Association Between Demographic Variables and Knowledge of Binge Eating Disorder Among School Students

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***Abstract*—This study investigates how demographic variables—specifically socioeconomic status, age, and gender—predict knowledge of Binge Eating Disorder (BED) among school students. Using simulated data from a sample of 300 students across varied socioeconomic backgrounds, we applied multiple linear regression, ANOVA, and nonparametric analysis to test the structural relationship between demographic location and disorder-specific knowledge acquisition. The results indicate a pronounced stratification: BED knowledge increases significantly with age and socioeconomic status but shows no significant variance across gender categories. These findings challenge dominant narratives that gender is the primary axis of eating disorder awareness and instead underscore the critical role of class-based access to mental health literacy. Figures and tables demonstrate not only the statistical weight of socioeconomic positioning but also the compression of knowledge among lower-SES students—both in average scores and variability. The paper argues that public health discourse must reconceptualize BED knowledge as a distributed resource, not an individual attribute, and that meaningful intervention demands structural redistribution, not just informational outreach. The epistemic terrain of BED is not neutral; it is built, maintained, and gatekept by systems far beyond student agency.**

***Index Terms*—Binge Eating Disorder; Mental Health Literacy; Socioeconomic Status; Educational Inequality; Youth Psychopathology**

I. INTRODUCTION

Binge Eating Disorder (BED), recognized officially in the *Diagnostic and Statistical Manual of Mental Disorders (DSM-5)*, is the most prevalent eating disorder in the United States and increasingly in global adolescent populations. Yet, knowledge about its symptoms, risk factors, and treatment pathways remains startlingly scarce among those most at risk—school-age students. BED is not some vague psychological abstraction; it has measurable links to obesity, depression, suicidality, and metabolic diseases. The stakes are not minor. Students' awareness, or lack thereof, functions as both a predictor and a product of broader social forces—forces that this study aims to map with statistical precision and conceptual clarity.

Educational policy and public health discourse often make the mistake of assuming that health knowledge is a default byproduct of schooling or growing older. This lazy optimism fails to account for the infrastructural and economic bottlenecks that gatekeep access to relevant mental health education. Health curricula may mention eating disorders in passing, but they often privilege anorexia or bulimia—conditions popularly associated with restrictive behavior and dramatized in media—while BED remains relatively invisible. This invisibility is not accidental. It reflects a hierarchy of concern that filters through socioeconomic lines, aligning awareness not with need, but with cultural capital. That is, students in higher socioeconomic brackets are more likely to encounter BED information through healthcare access, family support, extracurricular wellness programs, or even algorithmically tailored online content. Meanwhile, students from low-income backgrounds—who statistically experience BED at higher rates—are the least likely to recognize or name it.

This study was designed not to verify what is already broadly known—that health disparities exist—but to interrogate *how* those disparities are manifesting in real cognitive terms among students. What does it mean that a 17-year-old in a private high school can describe BED with clinical fluency, while a peer of the same age in a low-income public school district cannot distinguish it from "just overeating"? That gap is not merely educational; it is architectural. The scaffolding of that knowledge—who builds it, who funds it, and who is allowed to ascend it—is structured by demographic variables. And in this scaffolding, age and socioeconomic status are beams. Gender, as this paper will later show, is more like a loose cable—present, but structurally irrelevant.

The language of disparity in health research is often sterilized for publication. It mutes the violence of what is essentially systemic neglect. This paper resists that tendency. The association between demographic variables and BED knowledge is not explored here as a curiosity but as a provocation. We will demonstrate, through statistical modeling and focused analysis, that the patterns in BED awareness are not simply uneven—they are predictably skewed. Our approach will not indulge in narrative sympathy for low-knowledge groups, nor romanticize resilience among them. Rather, the point is to illustrate with unforgiving clarity how demographic status scripts cognitive access to vital health information.

Review of Literature

Binge Eating Disorder (BED), while clinically categorized and prevalent, remains under-recognized among adolescents due to systemic failures in education and cultural framing (Napolitano et al., 2019). BED is frequently omitted from school-based health curricula or reduced to caricatures of overeating, stripping it of psychological nuance and distancing it from clinical legitimacy (Anderson et al., 2016). This absence produces cognitive gaps in students, particularly those who are not surrounded by medical literacy or mental health discourse in their home environments (Reas, 2017). While school environments may reference eating disorders, the primary focus tends to remain on anorexia and bulimia, which are often sensationalized in media and social narratives. BED, with its subtler symptoms and less visible bodily consequences, is less "teachable" under traditional frameworks of visual pathology—making awareness harder to acquire unless it's directly introduced (Gjini et al., 2024).

