

Navigating Adolescence: Effectiveness of the YRBSS Tool in Addressing High-Risk Behaviours in India

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ABSTRACT:

Background: Adolescence is a critical developmental stage characterized by rapid transitions and vulnerability to health-risk behaviors that may persist into adulthood. Monitoring these behaviors is essential for timely interventions. This study assessed the prevalence of high-risk behaviors among adolescents in Ludhiana, India, and evaluated the effectiveness of the Youth Risk Behavior Surveillance System (YRBSS) tool in the Indian context. **Methods:** A cross-sectional survey was conducted among 1000 adolescents (boys: 498, girls: 502) from classes 10–12 in selected urban schools. A culturally adapted YRBSS questionnaire (34 items) was self-administered after obtaining consent. Data on dietary habits, sedentary behaviors, bullying, violence, mental health, and road safety practices were collected. Associations with gender, maternal education, and socioeconomic status were analyzed using chi-square tests and 95% confidence intervals. **Results:** High prevalence of risk behaviors was observed, including low fruit intake (77.8%), inadequate vegetable intake (40.1%), cold drink consumption (26.4%), excessive gaming ≥ 3 h/day (70.3%), bullying (27.6%), physical fights (24.3%), and persistent sadness/hopelessness (54.4%). Gender differences were significant for physical fights (boys 34.5% vs girls 14.1%, $p < 0.001$), bullying victimization (girls 32.5% vs boys 22.7%, $p = 0.001$), and excessive gaming (girls 78.5% vs boys 62.4%, $p < 0.001$). Road safety risks such as seatbelt non-use (27.5%) and mobile phone use while driving (33.3%) were also common. The adapted YRBSS tool demonstrated high feasibility (100% participation), coverage of five key domains, and construct validity with multiple significant subgroup associations. **Conclusion:** Urban adolescents in Ludhiana exhibit widespread high-risk behaviors with distinct gender patterns, particularly in aggression, bullying, screen time, and emotional distress. The YRBSS tool proved to be effective and feasible for risk behavior surveillance in the Indian scenario, supporting its use for future adolescent health promotion strategies.

Keywords: Adolescents. High-risk behaviors. YRBSS.

INTRODUCTION

Adolescence, defined by the World Health Organization as the period between 10–19 years, represents a critical transitional stage marked by rapid biological, psychological, and social changes. Globally, there are 1.2 billion adolescents, with India contributing nearly 243

million one-fifth of the world's adolescent population. This developmental stage is characterized not only by opportunities for growth and resilience but also by vulnerabilities that predispose young people to high-risk behaviors. These behaviors often emerge in response to peer influence, familial dynamics, socio-cultural expectations, and evolving independence, and they significantly affect health trajectories into adulthood.^[1]

High-risk behaviors include substance abuse, unsafe sexual practices, physical inactivity, violence, bullying, reckless driving, depressive ideation, and unhealthy dietary habits. Many of these behaviors are initiated during adolescence and track into adult life, increasing the burden of chronic diseases, injuries, mental health disorders, and premature mortality. The *Youth Risk Behavior Surveillance System (YRBSS)*, developed by the Centers for Disease Control and Prevention (CDC), has been a widely validated tool to monitor these patterns globally. Its adaptation to the Indian context allows researchers to understand culturally influenced manifestations of adolescent risk-taking.^[2]

In India, studies from diverse urban and semi-urban regions demonstrate rising prevalence of unhealthy dietary habits, excessive screen time, bullying (both traditional and cyber), and mental health concerns. For example, breakfast skipping has been reported as high as 59% among boys, fruit and vegetable intake remains grossly inadequate, and junk food consumption is widespread. Furthermore, mobile use while driving and non-adherence to helmet/seatbelt usage highlight safety risks in urban adolescent populations.^[3]

Gender differences play a crucial role. Boys have shown greater engagement in physical fights, breakfast skipping, and carbonated drink consumption, whereas girls exhibit higher prevalence of gaming, bullying victimization, and destructive school behaviors. Mental health symptoms—sadness, hopelessness, or depressive ideation—affect more than half of Indian adolescents, with boys slightly more impacted (57.8% vs. 51% among girls).^[4]

While adolescence is often portrayed as a turbulent phase, it also provides an opportune window for positive interventions. Family support, structured school environments, and effective public health programs can mitigate risks and foster resilience. The importance of school-based surveys like YRBSS lies in their ability to systematically capture risk behavior patterns, identify vulnerable groups, and inform evidence-based policies for adolescent well-being.

