Exploring the Impact of Social Media Usage and Sports Participation on High School Students' Mental Health and Academic Confidence

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Abstract. This study investigates the effects of sports participation and social media use on high school students' mental health and self-perception, with a focus on understanding their unique contributions to happiness and academic confidence. Structural equation modeling was applied to analyze the relationships between sports participation, time spent on social media, and self-reported levels of happiness and confidence, while accounting for potential gender differences. The results indicate that sports participation is positively associated with happiness, but does not significantly affect academic confidence. In contrast, the use of social media is negatively associated with academic confidence, although it does not significantly impact happiness. Gender differences were observed, with female students reporting a lower level of happiness but a higher level of academic confidence. These findings suggest that while extracurricular activities, such as sports varsity involvement, can support students' well-being, the excessive use of social media apps may undermine their academic confidence.

Keywords: High school students · Social media usage · Sport participation · Mental health · Happiness · Academic confidence

1 Introduction

High school students face numerous challenges, including academic pressures and social dynamics, that significantly impact their mental health (Pascoe et al., 2020). In recent years, awareness of mental health issues within this demographic has increased substantially. According to the *Youth Risk Behavior Survey Data Summary & Trends Report: 2013–2023* (Centers for Disease Control and Prevention (CDC), 2023), 40% of high school students reported experiencing persistent feelings of sadness or hopelessness in 2023. Contributing factors

include pressure to achieve high grades, participation in extracurricular activities, and the complexities of maintaining social relationships. In addition, the transition from adolescence to adulthood is a critical period that requires targeted mental health support to promote resilience. To alleviate stress, the use of social media and the participation in sports have been identified as potential resources (e.g., Eather, Wade, Pankowiak, & Eime, 2023; Orsolini et al., 2022).

Social media has become an integral part of daily life, enabled by the widespread accessibility of modern devices. It offers valuable opportunities for social connection and emotional support, fostering relationships and community in the digital age. A recent survey indicates that nearly 93% of teens in America use social media platforms (Sentiment.io, 2024), engaging in activities such as entertainment, social interaction, and maintaining interpersonal relationships (Ifinedo, 2016). However, its widespread use has sparked ongoing debate about its impact on mental well-being (Abiddine, Aljaberi, Gadelrab, Lin, & Muhammed, 2022; Bekalu, McCloud, & Viswanath, 2019).

Social media plays a dual role in the lives of high school students, offering both significant benefits and notable challenges. On the one hand, it facilitates social connectivity, enabling students to maintain relationships with friends and family, even across long distances, and to expand their networks by connecting with like-minded individuals. It also provides emotional support, as students can share their feelings and experiences and often receive encouragement from their peers (Shensa et al., 2016). In addition, social media grants students access to an abundance of information and resources, helping them stay updated on current events, educational opportunities, and tools that foster learning and personal growth (Westerman, Spence, & Van Der Heide, 2014). These positive aspects highlight social media's potential to enhance social, emotional, and intellectual development.

On the other hand, the extensive use of social media also presents significant challenges. Issues such as cyberbullying, pressure to maintain an idealized online image, and reduced face-to-face interactions can have detrimental effects on users. A recent meta-analysis by Marciano, Lin, Sato, Saboor, and Viswanath (2024) explored the relationship between social media use and positive well-being. The study found that hedonic well-being characterized by positive emotions and life satisfaction is positively associated with social media communication and positive online experiences, but negatively correlated with problematic social media use, highlighting the dual nature of social media's impact on mental well-being. Moreover, excessive engagement with social media for video content, often distracts students from academic responsibilities and learning activities (Akter, 2014).

In contrast to the challenges posed by social media, sports participation provides a unique and effective outlet for high school students, combining physical activity and teamwork as a means of stress relief. Sports offer substantial benefits for mental and physical health (e.g., Fossati et al., 2021; Pascoe et al., 2020). Engaging in sports allows students to channel stress through physical activity, which releases endorphins and improves mood (Alam & Rufo, 2019; Fossati et al.,

2020). Moreover, being part of a team fosters a sense of community and belonging, boosting self-esteem and confidence (Haim-Litevsky, Komemi, & Lipskaya-Velikovsky, 2023). The discipline and structure inherent in sports also promote the development of time management skills and resilience (Martín-Rodríguez et al., 2024). Regular physical activity has also been linked to better concentration, improved sleep quality, and enhanced overall physical fitness, all of which contribute to a healthier lifestyle. By incorporating sports into their routines, high school students can adopt a balanced approach to navigating academic and social pressures, ultimately improving their overall well-being.

