pressure to meet high expectation from their parents. In contrast, government school students may have less pressure and a relatively more balanced academic environment, leading to lesser tendency to procrastinate, as evidenced by the lesser mean scores. This also explains the reason why the mean procrastination tendency score of private school students (64.45) is greater than the mean procrastination tendency score of government school students (62.99) as is evidenced by a mean difference of 1.458 and a t-value of 2.360 which is greater than the value obtained from the table which is 1.965.

Results show a statistically significant difference between procrastination tendencies of senior secondary school students from private and government schools. This indicates that the significance level is lower than a p-value of 0.05, thus, we reject the null hypothesis in favour of the alternative hypothesis concluding that there is a significant difference in good planning, delay scores, and time management, whereby private school students have higher tendencies of procrastination, as the t-values for dimensions 1, 2, and 4 (3.906, -3.289, and 3.068 respectively) surpass 1.965 critical value. Dimensions 3 (0.644) and 5 (1.455) on the 95% critical value are below and infer that poor time management and task delay do no differ. One potential explanation for these results is that students in private schools typically experience more academic pressure and competitive environments, leading to higher levels of procrastination related to stress and performance anxiety. However, the students of government schools may have a more laid-back academic culture, so that students tend to manage their time effectively and have less tendency to procrastinate in these aspects.

This shows that there is no significant difference in paternal autonomy support and psychological control between students of private and government schools. There are seen only minor differences in paternal autonomy support (56.29 for private schools and 55.55 for government schools) and paternal psychological control (39.77 for private schools and 38.61 for government schools), the mean difference values are 0.744 and 1.162, respectively. The calculated t-values of 0.666 and 1.157 are also both lower than 1.965 critical value at significant level of 0.05. It implies that the degree of parent involvement is equally important in both types of schools and maybe the cultural and socio-economic aspects of the region are playing a role because in the end, community support and traditionalness of family structure is always have an impact on how tend to parent, be it private or government school.

Private institutions have more infrastructure, personalized attention and good quality teaching resources and hence students perform better than government school students. Furthermore, at private schools, the class contains fewer students, ensuring that the teachers can give them individual attention and enhance their knowledge. Private school students receive per capita more extra coaching and have access to modern means of education which can better strengthen conceptual foundation of students and improve critical thinking. On the other hand, government schools often

struggle with issues such as overcrowded classrooms, inadequate resources, and physical infrastructure limitations, restricting individualized learning opportunities. The above reasons lead to higher academic achievement in private school students (mean score: 35.61) than urban government school students (mean score: 33.97).

5.3 Discussion on the findings of Objective 3

Objective 3: To study the relationship between school climate and academic achievement, scientific reasoning and academic achievement, procrastination tendency and academic achievement, and parent autonomy support and academic achievement in physics of senior secondary school students.

The weak association in between school climate of r = 0.137 depicted a low correlation coefficient between academic performance and school climate for senior secondary school students. This means the null hypothesis can be rejected at $p < 0.05$ so we can assume there is a significant association. It is congruent with the results of Geleta, k. (2017); Ahmed A. Osman Khaemba Ongeti, Cheng'oli Calistus Kisumo (2013), Muhammad, I. M., Akram, M., & Qamar, A. H. (2023) and Burma, Priti Bora, P. (2022). The findings of the study are also contradictory with Shindler et al. (2016) Greenway (2017) Seva & Demiroz (2020). This low correlation may also be due to external factors—for example, family support, personal motivation, and socio-economic status can significantly impact with the academic achievements of students, even if school climate is conducive and encouraging. For example, a student may have a positive school climate but struggle with challenges at home that impede academic success, thereby "diluting" the relationship we see.

The finding of a low correlation (0.135) between scientific reasoning and academic achievement among senior secondary school physics students indicates that scientific reasoning skills exist among these students but fundamental elements of scientific reasoning are not intended to generalize academic performance. This result is congruent with the findings of Remellind K. (2017); Zeynep Demirtaş (2011); Rani (2017). The findings of the study are also no consonance with Jaleel, S., Premachandran, P. (2017). These include a weak focus on experimental and inquiry-based learning in the curriculum, an over-reliance on rote learning, or too little practical exposure to develop critical thinking and problem solving skills. As an example, if students concentrate solely on theoretical learning through textbooks and

neglect practical experimentation or collaborative projects, their application of scientific reasoning in practical settings will be less effective and a possible weakening of the association for what is learnt and academic performance.

