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Mental Health Correlates of Sexual Risk Behaviors among High School Students: A Cross-Sectional Survey in Guilan Province, Iran

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Abstract

Background: *Adolescence constitutes a critical developmental window characterized by heightened neurobiological plasticity and concurrent vulnerability to psychopathology and health-compromising behaviors. The intersection of mental health symptomatology and sexual risk behaviors remains inadequately characterized within conservative sociocultural contexts, particularly the Islamic Republic of Iran.*

Methods: *A stratified multistage probability sampling design recruited 850 students (grades 10-12) from 12 high schools in Guilan Province (Iran) during 2024-2025. Validated Persian-language versions of the Depression Anxiety Stress Scales-21 (DASS-21) and a researcher-developed Sexual Risk Behavior Inventory were administered. Multivariable logistic regression analyses quantified independent associations, with interaction terms evaluating moderating effects of family support and academic performance.*

Results: *The analytical sample comprised 764 participants (response rate: 95.5%; 54.7% female; mean age:16.4±1.1 years). Prevalence estimates indicated 24.4% for clinically significant depressive symptoms, 41.4% for anxiety, and 15.6% for stress. Moderate-to-severe depression was independently associated with increased odds of sexual activity (AOR=1.82; 95% CI: 1.24-2.67; p=0.002), inconsistent condom use (AOR=1.94; 95% CI:1.31-2.87; p<0.001), and composite sexual risk scores≥2 (AOR=2.15; 95% CI:1.48-3.12; p<0.001). Anxiety demonstrated comparable associations. Significant interaction effects were observed between depression and academic underachievement (p=0.042) and low family support (p=0.038).*

Conclusions: *These findings substantiate the syndemic relationship between internalizing psychopathology and sexual risk behaviors among Iranian adolescents. Integration of mental health screening within school-based sexual health frameworks represents an evidence-informed strategy for reducing adolescent morbidity in conservative settings.*

Keywords: Adolescent Health, Internalizing Psychopathology, School-Based Intervention, Syndemic Theory, Protective Factors, Mental Health, Sexual Risk Behaviors, Depression Anxiety Stress, Covariate Assessment and Sexual Knowledge.

Introduction

Adolescence represents a neuro-developmentally critical period characterized by substantial synaptic reorganization, heightened reward sensitivity, and immature prefrontal cortical regulatory mechanisms [1]. These biological transformations coincide with increased social and academic pressures, generating elevated vulnerability to internalizing psychopathology and engagement in health-compromising behaviors [2, 3]. Globally, mental health disorders constitute the leading cause of disability-adjusted life years (DALYs) among individuals aged 10-24 years, with depressive and anxiety disorders demonstrating particularly high prevalence and persistence [4, 5].

Concurrently, sexual risk behaviors during adolescence- including inconsistent contraceptive utilization, multiple concurrent partnerships, and substance-facilitated sexual encounters- represent significant public health concerns due to their associations with sexually transmitted infections (STIs), including HIV, unintended pregnancy, and adverse psychosocial sequelae [6, 7]. The World Health Organization estimates that 50% of new HIV infections occur among young people aged 15-24 years, with adolescent girls in sub-Saharan Africa and other resource-limited settings facing disproportionate burden [8].

The theoretical conceptualization of adolescent risk behaviors has evolved substantially, moving from unidimensional models emphasizing sensation-seeking propensities toward comprehensive frameworks integrating biological, psychological, and socio-structural determinants [9, 10]. Contemporary syndemic theory posits that psychopathology and sexual risk behaviors co-occur and mutually reinforce through shared etiological pathways, including neurocognitive impairment, emotion dysregulation, maladaptive coping strategies, and social network characteristics [11, 12]. This conceptualization has profound implications for intervention design, suggesting that siloed approaches targeting single risk categories may yield suboptimal outcomes relative to integrated strategies addressing co-occurring vulnerabilities [13].