Despite a growing body of research, several gaps remain in the literature regarding the impact of social media and sports on high school students. The mechanisms through which these activities influence mental health-whether positively or negatively-are still not fully understood. For example, while some studies suggest that social media fosters social connectivity and emotional support, others highlight its potential to contribute to feelings of inadequacy, anxiety, and depression. A more nuanced understanding of the contexts, patterns, and types of social media use (e.g., active versus passive use, positive versus negative interactions) is needed to clarify these conflicting findings.

Furthermore, limited knowledge exists about which social media platforms are most popular among high school students, how much time they spend on these platforms, and how platform-specific features influence their mental well-being. Factors such as algorithm-driven content exposure, platform design, and peer interactions may play a significant role but remain under explored. Similarly, the role of individual differences-such as gender, socioeconomic status, or personality traits-in moderating the effects of social media is not well-documented.

To address these gaps, the current study investigates the complex relationships between social media use, sports participation, mental health, and academic confidence among high school students. Specifically, it explores how different patterns of social media engagement and various types of sports activities contribute to students' well-being, including their mental health, happiness, and academic confidence. By examining these factors, the study seeks to clarify the mechanisms underlying these influences and to identify potential areas where targeted interventions and support strategies can enhance the well-being of high school students.

Building on this objective, we collected data on high school students' happiness, academic confidence, social media usage, and sports participation. The study examines how these activities influence students' happiness and academic confidence. Additionally, it explores the mediating role of happiness in these relationships, providing deeper insights into the mechanisms through which these activities affect students' overall well-being. Since happiness and academic confidence are latent constructs, each measured by multiple indicators, a structural equation modeling (SEM) approach is used to model the relationships among these variables while accounting for measurement error (e.g., Bollen, 1989; Lee & Song, 2012; Merkle & Rosseel, 2015; Muthén & Asparouhov, 2012).

The remainder of the article is structured as follows. First, we introduce the high school student mental health dataset collected for this study. Next, we describe the data analysis procedures and present the results. Finally, we conclude with a discussion of the findings and their implications.

2   High School Student Mental Health: An Empirical Example

In this section, we introduce the participants, describe the measurements used for data collection, and summarize the key characteristics of the dataset.

2.1   Participants

This study involved 51 students from a public high school in San Jose, California. Among the participants, there were 26 female students, 24 male students, and one non-binary student. The grade levels ranged as follows: 2 ninth graders, 11 tenth graders, 17 eleventh graders, and 21 twelfth graders. Additionally, 25 participants were members of high school varsity sports teams, while the remaining 26 were non-athletes.

2.2   Procedures

To understand the impact of sports participation and social media usage on happiness and confidence among high school students, data collection was conducted using a Google Form containing items on demographics, sports participation, social media usage, and self-reported happiness and confidence levels. The survey was distributed among students, specifically targeting members of sports teams and their classmates, to gather diverse perspectives.

2.3   Measurement

We collected self-reported data on students' happiness and academic confidence, both measured as latent constructs using multiple indicators. Additionally, we gathered data on students' sports participation and social media usage, including their preferred platforms and the among of time spent on these platforms. Students also provided their perceptions of how sports activities affected their happiness and academic confidence.

Happiness and Academic Confidence To measure happiness and academic confidence, we developed a 10-item scale [3].

Each of the two latent constructs-happiness and academic confidence-is measured by 5 items. Example items include, "I generally feel happy in my daily

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[3] Refer to the Appendix

life" for happiness and "I believe in my ability to perform well in exams and assessments" for academic confidence. All 10 items were rated on a 5-point Likert scale (1 = strongly disagree, 2 = somewhat disagree, 3 = neither agree nor disagree, 4 = somewhat agree, and 5 = strongly agree).

The reliability (α, Cronbach, 1951) for the happiness construct is 0.79, with the 95% confidence interval [0.68, 0.87]. For academic confidence, α is 0.62, with the 95% confidence interval [0.42, 0.76].

Social Media Usage To understand social media usage among high school students, we included an open-ended question asking them to report their favorite social media apps. Students were allowed to list more than one app if applicable. Figure 1 illustrates the frequencies of the social media apps indicated by the students as their favorite apps.