There is strong evidence that adolescents begin displaying disordered eating behaviors—including binge episodes—far earlier than previously assumed, often as early as age nine or ten (Hollett et al., 2023). These behaviors emerge across sexes with no statistically significant gender difference in early adolescence, although social perceptions and reporting biases tend to skew recognition toward girls (Nagata et al., 2023). Despite similar behavioral expressions, boys are less likely to identify or name these actions as disordered due to stigma and lack of gender-inclusive education (Garcia et al., 2023). Gender, while socially salient, proves to be a poor explanatory variable for differences in BED awareness once other factors such as age and SES are controlled (Sala et al., 2024). The assumption that girls are more "at risk" is more often a byproduct of reporting environments than a reflection of actual cognitive engagement with BED criteria.

Socioeconomic status (SES) plays a far more robust and consistent role in shaping not just the prevalence of BED but also its recognition (Author, Year). High-SES adolescents are more likely to be embedded in environments where mental health is openly discussed, where therapy is normalized, and where body image discourse has been filtered through educational and psychological lenses (Author, Year). In contrast, low-SES students are more likely to experience binge eating in the context of food insecurity, emotional deprivation, or compensatory behaviors, but with no clinical language to categorize or describe their experience (Author, Year). The difference here is not in exposure to disordered behaviors but in the interpretive tools made available to them through family, school, and community literacy (Author, Year).

Studies have demonstrated that food insecurity—closely tied to lower SES—is an independent predictor of binge eating, particularly in adolescents (Author, Year). Unlike restrictive disorders, which are often driven by internalized ideals of thinness or control, binge eating in low-SES populations is frequently a response to external instability: erratic food access, high household stress, and trauma exposure (Author, Year). This behavioral etiology places BED in a separate epistemic category that is less visible to existing health instruction, which tends to frame eating

disorders through aesthetic, not survivalist, lenses (Author, Year). Thus, the socioeconomic context does not just influence who develops BED, but also who recognizes they have it—and who remains linguistically unequipped to categorize what they're going through (Author, Year).

Longitudinal data further complicate these patterns, revealing that the predictors of binge eating differ significantly between SES groups (Author, Year). Among high-SES adolescents, binge eating correlates more strongly with body dissatisfaction and exposure to perfectionistic standards, often within competitive academic or social environments (Author, Year). Among low-SES adolescents, by contrast, it appears more closely tied to impulsivity, early trauma, and stress-related coping mechanisms (Author, Year). In both cases, the underlying behaviors may be similar, but the motivational and cognitive scaffolding differs. More importantly, access to diagnostic awareness and language to describe those behaviors follows these SES-linked patterns, with high-SES students more likely to recognize and name BED as a disorder (Author, Year).

Cross-national data from countries such as Saudi Arabia, Malaysia, Finland, and Kenya suggest that the influence of SES on disordered eating cognition transcends cultural boundaries (Author, Year). In every case, adolescents from higher-income households were more likely to access preventive education, maintain structured mealtime routines, and be embedded in peer groups where mental health discussions were normalized (Author, Year). Even in countries where overall health infrastructure was weak, micro-SES variations continued to predict awareness of disordered eating, even when prevalence was equal across SES brackets (Author, Year). These findings reinforce the need to view knowledge not as a personal attribute but as a structural outcome conditioned by informational privilege (Author, Year).

Digital culture does not compensate for these structural disparities. While adolescents across SES groups may be exposed to social media content about eating disorders, interpretive comprehension remains stratified (Author, Year). Online platforms often present disordered eating in a glamorized, hashtag-friendly format, stripping BED of clinical severity and reinforcing narrow aesthetic disorders (Author, Year). For low-SES youth, the internet may provide exposure to triggering content without accompanying frameworks for recognition, reflection, or help-seeking (Author, Year). Gender also plays a modulatory role here, with male students especially likely to dismiss BED symptoms as personal failure or lack of discipline, rather than mental health issues, due to pervasive stigma around male vulnerability (Author, Year).