Aim

To assess the prevalence and gender differences of high-risk behaviors among urban school-going adolescents in Ludhiana using the YRBSS tool.

Objectives

1. To identify the prevalence of high-risk behaviors such as unhealthy dietary habits, physical inactivity, bullying, violence, depressive ideation, and violation of road traffic rules among adolescents.
2. To evaluate associations between these high-risk behaviors and demographic variables such as gender, maternal education, and socioeconomic status.
3. To determine the effectiveness of the YRBSS tool in capturing adolescent health risk behaviors within the Indian urban context.

MATERIAL AND METHODOLOGY

Source of Data

The study population comprised adolescents enrolled in classes 10th to 12th in urban schools of Ludhiana, Punjab. Data were obtained using a structured questionnaire adapted from the CDC YRBSS tool.

Study Design

This was a prospective cross-sectional observational study.

Study Location

The research was conducted at tertiary care hospital in collaboration with randomly selected English-medium schools.

Study Duration

The study was carried out over a period of one year.

Sample Size

A total of 1000 adolescents participated (boys: 498, girls: 502). The age distribution ranged from 15–19 years, with a mean of 16 years (SD = 1.0).

Inclusion Criteria

- Adolescents of both genders enrolled in 10th, 11th, and 12th grades.
- Students present on the day of survey administration.

Exclusion Criteria

- Adolescents who had previously participated in similar screening programs.
- Students absent on the day of data collection.

Procedure and Methodology

Schools were selected through convenient sampling after obtaining permission from principals. Parental consent and school authority approval were secured prior to participation. The CDC YRBSS questionnaire originally comprising 84 questions was modified to align with local cultural sensitivities; questions relating to sexual behavior, HIV, and substance abuse were excluded following objections from school authorities. The final instrument consisted of 34–36 questions covering domains such as dietary habits, physical activity, bullying, violence, road safety practices, and mental health.

The self-administered questionnaire was provided in English. Students completed it during free classroom periods to ensure minimal disruption. Confidentiality was emphasized by omitting names, and responses were voluntary. A brief orientation talk was given before administration.

Sample Processing

Completed questionnaires were collected, screened for completeness, and anonymized. Data were tabulated and categorized into domains of risk behavior for analysis. Socioeconomic status was classified using the Modified Kuppuswamy Scale.

Statistical Methods

Data were analyzed using descriptive statistics (frequency, percentage, mean \pm SD). Chi-square tests were applied to assess associations between categorical variables (e.g., gender vs. risk behaviors). Continuous variables were compared using appropriate parametric or non-parametric tests. A p-value <0.05 was considered statistically significant.

Data Collection

Data were collected directly from students during classroom sessions by author with support from class teachers. Responses were entered into electronic spreadsheets, cross-checked for accuracy, and analyzed with standard statistical software.

OBSERVATION AND RESULTS

Table 1: Prevalence and Gender Differences of High-Risk Behaviors (n = 1000)

Behavior	Boys (%) n/N [95% CI]	Girls (%) n/N [95% CI]	Δ (Boys–Girls) %pts [95% CI]	χ^2 (df=1)	p-value
Physical fight (≥ 1 time in past 12 months)	172/498 (34.5%) [30.3, 38.9]	71/502 (14.1%) [11.3, 17.3]	+20.4 [15.4, 25.5]	61.6	0.000
Been bullied (past 12 months)	113/498	163/502	−9.8 [−15.1, −4.5]	10.7	0.001

months)	(22.7%) [19.1, 26.7]	(32.5%) [28.3, 36.9]	-4.4]		
Video/computer games ≥3 h/day	309/498 (62.4%) [57.9, 66.7]	394/502 (78.5%) [74.6, 82.0]	-16.1 [-21.5, -10.6]	30.5	0.000
Sadness/hopelessness ≥2 weeks	288/498 (57.8%) [53.3, 62.2]	256/502 (51.0%) [46.6, 55.4]	+6.8 [1.1, 12.6]	4.7	0.030
Seatbelt never (past 12 months)	155/498 (31.1%) [27.0, 35.6]	120/502 (23.9%) [20.1, 28.0]	+7.2 [1.7, 12.7]	5.3	0.022
Helmet non-use while riding	123/498 (24.7%) [21.0, 28.9]	139/502 (27.7%) [23.9, 31.9]	-3.0 [-8.2, 2.2]	1.2	0.273
Mobile phone use while driving	160/498 (32.1%) [27.9, 36.6]	173/502 (34.5%) [30.2, 39.0]	-2.4 [-7.9, 3.1]	0.6	0.434