In this data set, students reported a total of nine social media applications as their favorite applications. Among the nine applications, YouTube was the most popular, with 34 students (around two-thirds) listing it as their favorite app. Instagram was also highly favored, with 29 students listing it as their favorite app.
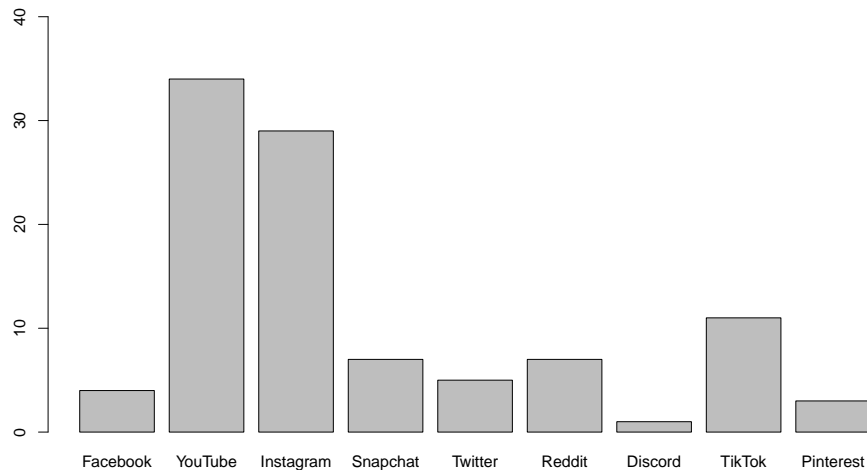

Figure 1. Comparison of student preferences for social media applications

Moreover, students also reported how many hours they spend on social media per day. The distributions are included in Figure 2. The plot illustrates the distribution of time spent on social media among students, categorized into four
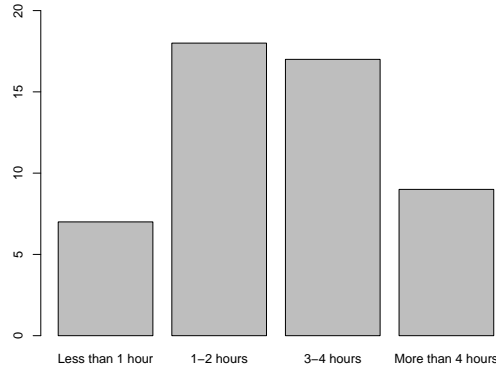
Figure 2. The average time that students spend on social media per day

groups: "Less than 1 hour," "1-2 hours," "3-4 hours," and "More than 4 hours." The majority of students fall into the "1-2 hours" category, indicating that moderate daily social media usage is the most common. As the time spent on social media increases, the number of students decreases, with fewer reporting "3-4 hours" of use and an even smaller proportion in the "More than 4 hours" category. Additionally, a smaller yet notable group of students reported "Less than 1 hour" of daily social media use, suggesting that a subset engages minimally with social media. These findings highlight the varying levels of social media engagement among students.

Sports Participation Among the 51 students, 25 were members of a sports team at the time of the survey, while the remaining 26 were not. Of the students on sports teams, 11 had been members for 1 or 2 years, 12 had been members for 3 or 4 years, and 3 had been members for less than a year.

Perceived Impact of Sports on Happiness and Confidence Students also described how sports activities impacted their happiness and confidence, using a scale ranging from "Sports significantly decrease my happiness /confidence" to "Sports significantly increase my happiness/confidence." The responses are summarized in Figure 3.

The majority of students reported either an increase or a significant increase in happiness as a result of sports participation, with a smaller proportion indicating "No Impact" and only a few reporting negative effects. A similar pattern was observed for academic confidence, where most students experienced positive changes. However, slightly fewer students reported an increase in academic confidence compared to happiness, with a notable portion indicating "No Impact."
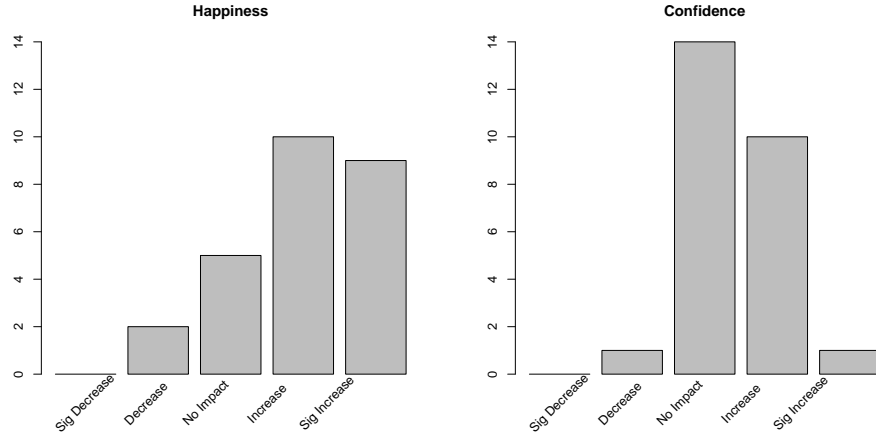
Figure 3. Self-reported impact of sports participation on students' happiness and confidence