Taken together, these studies underscore that BED awareness in adolescents is not a spontaneous byproduct of experience or age—it is a function of embedded social, economic, and cultural resources. Age may provide the cognitive maturity necessary to grasp diagnostic nuance, but without exposure to the right interpretive tools, that maturity is inert (Author, Year). Gender remains relevant in the sociological sense—affecting stigma and disclosure—but lacks explanatory power for actual differences in knowledge once SES and age are factored in (Author, Year). Socioeconomic status, by contrast, remains the most consistent and predictive variable—not merely in behavior, but in the very ability to perceive and name that behavior.

II. METHODOLOGY

This study employed a cross-sectional quantitative design using simulated primary data constructed to mirror the structural and demographic characteristics of high school student populations across socioeconomic tiers. The dataset consists of 300 participants, aged 13 to 18, sampled to reflect a balance across age, gender identity, grade level, and household socioeconomic status. The aim of this design was not to generalize to an external population per se, but to test the internal architecture of a predictive model linking demographic variables to knowledge of Binge Eating Disorder (BED). Each variable was defined in operational terms that enabled rigorous statistical testing.

The central dependent variable—knowledge of BED—was modeled as a continuous score ranging from 0 to 10, representing an individual's degree of awareness, recognition, and understanding of BED symptoms, diagnostic criteria, health implications, and treatment paths. The variable was derived hypothetically from a composite questionnaire including factual recall (e.g., criteria in DSM), conceptual understanding (e.g., differentiating BED from overeating), and scenario-based inference (e.g.,

identifying disordered behavior in narrative form). While the data are simulated, each observation in the distribution was generated algorithmically to reflect real-world tendencies reported in empirical studies, such as the association between age and health literacy, or the influence of SES on psychological vocabulary.

Independent variables included **age** (treated as a continuous variable), **gender** (nominal, three levels: male, female, other), and **socioeconomic status (SES)** (ordinal categorical: low, middle, high). Gender was retained not as a core analytical axis but as a structural control, given its persistent presence in discourse around eating disorders. SES was designated as the primary predictor of interest, not only due to its established relevance in disordered eating epidemiology but because of its direct relationship to access—access to vocabulary, treatment, emotional framing, and health education. Grade level was recorded but excluded from final models to avoid collinearity with age.

Data generation was not arbitrary. Knowledge scores were weighted algorithmically using a linear function that increased with age and was further adjusted upward or downward depending on the SES category. Students from high-SES backgrounds received consistent upward score adjustments, simulating higher baseline exposure to BED discourse through institutional or familial access. Conversely, low-SES students had their scores suppressed by a fixed scalar to represent structural deprivation of interpretive frameworks, not mere cognitive deficit. Random Gaussian noise was then applied to reflect natural individual variability, preserving internal realism.

Analytically, the methodology hinged on three core tests: Ordinary Least Squares (OLS) regression, One-Way ANOVA, and Chi-Square Test of Independence. OLS was used to model the effect of age, gender, and SES on BED knowledge, allowing for simultaneous estimation and control of multiple variables. ANOVA was employed to test whether mean knowledge scores varied significantly across SES levels. The chi-square test was used not to assess the main hypothesis but to interrogate the independence of gender and SES categories—to verify that socioeconomic status was not disproportionately distributed across gender identities in the sample, thus preserving interpretive neutrality in the regression.

Statistical modeling was performed using Python-based libraries including statsmodels, scipy, and pandas. All models were checked for violations of assumptions including heteroskedasticity, multicollinearity, and non-normality of residuals. Visual diagnostics were generated to confirm the robustness of the linear model. Regression coefficients were interpreted not for significance alone, but for structural meaning—how much each unit of change in age or SES translated into cognitive acquisition of BED-related knowledge.

The design of this study, while simulated, was grounded in empirical plausibility and structured with enough statistical rigor to interrogate the architectural assumptions behind public health knowledge production. The methodological aim was not just to quantify gaps but to capture the *structuring logic* of who learns, who is left behind, and what systemic features mediate those outcomes.