Table 1 highlights the gender differences in the prevalence of selected high-risk behaviors among 1000 adolescents. A significantly higher proportion of boys reported involvement in physical fights in the past year (34.5%) compared to girls (14.1%), with a difference of 20 percentage points ($\chi^2=61.6$, $p<0.001$). Conversely, being bullied was more commonly reported by girls (32.5%) than boys (22.7%), and this difference was statistically significant ($\chi^2=10.7$, $p=0.001$). Excessive screen exposure also showed a gender skew: 78.5% of girls versus 62.4% of boys reported ≥3 hours of video/computer games daily ($\chi^2=30.5$, $p<0.001$). Emotional distress in the form of sadness or hopelessness lasting ≥2 weeks was slightly higher among boys (57.8%) compared to girls (51.0%), with a modest but significant difference ($p=0.030$). In terms of road safety behaviors, non-use of seatbelts was more common among boys (31.1%) than girls (23.9%) ($p=0.022$), whereas helmet non-use and mobile phone use while driving did not differ significantly between genders ($p>0.05$).

Table 2: Overall Prevalence of High-Risk Behaviors among Adolescents (n = 1000)

Behavior/Indicator	n/N (%)	95% CI
Low fruit intake (< daily)	778/1000 (77.8%)	[75.1, 80.3]
Low vegetable intake (< daily)	401/1000 (40.1%)	[37.1, 43.1]
Cold drinks ≥1/day	264/1000 (26.4%)	[23.7, 29.3]
Milk < daily	322/1000 (32.2%)	[29.3, 35.3]
Meals outside home ≥1/day	84/1000 (8.4%)	[6.7, 10.3]
TV ≥3 h/day	157/1000 (15.7%)	[13.6, 18.1]
Video/computer games ≥3 h/day	703/1000 (70.3%)	[67.4, 73.0]
Been bullied (yes)	276/1000 (27.6%)	[24.9, 30.4]
Physical fight (≥1 time)	243/1000 (24.3%)	[21.8, 27.1]
Electronically bullied (yes)	58/1000 (5.8%)	[4.5, 7.5]
Bullying others (yes)	69/1000 (6.9%)	[5.5, 8.7]
Sadness/hopelessness ≥2 weeks	544/1000 (54.4%)	[51.3, 57.4]
Seatbelt never	275/1000 (27.5%)	[24.9, 30.3]
Helmet non-use while riding	262/1000 (26.2%)	[23.6, 29.0]
Mobile phone use while driving	333/1000 (33.3%)	[30.4, 36.4]

Table 2 summarizes the overall prevalence of high-risk behaviors in the adolescent population. Dietary risk factors were highly prevalent, with 77.8% reporting low fruit intake and 40.1% reporting inadequate vegetable intake. Milk consumption was also suboptimal, with 32.2% consuming it less than daily, while 26.4% consumed cold drinks daily and 8.4% reported eating meals outside the home every day. Screen-related sedentary behaviors were widespread: 70.3% of adolescents reported ≥ 3 hours of video/computer games daily and 15.7% watched television for ≥ 3 hours. Psychosocial risks were equally prominent 27.6% reported being bullied, 24.3% reported involvement in physical fights, 6.9% admitted bullying others, and 5.8% experienced electronic bullying. Emotional distress was strikingly common, with 54.4% reporting sadness or hopelessness lasting more than two weeks. Road traffic safety risks were also evident, with 27.5% reporting never using a seatbelt, 26.2% not wearing a helmet, and 33.3% using a mobile phone while driving.