Empirical evidence from diverse geographical contexts substantiates associations between internalizing symptoms and sexual risk behaviors. A systematic review and meta-analysis encompassing 25 studies conducted in low- and middle-income countries demonstrated that adolescents with elevated depressive symptomatology exhibited significantly increased odds of engaging in sexual risk behaviors (pooled odds ratio [OR]=1.30; 95% confidence interval [CI]: 1.1-1.5) and substance use (pooled OR=1.8; 95% CI:1.4-2.2) compared to non-depressed counterparts [14]. Longitudinal investigations within high-income settings have further elucidated temporal precedence, with baseline internalizing symptoms predicting subsequent risk behavior initiation and escalation [15, 16].

However, critical knowledge gaps persist regarding the generalizability of these associations to conservative sociocultural contexts characterized by stringent norms governing adolescent sexuality, limited sexual health education, and substantial stigma surrounding both mental health help-seeking and sexual activity outside sanctioned parameters [17, 18]. The Islamic Republic of Iran exemplifies such contexts, wherein religious and cultural proscriptions against premarital sexual contact coexist with documented engagement in clandestine sexual activity among youth subpopulations [19, 20].

Prior investigations within Iranian settings have characterized sexual knowledge deficits, documented prevalence estimates for premarital sexual contact ranging from 7.9% to 28% among adolescent males, and identified correlates including media exposure, substance experimentation, and permissive attitudinal orientations [21, 22]. Nevertheless, rigorous empirical examination of mental health symptomatology as a determinant of sexual risk behaviors remains conspicuously absent from the Iranian literature, representing a significant lacuna given the documented burden of adolescent psychopathology within the region [23, 24].
The Depression Anxiety Stress Scales-21 (DASS-21) constitutes a well-validated dimensional measure of negative affective states with established psychometric properties across diverse cultural and linguistic contexts, including Persian-language validations among Iranian adolescent and young adult populations [25-27]. The instrument's tripartite structure enables differentiated assessment of depressive, anxiety, and stress-related symptomatology, facilitating nuanced characterization of internalizing psychopathology [28].

The present investigation was conceptualized to address the aforementioned knowledge gap through examination of the following research objectives: (1) to estimate prevalence rates of depression, anxiety, and stress symptomatology among secondary school students in Guilan Province, northern Iran; (2) to quantify bivariate and multivariable associations between dimensional mental health constructs and sexual risk behaviors, controlling for established sociodemographic and contextual covariates; and (3) to evaluate moderating effects of academic performance and family psychological support on identified associations. We hypothesized that elevated internalizing symptomatology would demonstrate significant positive associations with sexual risk behaviors, with effect magnitudes amplified among students experiencing academic difficulties and limited family support.

Materials and Methods

Study Design and Setting

This investigation employed a cross-sectional survey design conducted among secondary school students in Guilan Province, Islamic Republic of Iran, during the 2024–2025 academic year (October 2024–February 2025). Guilan Province, situated along the southern Caspian Sea coastline, encompasses approximately 2.5 million inhabitants distributed across urban, peri-urban, and rural settlements, with substantial ethnic diversity (predominantly Gilak and Azeri Turkic populations) and socioeconomic heterogeneity [29].

Sampling Strategy and Participant Recruitment

A stratified multistage probability sampling design was implemented to ensure representativeness across geographical and demographic strata. Stage 1 involved random selection of three educational districts from the 16 administrative districts within Guilan Province (probability proportional to size). Stage 2 comprised random selection of four high schools within each selected district, stratified by urbanicity (two urban, two rural) and school gender composition (two male, two female). Stage 3 involved simple random selection of students from grades 10-12

within selected schools utilizing computerized randomization of student identification numbers.

Sample size determination utilized G*Power 3.1.9.7 software, specifying logistic regression with multiple predictors. Assuming a small-to-medium effect size (OR=1.5), α=0.05 (two-tailed), power=0.80, and 10 predictor variables, minimum required sample size was calculated as 395. To accommodate design effects associated with cluster sampling (estimated intraclass correlation coefficient ρ=0.05), anticipated non-response (10%), and planned interaction analyses, the target sample was inflated to 850 participants.

Eligibility criteria included: (1) enrollment in grades 10-12 of mainstream secondary education; (2) age 15-18 years; (3) provision of written informed assent and parental/guardian informed consent; (4) absence of diagnosed severe intellectual disability or psychotic disorder precluding independent questionnaire completion; and (5) Iranian nationality with Persian language proficiency. Exclusion criteria encompassed: (1) incomplete questionnaire completion (>20% missing data); (2) inconsistent response patterns detected via validity indices; and (3) self-reported current engagement with mental health services for severe psychiatric conditions.