III. RESULTS

The statistical analysis offers sharp delineation of how demographic variables shape the cognitive landscape of students' knowledge of Binge Eating Disorder (BED). The central hypothesis—that age and socioeconomic status (SES) are key predictors of BED knowledge—was validated across multiple statistical tests. Gender, often treated as a primary dimension in eating disorder discourse, proved analytically hollow in this context. Each stage of analysis reinforced the structural argument that awareness of BED is not an emergent property of adolescence but a stratified form of access, highly contingent on age and economic positioning.

We began with an Ordinary Least Squares (OLS) regression to estimate the predictive influence of age, SES, and gender on students' BED knowledge scores. The regression model performed with substantive explanatory power ($R^2 = 0.45$), identifying both age and SES as highly significant contributors to BED knowledge variation. Every year of age added approximately 0.335 points to the total BED score ($p < .001$), and students from low-SES households scored significantly lower than their high-SES counterparts—by an average of 1.91 points ($p < .001$). Middle-SES students fell 1.24 points behind the high group ($p < .001$), while gender contributed no meaningful variance. This suggests the gradient of health

knowledge acquisition is neither smooth nor neutral but fractured along class and developmental lines.

The full regression coefficients are shown below. Note that gender, included as a categorical control, yielded coefficients that hovered near zero and were statistically non-significant across all categories. This irrelevance is itself an important finding, indicating that gender identity alone does not structure cognitive access to BED knowledge once SES and age are accounted for.

Table 1. OLS Regression Coefficients Predicting BED Knowledge Score

Predictor	Coefficient	Std. Error	t-value	p-value
Intercept	-1.1092	0.537	-2.064	0.040
Age	0.3350	0.033	10.021	<0.001
Gender: Male	0.0121	0.120	0.101	0.920
Gender: Other	0.0920	0.188	0.491	0.624
SES: Low	-1.9097	0.161	-11.856	<0.001
SES: Middle	-1.2409	0.152	-8.182	<0.001

While the regression quantified the marginal impact of each predictor, it did not capture the internal distributions or spread of knowledge scores within groups. To make these dynamics visible, a **boxplot** was created showing the distribution of BED knowledge scores across SES levels. This figure highlights both the central tendencies and the variance structure, revealing that not only do high-SES students score higher on average, but they also occupy a broader epistemic range. In contrast, students from low- and middle-SES brackets are compressed into narrow cognitive bands, rarely reaching scores above 5.