It is understandable based on the results that the correlation coefficient of 0.114 indicates a poor relationship between procrastination tendency and academic achievement among senior secondary school students since it is known that procrastination is associated with how students manage their time and study habits. Procrastinating students usually get issues with hitting deadlines, keeping up with a study schedule, as well as recollecting information that reflects on their educational achievements. A student who procrastinates and waits until just before the physics exams to study will not have the time to learn and practice the complicated concepts in depth but rather be tawdry and thus perform worse in the exam. Significant level (p-values < 0.05) rejects the null hypothesis and confirms the impact of procrastination on academic achievement despite the weak strength. The findings of the study are no consonance with Morales (2021) and Widia et al. (2024) which confirmed the negative impact of academic procrastination on performance, with self-efficacy acting as a mitigating factor.

The outcome indicates a low degree of positive correlation ($r = 0.090$) between dimension 1 of parental autonomy support and the academic performance of senior secondary students of schools with significant p value ≤ 0.05. It indicates a though slightly positive relationship, but the strength of the association is quite poor. This finding is in line with the findings of Sakhavat, M. and Kayla, S. (2023). The findings of the study are also no consonance with Wang et al. (2023) which emphasized the strong relationship between parental autonomy support and academic performance, mediated by metacognition, showing the prominent role of parents. Froiland (2017) also highlighted that parental autonomy support indirectly influences academic achievement through intrinsic life goals and expectations. One explanation for this finding could be differences in parental involvement or support across socioeconomic groups. In the Kangra district, most of the parents are either illiterate or economically weak, whereupon they cannot provide effective academic support as well as motivation to their children. These highlight the potential socio-economic factors, parental types, and regions with lower standards of educational support that can lead to the low correlation coefficient that was observed.

The p-value of the correlation between dimension 2 of psychological control of parental autonomy support and academic achievement of senior secondary school students was greater than 0.05, indicating no significant correlation. At the 5% level, it indicates that there is no significant evidence against the null hypothesis that there is no strong relationship between these variables. A very small positive correlation of 0.059 suggests a small association, however, it is so weak that it is too weak to be meaningful in practice. The findings of the study is consonance with Das (2016) which shows gender differences in procrastination tendencies were minimal, but the study found no significant correlation with academic performance. This finding may be due to the presence of qualitative parental interactions in the Kangra district, giving rise to more freedom and encouraging parents to foster independence in their children at the cost of maintaining a moderated approach to parental autonomy support. Parental psychological control, even when delivered with the best of intentions, can also detract from a student's autonomy and ability to self-regulate, both of which are paramount to achieving academic ascent. Psychological control, on the other hand, is often composed of high expectations and intrusive parenting, which subsequently creates pressure and stress in academics, thereby potentially lowering intrinsic motivation, in particular divergent thinking, then its supportive autonomy practices counterpart. The type of pressure exerted by the parents through coercion rather than coaxing could cause anxiety in the student, instead of pushing him to attain the best marks, might lead to the worst academic performance. Thus, the significant but small positive correlation hints that while a small amount of psychological control may necessarily contribute to better student performance, this is to only improve a small optimum, where at a slightly higher 'dose', more severe, unsupportive and autonomy-frustrating practices impedes the academic achievement of students effectively.

5.4 Discussion on the findings of Objective 4

Objective 4: To study the joint contribution of School climate, scientific reasoning, procrastination tendency, parent autonomy support on academic achievement in Physics of senior secondary school students.

The regression analysis results offer a dimension of insight into the determinants of academic performance in physics among senior secondary students. The combined

predictive ability of school climate, scientific reasoning, procrastination tendency, and parent autonomy support was statistically significant but only accounted for 5.3% of the variation in academic achievement. Among the predictors, scientific reasoning emerged as the strongest ($\beta =. 162$, $p <. 001$), and procrastination tendency ($\beta =. 101$, $p <. 019$), which suggests that students' ability to think logically and deal with delays had beneficial effects on their achievement in physics. However, school climate, autonomy support and psychological control were not significant predictors, indicating that even though these factors play a role in the learning environment, their direct influence on physics academic performance might be masked by more proximal cognitive and behavioural phenomena. These results highlight the importance of targeting students' reasoning skills and optimal time management as areas of support to improve learning performance.