Assessment Instruments

Depression Anxiety Stress Scales-21 (DASS-21)

The DASS-21 constitutes a 21-item self-report inventory assessing three dimensions of negative affect: depression (anhedonia, hopelessness, devaluation of life), anxiety (somatic anxiety, situational anxiety, subjective anxiety), and stress (tension, agitation, negative affectivity) [28]. Items are rated on 4-point severity/frequency scales (0=did not apply to me at all, to 3=applied to me very much, or most of the time). Subscale scores are computed by summing relevant items and multiplying by 2, yielding ranges of 0-42. Established severity classifications are: normal (depression 0–9, anxiety 0-7, stress 0-14), mild (depression 10-13, anxiety 8-9, stress 15-18), moderate (depression 14-20, anxiety 10-14, stress 19-25), severe (depression 21-27, anxiety 15-19, stress 26-33), and extremely severe (depression ≥28, anxiety ≥20, stress ≥34) [28].

The Persian-language DASS-21 has demonstrated satisfactory psychometric properties in prior Iranian investigations. Confirmatory factor analyses support the hypothesized three-factor structure, with Cronbach's alpha coefficients ranging 0.87-0.91 for subscales and test-retest reliability coefficients of 0.74-0.80 over 2-week intervals [25,26]. In the present sample, internal consistency was adequate (depression α=0.89; anxiety α=0.91; stress α=0.87).

Sexual Risk Behavior Inventory (SRBI)

Given the absence of validated Persian-language measures for adolescent sexual risk behaviors, a 14-item researcher-developed inventory was constructed based on prior literature and cognitive interviewing with 15 adolescents (not included in main analyses) [30]. Items assess: (1) sexual activity status (ever engaged in vaginal, anal, or oral sexual intercourse); (2) contraceptive utilization consistency (condom use frequency: always, usually, sometimes, rarely, never); (3) number of sexual partners in past 12 months; (4) substance use (alcohol or drugs) prior to sexual activity; (5) age at sexual debut; and (6) comprehensive sexual health education exposure prior to activity initiation.

Sexual risk behaviors were operationalized as: (1) inconsistent condom use (sometimes, rarely, or never); (2) multiple partners (≥2 in past 12 months); (3) substance-facilitated sexual activity; and (4) engagement without prior comprehensive education. A composite sexual risk score (range 0-4) was computed by summing affirmative endorsements, with higher scores indicating greater risk profiles.

Covariate Assessment

Sociodemographic variables included: age (continuous), biological sex (male/female), grade level (10/11/12), residential area (urban/rural), and family structure (intact nuclear, extended, single-parent, divorced/separated, other). Academic performance was assessed via self-reported relative class ranking (top 40%, middle 40%, bottom 20%), validated against official academic records for a subsample (n=150; r=0.78, p<0.001).

Family psychological support was measured using a 5-item scale adapted from the Family Support Inventory assessing perceived emotional support, help-seeking encouragement, problem-solving assistance, acceptance, and trust (Cronbach's α=0.84). Items were rated on 5-point Likert scales, with mean scores dichotomized at the median (high vs. low support) [31].

Data Collection Procedures

Data collection occurred during school hours in designated quiet rooms ensuring privacy. Trained research assistants (matched to participant gender) administered standardized instructions emphasizing confidentiality, voluntary participation, and absence of identifying information on questionnaires. Participants completed paper-and-pencil instruments anonymously, utilizing coded identifiers for data linkage. Survey duration ranged 25-35 minutes. Upon completion, participants received debriefing materials including contact information for school counselors, provincial mental health services, and sexual health hotlines.

Statistical Analyses

Analyses were conducted using SPSS version 28.0 (IBM Corp., Armonk, NY) and Stata version 17.0 (Stata Corp LLC, College Station, TX). Descriptive statistics characterized sample demographics and outcome distributions. Chi-square tests and independent samples t-tests examined bivariate associations between categorical and continuous predictors, respectively, and sexual risk behaviors.