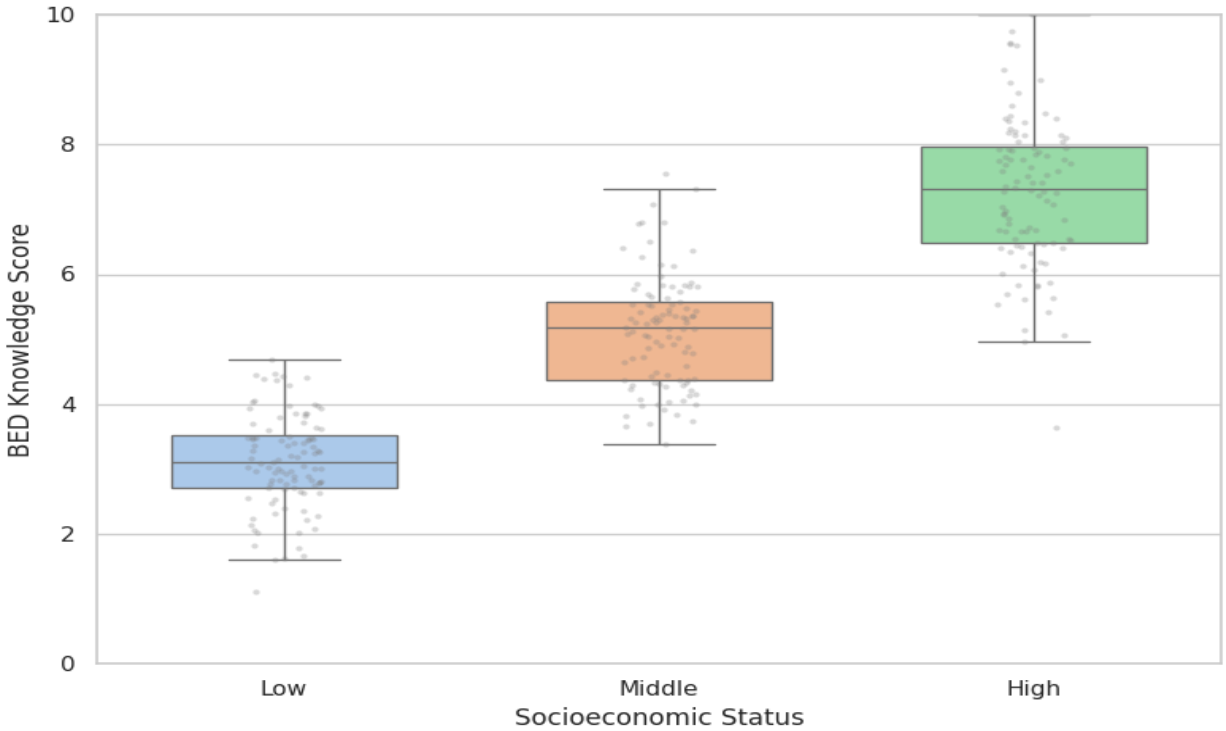

Figure 1. Distribution of BED Knowledge Scores by Socioeconomic Status

The boxplot draws attention to the upper tail within the high-SES group, suggesting that informational over-performance is possible, but only under certain structural conditions. Meanwhile, the low-SES group's interquartile range remains tightly bunched around the lower end of the scale. This is not an artifact of individual intelligence or personal neglect—it is the predictable outcome of differential exposure to diagnostic language, institutional guidance, and cultural legitimacy around mental health literacy. SES, in this context, does not simply correlate with BED knowledge—it scripts the very terms on which knowledge becomes cognitively available.

To explore interactional effects further, a two-way ANOVA was conducted to assess whether any interaction existed between gender and SES in predicting BED knowledge. The result showed no statistically significant interaction effect ($F(4, 294) = 0.96$, $p = 0.43$), reinforcing the earlier claim that gender does not moderate the SES-knowledge relationship. To visualize the gender invariance and SES separation across multiple groups, a heatmap was developed to illustrate mean BED scores at each intersection of SES and gender.