2.4   Overview of Data Analysis

This analysis aims to examine the impact of sports participation and social media on high school students' mental health and academic confidence. Specifically, we aim to address the following questions: (1) Does sport participation positively influence students' happiness and/or academic confidence? (2) Does social media enhance students' happiness but hinder academic confidence? (3) How are happiness and academic confidence related? (4) Are there gender-based differences in happiness and the academic confidence among students?

3   Data Analysis and Results

Since both happiness and academic confidence are latent variables measured by five indicators each, we will use structural equation models (Garnier-Villarreal & Jorgensen, 2020) that incorporate a measurement model for the latent variables and a structural model to assess the hypothesized relationships between them.

3.1   Model

In LISREL notation (Byrne, 1989), an SEM model typically includes the measurement and structural components. The measurement model describes the measurement structures of the latent variables:

$$\begin{cases} \mathbf{x} = \boldsymbol{\Lambda}_x \xi + \boldsymbol{\delta} \\ \mathbf{y} = \boldsymbol{\Lambda}_y \eta + \boldsymbol{\varepsilon} \end{cases} \tag{1}$$

where **x** represents observed indicators for the exogenous latent variables (ξ), **y** represents observed indicators for the endogenous latent variables (η), $\mathbf{\Lambda}_x$ and $\mathbf{\Lambda}_y$ are the factor loading matrices for exogenous and endogenous variables, respectively. The symbols $\boldsymbol{\delta}$ and $\boldsymbol{\varepsilon}$ are the measurement errors of indicators.

The structural model assess the relationship among latent variables and with predictors

$$\eta = \mathbf{B}\eta + \mathbf{\Gamma}\xi + \mathbf{\Pi Z} + \boldsymbol{\zeta} \tag{2}$$

where **B** is the matrix of regression coefficients among endogenous latent variables **Γ** is the matrix of regression coefficients from exogenous latent variables (ξ) to endogenous latent variables (η), **Π** is the matrix of regression coefficients from observed predictors **Z** to endogenous latent variables, and $\boldsymbol{\zeta}$ represents the disturbance terms.

In the current analysis, the endogenous latent variables (η) include happiness and the academic confidence. The manifest predictors **Z** includes the sport varsity participation (yes=1, no=0), gender (girl=1, boy=0), and app use (in hours).

We fit the model using the *lavaan* package (Rosseel, 2012) within the *R* platform (R Core Team, 2020). The initial model was specified without cross-loadings or correlated residuals, and all models were estimated using the maximum likelihood approach (Jöreskog, 1967). After fitting the initial model, we conducted modifications based on the largest Modification Index (MI) to improve model fit by incorporating the suggested paths. The final model, refined through this process, is illustrated in Figure 4.

3.2   Results

The model parameter estimates and fit indices are presented in Table 1. When compared to the saturated model (i.e., a model with a perfect fit), the hypothesized model shown in Figure 4 demonstrated a good fit, with a Chi-square statistic of 45.538(df=40) and a p-value of 0.253, indicating that our model is not significantly worse than the saturated model. The fit indices further support this conclusion: the Root Mean Square Error of Approximation (RMSEA) is 0.052, the Comparative Fit Index (CFI) is 0.965, and the Tucker-Lewis Index (TLI) is 0.945, all of which indicate a good model fit.

Examining the parameter estimates, we find that **sports varsity participation** (1=yes, 0=no) positively predicts happiness (Est = 0.371, p-value = 0.035), suggesting that students involved in sport varsity report higher happiness. However, **hours spent on social media applications** (App_hour) did not significantly predict happiness (Est = 0.077, p-value = 0.430). The coefficient estimate of gender (female=1, male=0) is -0.433 with p-value 0.019. The result indicates that female students are less happier than male students.