Table 3: Associations between High-Risk Behaviors and Demographic Variables (n = 1000)

Behavior	Overall n(%)	Gender χ^2 p	Maternal education χ^2 p	Socioeconomic status χ^2 p
Physical fight (≥ 1 time)	243 (24.3%)	p = 0.000		
Been bullied (yes)	276 (27.6%)	p = 0.001		$\chi^2=6.75$, p=0.034
Electronically bullied (yes)	58 (5.8%)			$\chi^2=1.56$, p=0.458
Bullying others (yes)	69 (6.9%)			$\chi^2=5.94$, p=0.050
Sadness/hopelessness ≥ 2 weeks	544 (54.4%)	p = 0.030		
Video/computer games ≥ 3 h/day	703 (70.3%)	p = 0.000		$\chi^2=1.55$, p=0.460
TV ≥ 3 h/day	157 (15.7%)			$\chi^2=11.9$, p=0.003
Vegetable intake < daily	401 (40.1%)		$\chi^2=3.86$, p=0.145	
Cold drinks ≥ 1 /day	264 (26.4%)		$\chi^2=6.92$, p=0.031	
Milk < daily	322 (32.2%)		$\chi^2=22.7$, p=0.000	
Seatbelt never	275 (27.5%)	p = 0.022		
Helmet non-use while riding	262 (26.2%)	$\chi^2=1.20$, p=0.273		
Mobile phone use while driving	333 (33.3%)	$\chi^2=0.61$, p=0.434		

Table 3 examines the associations of high-risk behaviors with gender, maternal education, and socioeconomic status. Gender differences were statistically significant for physical fights (p<0.001), being bullied (p=0.001), sadness/hopelessness (p=0.030), excessive gaming (p<0.001), and seatbelt non-use (p=0.022), confirming a differential risk profile between boys and girls. Maternal education showed a strong association with dietary behaviors: milk intake less than daily was significantly higher among adolescents whose mothers had lower educational levels (p<0.001), and daily cold-drink consumption was also significantly related

to maternal education ($p=0.031$). Vegetable intake showed no significant differences by maternal education. Socioeconomic status was significantly related to bullying ($\chi^2=6.75$, $p=0.034$) and television viewing ≥ 3 hours daily ($\chi^2=11.9$, $p=0.003$), while electronic bullying and gaming did not vary significantly across socioeconomic groups.

Table 4: Effectiveness of YRBSS Tool in Indian Urban Context (n = 1000)

Effectiveness Indicator	n(%) Mean(SD) or	Test (value)	95% CI
Coverage of YRBSS core categories (present out of 6)	5/6 (83.3%)		
Completion (students who completed survey)	1000/1000 (100%)		[99.6, 100.0]
Construct validity (proportion of subgroup tests with $p<0.05$)	10/15 (66.7%)	Binomial (Wilson)	[41.7, 85.4]

Table 4 evaluates the effectiveness of the adapted Youth Risk Behavior Surveillance System (YRBSS) in this Indian urban setting. The adapted tool captured 5 out of 6 core CDC domains (83.3%) dietary habits, physical inactivity/sedentary behaviors, violence and bullying, mental health, and road safety while excluding substance use and sexual behavior due to cultural constraints. Completion rates were excellent, with 100% of students ($n=1000$) participating in the survey, and the 95% CI confirmed near-universal compliance. Evidence of construct validity was demonstrated, with 66.7% of subgroup comparisons across gender, maternal education, and socioeconomic strata yielding statistically significant results, indicating the tool's ability to discriminate between different risk groups. The tool was feasible in this context, being self-administered, culturally adapted to 34 questions, and conducted in a confidential environment.

DISCUSSION

Table 1: Gender differences across behaviours

data show a markedly higher prevalence of physical fighting among boys (34.5%) than girls (14.1%), a gap of ~ 20 percentage points. In large, nationally representative YRBS trend reports from the U.S., the overall proportion of high-school students reporting ≥ 1 physical fight in the previous 12 months has hovered around “one in four” in recent cycles and has declined since the 1990s; males consistently report higher involvement than females. Thus, level in boys looks elevated relative to recent YRBS national averages, while the female level is closer to those benchmarks; both align with the well-documented male excess in physical violence. Powell TW *et al.*(2022)^[5]

Girls in sample more often reported being bullied (32.5% vs 22.7% in boys). North Indian school studies have found overall bullying involvement around 25–26% with cyberbullying in low single digits ($\approx 3\%$), and they also describe gender asymmetries across forms (e.g., verbal vs physical), supporting the construct observe (overall bullying 27.6% and cyberbullying 5.8%). The slightly higher cyberbullying point estimate in cohort could reflect growing device access and social-media penetration since those earlier Indian studies. Duarte-Velez Y *et al.*(2023)^[6]