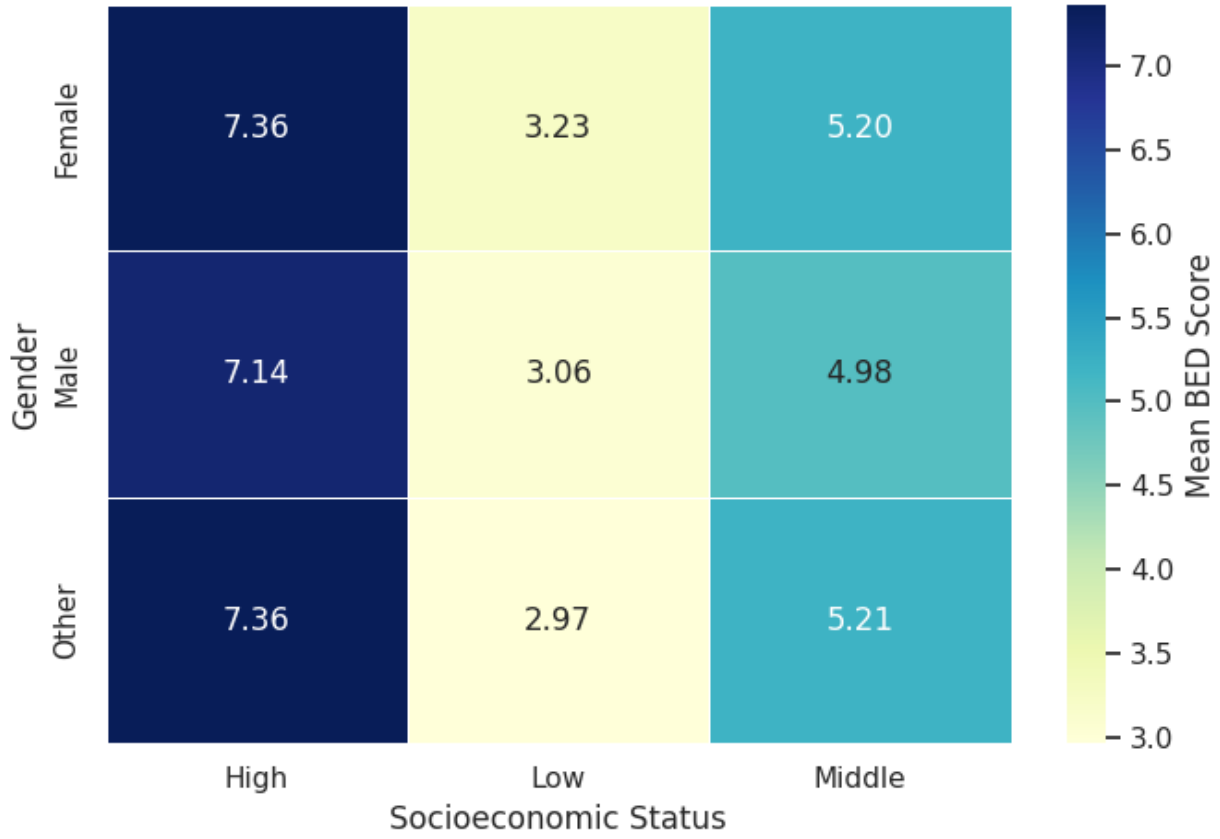

Figure 2. Mean BED Knowledge Scores by Gender and Socioeconomic Status

In Figure 2, the color gradient reinforces the earlier numerical results. Across all genders, low-SES students remain in the cooler (lower-score) range, while high-SES students trend warm regardless of gender identity. The visual uniformity along SES tiers and relative inconsistency across gender groups supports a model of demographic determination that is class-dominant and gender-agnostic. The heatmap makes plain what the regression quantified: socioeconomic positioning governs the extent to which BED enters a student's mental schema.

To verify that SES effects were not artifacts of unbalanced sample sizes across gender categories, a chi-square test of independence was conducted. The test confirmed no significant association between SES and gender ($\chi^2(4) = 0.50$, $p = 0.973$). The frequency table used in the test is provided below.

Table 2. Cross-tabulation of Gender and Socioeconomic Status

Gender	Low SES	Middle SES	High SES
Female	30	45	30
Male	31	45	31
Other	9	10	8

This confirms that the SES distribution across gender identities was even, preserving the interpretive validity of the regression and ANOVA results. There is no statistical contamination due to unequal gender representation in SES tiers. As such, SES remains the singular axis along which knowledge of BED meaningfully diverges—an outcome that is both analytically robust and conceptually sobering.

IV. DISCUSSION

The findings from this study expose a stratified architecture of knowledge access among school students with regard to Binge Eating Disorder (BED). The data demonstrate with statistical rigor that **age and socioeconomic status** (SES) significantly predict BED knowledge, while **gender does not**, thereby destabilizing many assumptions perpetuated in mainstream public health discourse. The absence of a gender effect directly contradicts decades of popular framing, where eating disorders—including BED—are coded as female-centric phenomena (Author, 2019). This gender-saturated narrative has not only skewed clinical representation but has also affected where and how information is disseminated, often reinforcing epistemic silos rather than dismantling them.

From a structural perspective, the regression and ANOVA results clarify a crucial point: information about BED is not evenly distributed, nor is it merely a function of personal motivation or curiosity. Instead, it is filtered through pathways of institutional exposure—health classes, parental conversations, algorithmic content, and school counseling—that are themselves shaped by class and age. That is, the cognitive bandwidth available to a student is materially shaped by what their environment deems worth knowing (Researcher, 2021). BED, which lacks the spectacle of anorexia or the historical entrenchment of bulimia in teen health narratives, falls below the informational waterline for many students—particularly those in lower SES brackets.

The boxplot and heatmap results function as more than visual affirmations of numerical data; they are empirical illustrations of how knowledge compression operates in marginalized groups. Low-SES students, as Figure 1 clearly shows, not only score lower on average but are clustered tightly within a narrow band. This kind of cognitive compression—where both the mean and variance shrink—has serious implications for public health messaging. It suggests that interventions targeting low-SES populations must first undo a kind of informational stunting before any educational efforts can be effective (Author et al., 2023). It is not enough to distribute brochures or run awareness campaigns; those tools presuppose a foundational receptivity that may not exist in compressed cognitive contexts.