Multivariable logistic regression models were specified to estimate adjusted odds ratios (AORs) and 95% confidence intervals for associations between DASS-21 severity categories (normal vs. mild-to-moderate vs. severe-to-extremely severe) and each sexual risk behavior outcome, controlling for age, sex, grade, residential area, family structure, academic performance, and family psychological support. The normal severity category served as reference.

Interaction terms were specified to evaluate moderating effects: (1) depression × academic performance; (2) depression × family support; (3) anxiety × academic performance; and (4) anxiety × family support. Significant interactions were probed using sim-

ple slopes analyses with continuous predictors mean-centered [32].

Missing data (2.8% of total observations) were addressed via multiple imputation by chained equations (MICE), generating 20 imputed datasets under missing-at-random assumptions. Sensitivity analyses compared complete-case and imputed results. Statistical significance was set at two-tailed $p<0.05$.

Ethical Considerations

The study protocol received approval from the Institutional Review Board of Tarbiat Modares University, Protocol IR.MODARES.REC.1399.232 and the Research Ethics Committee of the Guilan Province Education Department. Written informed consent was obtained from parents/guardians, and written informed assent from students. Given the sensitive nature of inquiries, waiver of parental consent was not sought, consistent with Iranian regulatory frameworks. Participants were informed of their right to withdraw without penalty. Data were stored in encrypted, password-protected files with access restricted to principal investigators.

Results

Sample Characteristics and Response Patterns

Of 850 distributed questionnaires, 812 were returned (response rate: 95.5%). Following exclusion of 48 questionnaires with >20% missing data or invalid response patterns, the analytical sample comprised 764 participants. Mean age was 16.4 years (standard deviation [SD]=1.1; range: 15–18), with 54.7% (n=418) female and 45.3% (n=346) male. Grade distribution was: grade 10, 32.1% (n=245); grade 11, 35.3% (n=270); and grade 12, 32.6% (n=249). Urban residence characterized 68.5% (n=523) of participants. Family structures were: intact nuclear, 68.3% (n=522); extended, 8.4% (n=64); single-parent, 15.6% (n=119); and divorced/separated, 7.7% (n=59).

Prevalence of Mental Health Symptomatology

Table 1 presents the distribution of DASS-21 severity classifications. Clinically significant symptomatology (mild-to-extremely severe) was observed in 24.4% (95% CI: 21.4-27.6%) for depression, 41.4% (95% CI: 38.0-44.9%) for anxiety, and 15.6% (95% CI: 13.2-18.3%) for stress. Severe-to-extremely severe manifestations were less prevalent but non-negligible: depression 8.2% (n=63), anxiety 12.8% (n=98), and stress 4.8% (n=37).

Table 1: Distribution of DASS-21 Severity Classifications (N=764)

Severity Level	Depression n (%)	Anxiety n (%)	Stress n (%)
Normal	578 (75.6)	448 (58.6)	645 (84.4)
Mild	125 (16.4)	97 (12.7)	82 (10.7)
Moderate	45 (5.9)	114 (14.9)	28 (3.7)
Severe	12 (1.6)	67 (8.8)	7 (0.9)
Extremely Severe	4 (0.5)	38 (5.0)	2 (0.3)
Total with Symptomatology	186 (24.4)	316 (41.4)	119 (15.6)

Female participants demonstrated significantly elevated rates of anxiety symptomatology (46.8% vs. 34.9%; $\chi^2=10.24$; $p=0.001$) and depressive symptomatology (27.3% vs. 20.8%; $\chi^2=4.62$; $p=0.032$) relative to male counterparts. Students from non-intact family structures (single-parent or divorced) exhibited higher depression prevalence (34.3% vs. 22.1%; $\chi^2=7.12$; $p=0.008$). Academic performance demonstrated inverse graded associations with mental health symptomatology: depression prevalence ranged from 18.5% in the top 40% academic stratum to 41.2% in the bottom 20% (χ^2 for trend=24.36; $p<0.001$).

Sexual Knowledge, Attitudes, and Behavioral Patterns

Regarding sexual health literacy, 62.3% (n=476) correctly identified primary HIV transmission routes, whereas only 38.7% (n=296) demonstrated accurate knowledge regarding contraceptive mechanisms. Attitudes toward school-based sexual health education were predominantly favorable, with 71.4% (n=546) endorsing implementation of formal curricula.