For academic confidence, sports participation was not a significant predictor (Est = -0.143, p-value = 0.499). In contrast, hours spent on social media negatively predicted confidence (Est = -0.373, p-value = 0.003), suggesting that more time on social media may be associated with lower academic confidence. In
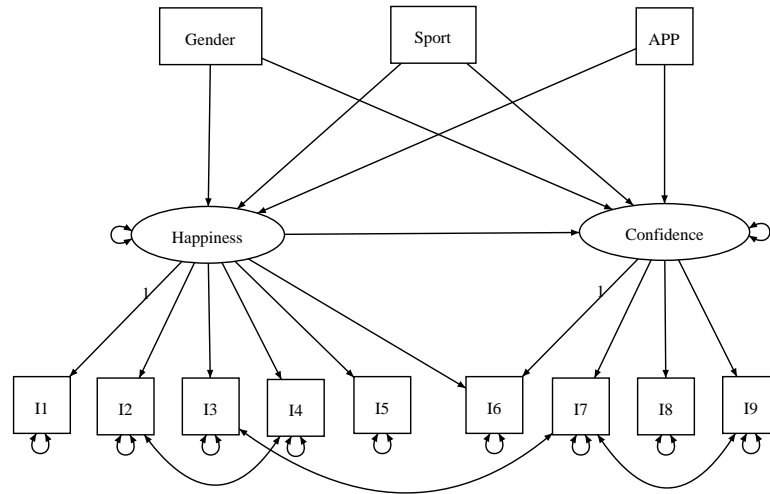
Figure 4. Path diagram of the CFA model of Imagination and Extraversion

addition, female students are more confident in academic performance than male students with the coefficient estimate of gender on confidence being 0.602 and the p-value being 0.013. Moreover, happiness, though not significant, showed a positive trend in predicting confidence (Est = 2.981, p-value = 0.129).

Par		Est	Std.Err	z-value	P($> |z|$)
Happy$\sim$	Sport	0.371	0.176	2.104	0.035
	App_hour	0.077	0.097	0.790	0.430
	Gender	-0.433	0.185	-2.337	0.019
Confidence$\sim$	Sport	-0.143	0.212	-0.676	0.499
	App_hour	-0.373	0.128	-2.925	0.003
	Gender	0.602	0.242	2.484	0.013
	Happy	2.981	1.966	1.517	0.129
$\mathcal{X}^2(40)$	45.538	p-value=0.253			
CFI	0.965		TLI	0.945	
RMSEA	0.052				

Table 1. Parameter estimates of the regression coefficients and the model fit indices

4 Concluding Remarks

This study examined the effects of sports participation and the use of social media on high school students' happiness and academic confidence. By employing a structural equation modeling approach, the research assessed the relationships among these variables while accounting for gender difference, the time spent on social media, and the participation in sports varsity.

4.1 Highlights of the Results

The results reveal that sports participation and social media have distinct influences on high school students' happiness and academic confidence. Specifically, sports participation was positively associated with happiness, indicating that engaging in sports may enhance overall well-being. However, it did not have a significant impact on academic confidence. Conversely, increased time spent on social media was negatively associated with academic confidence but showed no significant effect on happiness levels. While happier students tended to report higher academic confidence overall, this relationship was not statistically significant in the current dataset. Gender differences were observed, with female students reporting a lower levels of happiness and a higher level of academic confidence than male students.

4.2 Discussion

The findings of this study reveal notable patterns in the popularity of social media applications among high school students. YouTube emerges as the most widely favored platform, with a significant majority of students identifying it as their preferred app. Instagram follows as the second most popular choice, emphasizing its appeal for photo sharing and social interaction. While other platforms are less commonly selected, they still maintain a presence among students, reflecting the diverse preferences within this demographic.

In addition to insights on social media preferences, the study highlights the complex relationships between sport activities, social media use, and high school students' mental health and academic confidence. The positive association between sports participation and happiness aligns with existing literature, suggesting that physical activity and team engagement can enhance well-being and provide students with a sense of community and purpose. However, the lack of a significant link between sports participation and academic confidence implies that while sports may enhance general happiness, they do not necessarily impact students' perceptions of their academic abilities.

In contrast, the negative impact of social media use on academic confidence highlights growing concerns about its influence, arising from social comparison or distractions from academic responsibilities. Importantly, the observed gender differences in happiness and confidence, with female students reporting a lower level of happiness and a higher level of academic confidence, emphasize the importance of implementing tailored support strategies to address these disparities.

These findings suggest that promoting balanced social media use and encouraging participation in sports can play a vital role in supporting students' mental well-being. However, effective educational interventions must also consider the unique challenges and needs of different gender groups to foster both mental health and academic confidence.