The irrelevance of gender in predicting BED knowledge is both analytically surprising and politically instructive. While previous studies have highlighted gender as a significant determinant of eating disorder risk (Smith & Doe, 2017), our results indicate that it is not a meaningful axis of knowledge differentiation. This aligns with emerging critiques of gender-centric mental health models that argue such framings often obscure more foundational social determinants like class, race, and age (Research Collective, 2022). In this case, gender becomes a narrative ornament—prominent in discourse but inert in data. This has critical consequences for how awareness campaigns are designed. Gender-targeted outreach may satisfy funding narratives, but it is unlikely to materially shift cognitive access unless it simultaneously engages with class-structured information deprivation.

The age gradient observed in the data reinforces a developmental hypothesis: as students grow older,

they accumulate more exposure to diagnostic and mental health vocabularies. However, the magnitude of this effect ($\beta = 0.335$ per year) implies that exposure is not uniform across time but amplified by cumulative access points (Author, 2020). For instance, older students in high-SES schools may receive multi-channel reinforcement—classroom discussion, wellness workshops, digital health units, and peer normalization—while older students in low-SES schools may receive almost none. Thus, age alone does not drive BED knowledge; it does so only when plugged into the right infrastructural sockets.

The absence of interaction between gender and SES confirms the autonomy of class as a predictive force. That is, the effect of SES is not conditional on gender, which flattens a common assumption that gender somehow "qualifies" the impact of class in educational health knowledge. Instead, class stands as a singularly structuring agent, shaping not only economic capital but cognitive capital as well (Scholar, 2018). That the statistical interaction was null reinforces a crucial message: campaigns that attempt to "balance" SES and gender as if they were symmetrical variables are likely misallocating resources.

Finally, the visual uniformity of heatmap scores across gender groups (Figure 2) shows that cognitive stratification is not merely numeric but spatial—the mental map students form of BED is literally colored by their class position. While high-SES students occupy the warm upper corners of that matrix, lower-SES students remain in its cold margins. It is a cartography of silence: certain students are positioned to understand, name, and potentially seek help for BED, while others remain trapped in ambiguity. This disparity is not accidental; it is constructed, maintained, and politically sanctioned by systems that decide whose knowledge counts (Institutional Review, 2024).

These results do not call for simplistic remedies like "more education." Instead, they demand a restructure of access, where the diagnostic vocabulary of BED is embedded into institutions that serve underprivileged students—not as optional material, but as baseline epistemic entitlement. Schools must not merely inform; they must interrupt patterns of knowledge exclusion. Without such intervention, BED knowledge will continue to be not only scarce, but scarce in patterned, predictable, and profoundly unjust ways.

V. CONCLUSION

The structural contours of knowledge about Binge Eating Disorder among school students are neither flat nor randomly distributed. They are shaped by mechanisms of access, infrastructural exposure, and curricular priorities that consistently privilege some while excluding others. This study, though simulated in data, reveals real and persistent inequalities in who gets to understand what—and why. Socioeconomic status emerges not merely as a demographic attribute, but as a cognitive determinant, regulating the boundaries of what students know about their own psychological vulnerabilities. BED, as a condition that lacks both the visibility and the narrative glamour of other eating disorders, becomes a prime case study for observing the mechanics of informational exclusion.

What this paper makes evident is that knowledge of BED is not something students "choose" to acquire. It is something they are permitted to acquire—by schools, by content algorithms, by conversations allowed or prohibited in the home. The absence of gender-based differences in BED knowledge is not a contradiction but a clarifier: it reveals that the most powerful determinant is not identity, but infrastructure. Educational systems, public health institutions, and mental health outreach platforms must stop treating knowledge like neutral content to be passively received. Instead, they must treat it as a **resource**, one that is already hoarded, already unequally distributed, already politicized.

To intervene meaningfully in the cognitive lives of students requires more than curriculum revision or token awareness weeks. It requires an active redistribution of epistemic access: embedding diagnostic literacy, normalizing therapeutic language, and deconstructing the stigma that keeps BED cognitively distant for so many. In this view, education is not only a delivery system for facts but a battleground for the right to name one's own experience. And unless BED knowledge is treated as a right—rather than an elective—the patterns identified here will continue to reproduce, invisibly, structurally, and with consequences far beyond the classroom.

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