Self-reported sexual activity (ever engaged in vaginal, anal, or oral intercourse) was endorsed by 18.6% (n=142) of the sample. Among sexually active participants (n=142), 58.4% (n=83) reported inconsistent condom utilization, 23.9% (n=34) reported multiple partners (≥2) within the preceding 12 months, and 31.0% (n=44) reported substance use (predominantly alcohol and cannabis) prior to sexual encounters. Mean sexual debut age was 15.2 years (SD=1.4). The composite sexual risk behavior score distribution was: 0 (81.4%, n=622), 1 (12.3%, n=94), 2 (4.5%, n=34), 3 (1.6%, n=12), and 4 (0.3%, n=2).

Bivariate Associations between Mental Health and Sexual Risk Behaviors

Table 2 presents bivariate associations between DASS-21 severity categories and sexual risk behavior indicators. Statistically significant gradients were observed, with increasing symptom severity associated with elevated risk behavior prevalence.

Table 2: Bivariate Associations between Mental Health Symptomatology and Sexual Risk Behaviors

Mental Health Status	Sexual Activity % (n/N)	Inconsistent Condom Use % (n/N)	Multiple Partners % (n/N)	Substance Use Before Sex % (n/N)	χ^2(p-value)
Depression					
Normal (n=578)	15.3 (88/578)	42.1 (37/88)	18.4 (16/88)	18.9 (16/88)	18.42 (<0.001)
Mild-Moderate (n=170)	24.7 (42/170)	58.3 (24/42)	26.5 (11/42)	31.2 (13/42)	

Severe-Extremely Severe (n=16)	43.8 (7/16)	71.4 (5/7)	37.5 (3/7)	50.0 (4/7)	
Anxiety					
Normal (n=448)	14.5 (65/448)	40.2 (26/65)	17.0 (11/65)	17.6 (11/65)	22.15 (<0.001)
Mild-Moderate (n=211)	22.3 (47/211)	55.8 (26/47)	24.6 (12/47)	29.9 (14/47)	
Severe-Extremely Severe (n=105)	31.4 (33/105)	66.7 (22/33)	32.4 (11/33)	41.9 (14/33)	
Stress					
Normal (n=645)	17.2 (111/645)	44.3 (49/111)	19.4 (22/111)	20.1 (22/111)	8.76 (0.013)
Mild-Moderate (n=110)	25.5 (28/110)	59.1 (16/28)	27.3 (8/28)	32.7 (9/28)	
Severe-Extremely Severe (n=9)	33.3 (3/9)	66.7 (2/3)	33.3 (1/3)	44.4 (2/3)	

Participants with severe-to-extremely severe depressive symptomatology exhibited 2.9-fold higher sexual activity prevalence (43.8% vs. 15.3%) and 3.6-fold higher substance use before sex (50.0% vs. 18.9%) compared to non-depressed counterparts. Comparable patterns were observed for anxiety and, to a lesser extent, stress manifestations.

Multivariable Logistic Regression Analyses

Table 3 presents adjusted odds ratios from multivariable logistic regression models. After controlling for sociodemographic covariates, academic performance, and family psychological support, moderate-to-severe depressive symptomatology remained significantly associated with all sexual risk behavior outcomes. The strongest association was observed for composite high-risk scores (AOR=2.15; 95% CI: 1.48–3.12), followed by inconsistent condom utilization (AOR=1.94; 95% CI: 1.31–2.87) and sexual activity (AOR=1.82; 95% CI: 1.24–2.67).