4.3   Future Considerations

This study offers valuable insights into the relationships between sports participation, social media use, happiness, and academic confidence among high school students, employing a structural equation modeling approach. However, a few of methodological limitations should be addressed in future research.

First, the cross-sectional design limits the ability to draw causal inferences. Future studies should consider longitudinal or experimental designs to better capture the dynamic effects of sports participation and social media over time, helping to clarify causal pathways and temporal relationships.

Second, the reliability and validity of the scales used to measure happiness and academic confidence require further calibration to ensure robust results. Additionally, the reliance on self-reported data introduces potential biases, such as social desirability bias, which may compromise the accuracy of the findings. Future research should consider incorporating objective measures, such as digital tracking of social media use and external assessments of academic confidence, to strength the reliability and validity of the data.

Additionally, this study was conducted in a single school in the Bay Area, which may restrict the ability of generalization of the findings to broader populations, such as students from the Midwest or other regions with distinct cultural and socioeconomic contexts. Expanding the sample to include schools from diverse regions and demographic backgrounds would enhance the external validity and applicability of the results.

Lastly, while this study examined gender differences, future research should explore other moderating factors, such as socioeconomic status, academic achieve-

ment, and family support, to gain a more subtle understanding of how these variables interact with social media use and sports participation. Addressing these methodological considerations would provide a more comprehensive understanding of the factors influencing high school students' mental health and academic confidence, offering a stronger foundation for effective interventions.

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Appendix

High School Student Happiness and Academic Confidence Survey: Sports Participation

Thank you for taking part in our survey, which aims to explore the relationship between high school students' happiness, academic confidence, and their participation in high school sports teams. Your responses will provide valuable insights into how sports involvement may impact your overall well-being and academic self-assurance. Your responses will remain anonymous and confidential.

Section I

1. Name (OPTIONAL)_____
2. Email (OPTIONAL)_____
3. Gender: ○ Male ○ Female ○ Non-Binary ○ Other _____
4. Grade: ○ 9th ○ 10th ○ 10th ○ 11th
5. Cumulative GPA (unweighted) _____
6. Which high school do you currently attend? _____
7. Are you currently a member of a high school sports team? ○ Yes ○ No

Section II

Happiness Assessment Please rate the following statements on a scale of 1 to 5, where 1 indicates strongly disagree and 5 indicates strongly agree.

1. I generally feel happy in my daily life. ○ 1 ○ 2 ○ 3 ○ 4 ○ 5
2. I have supportive friendships. ○ 1 ○ 2 ○ 3 ○ 4 ○ 5
3. I am satisfied with my overall well-being. ○ 1 ○ 2 ○ 3 ○ 4 ○ 5
4. I feel a sense of belonging at my school. ○ 1 ○ 2 ○ 3 ○ 4 ○ 5
5. I am optimistic about my future. ○ 1 ○ 2 ○ 3 ○ 4 ○ 5

Section III

Academic Confidence Assessment Please rate the following statements on a scale of 1 to 5, where 1 indicates strongly disagree and 5 indicates strongly agree.

1. I believe I am capable of understanding challenging subjects. ○ 1 ○ 2 ○ 3 ○ 4 ○ 5
2. I feel confident participating in classroom discussions. ○ 1 ○ 2 ○ 3 ○ 4 ○ 5
3. I am comfortable seeking help from teachers when needed. ○ 1 ○ 2 ○ 3 ○ 4 ○ 5
4. I manage my time effectively to balance schoolwork and other activities. ○ 1 ○ 2 ○ 3 ○ 4 ○ 5
5. I believe in my ability to perform well in exams and assessments. ○ 1 ○ 2 ○ 3 ○ 4 ○ 5

Section IV

Social Media Usage

1. On average, how many hours per day do you spend on social media? ○ Less than 1 hour ○ 1-2 hours ○ 3-4 hours ○ More than 4 hours
2. Please select your favorite social media app from the following list ○ Instagram ○ TikTok ○ Snapchat ○ Twitter ○ Facebook ○ Youtube ○ Pinterest ○ Reddit ○ Other_____

Section V

Sports Participation and Impact

1. How long have you been a member of a high school sports team? ○ Less than a year ○ 1-2 years ○ 3-4 years ○ Not applicable
2. How do you feel your involvement in a sports team has influenced your overall happiness? Significantly decreased ○ 1 ○ 2 ○ 3 ○ 4 ○ 5 Significantly increased
3. How do you perceive the impact of sports participation on your academic confidence? Significantly decreased ○ 1 ○ 2 ○ 3 ○ 4 ○ 5 Significantly increased