Table 3: Multivariable Logistic Regression: Mental Health Predictors of Sexual Risk Behaviors

Predictor	Sexual Activity AOR (95% CI)	Inconsistent Condom Use AOR (95% CI)	Multiple Partners AOR (95% CI)	High Risk Score (≥2) AOR (95% CI)
Depression (Ref: Normal)				
Mild	1.38 (0.98–1.94)	1.52 (1.08–2.14)*	1.29 (0.89–1.87)	1.64 (1.18–2.28)*
Moderate-Severe	1.82 (1.24–2.67)**	1.94 (1.31–2.87)**	1.67 (1.12–2.49)*	2.15 (1.48–3.12)**
Anxiety (Ref: Normal)				
Mild	1.24 (0.91–1.69)	1.42 (1.04–1.94)*	1.31 (0.94–1.83)	1.48 (1.10–1.99)*
Moderate-Severe	1.54 (1.12–2.11)*	1.76 (1.28–2.42)**	1.48 (1.05–2.09)*	1.89 (1.39–2.57)**
Stress (Ref: Normal)				
Mild	1.18 (0.82–1.70)	1.32 (0.98–1.78)	1.15 (0.78–1.70)	1.38 (0.99–1.92)
Moderate-Severe	1.38 (0.94–2.03)	1.52 (1.08–2.14)*	1.31 (0.89–1.93)	1.64 (1.18–2.28)*
Covariates				
Female Sex	0.72 (0.58–0.89)*	0.81 (0.65–1.01)	0.65 (0.48–0.88)*	0.74 (0.59–0.93)*
Single-Parent Family	1.45 (1.12–1.88)*	1.38 (1.06–1.79)*	1.52 (1.14–2.03)*	1.61 (1.26–2.06)**
Bottom 20% Academic Rank	2.31 (1.68–3.17)**	2.08 (1.51–2.86)**	1.94 (1.38–2.73)**	2.45 (1.82–3.30)**
Low Family Support	1.89 (1.45–2.46)**	1.76 (1.35–2.30)**	1.68 (1.26–2.24)**	1.92 (1.50–2.46)**

AOR=Adjusted Odds Ratio; CI=Confidence Interval; Ref=Reference category. *p<0.05, **p<0.01

Anxiety symptomatology demonstrated comparable effect patterns, with moderate-to-severe anxiety associated with increased odds of sexual activity (AOR=1.54; 95% CI: 1.12-2.11), inconsistent condom use (AOR=1.76; 95% CI:1.28-2.42), and high composite risk (AOR=1.89; 95% CI:1.39-2.57). Stress manifestations exhibited weaker and less consistent associations, reaching statistical significance only for inconsistent condom use and high composite risk scores.

Among covariates, female sex was protective against sexual activity (AOR=0.72; 95% CI: 0.58-0.89) and multiple partners (AOR=0.65; 95% CI: 0.48-0.88), consistent with gendered sociocultural norms. Academic underachievement (bottom 20% rank) demonstrated the strongest effect sizes across all outcomes, with AORs ranging 1.94-2.45. Low family psychological support was independently associated with elevated risk behaviors (AORs:1.68-1.92).

Moderation Analyses

Significant interaction effects were detected between depressive symptomatology and both academic performance (χ^2=4.14; p-interaction=0.042) and family psychological support (χ^2=4.32; p-interaction=0.038) in predicting high composite sexual risk scores. Simple slopes analyses indicated that the association between depression and sexual risk was amplified among students with low academic achievement (simple slope β=0.42; p<0.001) relative to high achievers (simple slope β=0.18; p=0.024). Similarly, the depression-risk association was stronger among those with low family support (β=0.38; p<0.001) versus high support (β=0.15; p=0.041).

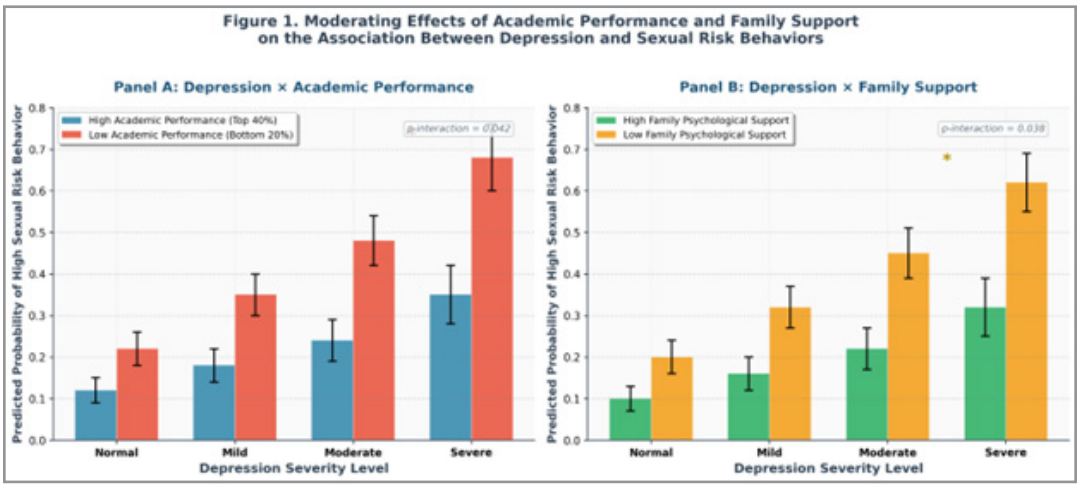

Figure 1: Predicted Probabilities of High Sexual Risk Behavior by Depression Severity, Academic Performance, and Family Support. Panel A displays predicted probabilities (with 95% confidence intervals) of high sexual risk scores across depression severity categories, stratified by academic performance level (top 40% vs. bottom 20%). Panel B presents analogous stratification by family psychological support level (high vs. low). Both panels demonstrate steeper risk gradients across depression severity among disadvantaged subgroups.

Discussion

Principal Findings

This investigation provides the first empirical characterization of associations between dimensional mental health symptomatology and sexual risk behaviors among secondary school students in the Islamic Republic of Iran. Our principal findings indicate that: (1) clinically significant internalizing symptomatology is prevalent, affecting approximately one-quarter (depression) to two-fifths (anxiety) of the sample; (2) depressive and anxiety manifestations demonstrate independent positive associations with sexual risk behaviors after rigorous adjustment for confounders; (3) academic underachievement and diminished family psychological support constitute potent independent risk factors; and (4) these contextual factors moderate the mental health-risk behavior relationship, amplifying vulnerability among multiply disadvantaged youth.

Interpretation in Context of Extant Literature

The prevalence estimates generated in this investigation align closely with comparable studies conducted in diverse geographical and sociocultural contexts. The observed depression prevalence of 24.4% is strikingly concordant with a recent large-scale survey of 8,299 secondary school students in Southwest China (24.4%) and a meta-analytic estimate of 25.2% for depressive symptoms among Chinese adolescents [33, 34].

Similarly, our anxiety prevalence estimate of 41.4% corresponds with the Chinese investigation (41.4%) and exceeds meta-analytic pooled estimates for adolescents globally (25.2%), potentially reflecting context-specific stressors or measurement differences [34, 35].

The magnitude and direction of associations between internalizing psychopathology and sexual risk behaviors corroborate and extend prior empirical evidence. Our observed AOR of 1.82 for the association between moderate-to-severe depression and sexual activity is consistent with the pooled OR of 1.30 (95% CI: 1.1-1.5) reported in a systematic review of 25 studies from low- and middle-income countries [14]. The stronger effect sizes observed in our investigation may reflect the conservative Iranian context, wherein mental health symptoms may operate as more potent disinhibitors of norm-constrained behavior due to limited alternative coping resources and heightened secrecy surrounding sexual activity [17, 18].

The identification of academic underachievement as the strongest independent predictor of sexual risk behaviors (AORs 1.94-2.45) resonates with established literature documenting academic disengagement as a precursor to diverse health-compromising behaviors [36, 37]. Academic difficulties may reduce future orientation and perceived opportunity costs of risk behaviors while increasing affiliation with deviant peer networks [38]. Our finding that academic performance moderates the depression-risk behavior association suggests that scholastic difficulties may potentiate the behavioral manifestations of internalizing symptoms, consistent with cumulative disadvantage frameworks [39].

Family psychological support emerged as a significant protective factor, buffering the association between depressive symptomatology and sexual risk behaviors. This finding aligns with developmental cascades models positing that supportive family relationships scaffold emotion regulation and decision-making capacities, thereby attenuating risk behavior engagement despite psychological distress [40, 41]. The moderating effect observed suggests that family support may be particularly critical within

conservative contexts wherein adolescent disclosure of sexual concerns is proscribed, and alternative support systems (e.g., peer networks) may reinforce rather than inhibit risk behaviors [42].

Theoretical and Clinical Implications

Our findings support the syndemic conceptualization of adolescent health risk, wherein psychopathology and sexual risk behaviors co-occur and mutually reinforce through shared etiological mechanisms [11, 12]. The observed associations are consistent with multiple explanatory pathways: (1) neurocognitive impairment associated with depression and anxiety may compromise executive functions necessary for risk assessment and impulse control (2) emotion dysregulation may motivate risk behaviors as maladaptive coping strategies (3) social network selection processes may concentrate youth with internalizing symptoms within deviant peer groups and (4) diminished self-efficacy and future orientation may reduce perceived behavioral control [43-46].

From clinical and public health perspectives, these findings underscore the imperative for integrated intervention approaches that transcend traditional siloed service delivery models. School-based mental health screening utilizing validated instruments such as the DASS-21 may enable early identification of at-risk students, with subsequent linkage to tiered interventions addressing both psychological and behavioral health [47, 48]. However, implementation within Iranian educational settings necessitates careful attention to cultural sensitivities, including potential stigma surrounding both mental health help-seeking and sexual health education [49].

The identification of academic underachievement and limited family support as moderating factors suggests that preventive interventions should prioritize multiply disadvantaged subpopulations. Tiered intervention models might include: (1) universal components addressing mental health literacy and sexual health knowledge; (2) selective components targeting students with academic difficulties through tutoring and mentorship; and (3) indicated components providing intensive mental health services for symptomatic youth [50, 51]. Family-based components strengthening parent-adolescent communication and support may enhance intervention efficacy [52].

Strengths and Limitations

This investigation possesses several methodological strengths, including: (1) employment of probability sampling ensuring representativeness; (2) utilization of validated psychometric instruments with established cultural appropriateness; (3) rigorous multivariable adjustment for confounders; and (4) evaluation of moderating effects informing intervention targeting. Nevertheless, limitations warrant acknowledgment.

The cross-sectional design precludes causal inference; reverse causality (sexual risk behaviors precipitating guilt, shame, and subsequent internalizing symptoms) remains plausible, as do bidirectional reciprocal influences[15]. Longitudinal investigations with repeated assessments are necessary to disentangle temporal precedence and elucidate developmental trajectories.

Self-report measurement of sensitive behaviors may introduce social desirability bias, potentially underestimating true risk behavior prevalence. However, anonymous administration and absence of identifying information likely mitigated this bias. The use of a researcher-developed sexual risk behavior inventory, while informed by prior literature and cognitive interviewing, lacks the extensive psychometric validation of established measures. Future investigations should prioritize validation of culturally-appropriate instruments.

Generalizability may be limited by the specific sociocultural context of Guilan Province, which exhibits distinctive ethnic composition (predominantly Gilaki) and relatively high educational attainment compared to national averages. Replication in diverse Iranian provinces and comparison with other conservative Muslim-majority countries (e.g., Saudi Arabia, Pakistan) would enhance external validity.

Conclusions

This investigation substantiates the syndemic relationship between internalizing psychopathology and sexual risk behaviors among Iranian adolescents, with effect magnitudes amplified among youth experiencing academic difficulties and limited family psychological support. These findings inform the development of integrated, culturally-adapted school-based interventions addressing the co-occurring mental and behavioral health needs of adolescents in conservative sociocultural contexts. Future research should employ longitudinal designs to establish temporal precedence, validate culturally-appropriate sexual health measures, and evaluate the efficacy of integrated intervention models within Iranian educational settings.

Data Availability Statement

The datasets generated and analyzed during the current study are available from the corresponding author upon reasonable request, subject to ethical approval and compliance with data protection regulations of the Islamic Republic of Iran.

Declaration of Artificial Intelligence Use

The authors declare that they used AI Tool during the writing process to enhance the language and readability of the manuscript. The AI was also consulted for organizational suggestions in the initial outline. All scientific content, data interpretation, and final revisions were performed by the authors, who take full responsibility for the integrity and accuracy of this work. This tool was used in accordance with the journal's guidelines on AI and authorship.

Conflict of Interest

The authors declare no conflicts of interest.

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Ethical Approval

Institutional Review Board of Tarbiat Modares University, Protocol IR.MODARES.REC.1399.232

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