Sedentary screen exposure was strikingly high: ≥ 3 h/day of gaming in 78.5% of girls and 62.4% of boys. Multiple Indian studies report very high proportions exceeding the ≥ 2 h/day guideline e.g., an urban resettlement colony in Delhi observed 68% above 2 h/day with a median ≈ 3.2 h; a more recent study in rural Pune reported 83% exceeding 2 h/day suggesting levels (with a stricter ≥ 3 h threshold) are directionally consistent with contemporary Indian trends. Duke NN *et al.*(2015)^[7]

Persistent sadness/hopelessness (≥ 2 weeks) was common in cohort (boys 57.8%, girls 51.0%). While that item is a symptom screen rather than a diagnostic, the high prevalence accords with concern about adolescent emotional distress seen in surveillance summaries (YRBS has reported roughly one-third of U.S. high-school students endorsing this item, with higher rates among girls) and with Indian reviews showing very wide school-based prevalence ranges depending on instruments and cut-points. gender pattern (boys slightly higher) is atypical relative to many Western datasets (often female-preponderant) and warrants local contextual interpretation. Keshwani N *et al.*(2024)^[8]

Road-safety behaviours also showed clear signals. “Never” using a seatbelt was more frequent in boys (31.1% vs 23.9%; $p=0.022$), which fits broader Indian evidence of very low seat-belt compliance (e.g., SaveLIFE’s multi-city study observed ~98% non-use of rear seat-belts and only 7% reporting regular rear-belt use). By contrast, helmet non-use and phone use while driving did not differ by gender in data; nonetheless, observational work from Hyderabad indicates that self-reported helmet use tends to overestimate true use, implying self-reports may still be optimistic. Baker LW *et al.*(2024)^[9]

Table 2: Overall prevalence across domains

The diet indicators in particular, low daily fruit intake (77.8%) and low daily vegetable intake (40.1%) mirror national concerns. The Comprehensive National Nutrition Survey (CNNS) thematic report for adolescents notes that fewer than one in five adolescents consume fruits daily and that intake of green leafy vegetables is also low, underscoring that the levels you observed are not outliers but part of a broader national pattern. Daily cold-drink consumption (26.4%) and suboptimal milk intake (32.2%) likewise align with CNNS’ depiction of obesogenic dietary shifts during adolescence. Kreuze E *et al.*(2018)^[10]

Sedentary behaviours were high in study (gaming ≥ 3 h/day in 70.3%, TV ≥ 3 h/day in 15.7%). As above, Indian studies commonly find two-thirds or more of adolescents exceeding the 2-hour screen-time threshold and median screen times around 3 hours/day, lending external validity to estimates despite differing cut-offs and measurement frames. Manlove J *et al.*(2022)^[11]

Bullying (27.6%), fighting (24.3%), and electronic bullying (5.8%) sit close to Indian school-based estimates for “any bullying” and slightly above earlier cyberbullying reports, which may reflect temporal increases in online engagement. Road-safety indicators (seatbelt never 27.5%, helmet non-use 26.2%, phone use while driving 33.3%) resonate with national road-safety audits showing poor restraint compliance and substantial risky driving practices among youth and families, reinforcing these as high-yield intervention targets for schools and municipalities. Flores DD *et al.*(2021)^[12]

Table 3: Demographic associations

gender associations higher odds in boys for fighting and seat-belt non-use, and higher bullying victimization in girls align with patterns seen in large surveillance systems and Indian school studies, strengthening the construct validity of adapted instrument in this population.

Maternal education showed robust links with diet (e.g., milk < daily and daily cold-drink consumption), a finding that dovetails with national syntheses emphasizing family-level and parental determinants of adolescent diet quality in India. CNNS and allied thematic analyses highlight low fruit/vegetable consumption and the school environment’s role, which complements observation that parental/maternal education gradients track with specific dietary risks. AU-Hektner JM *et al.*(2014)^[13]

Socio-economic status was associated with TV ≥ 3 h/day and with bullying outcomes in cohort. The literature here is mixed: some Indian work (e.g., the Delhi urban-poor study) found no SES association with screen time, while other settings report SES links to sedentary behaviours suggesting local infrastructure, device mix, and family rules may moderate SES

effects. significant χ^2 for TV time alongside a null for gaming echoes this heterogeneity by platform. Shah M *et al.*(2016)^[14]

Table 4: Effectiveness of the adapted YRBSS

Adapted YRBSS covered five of six core CDC domains (excluding sexual behaviours and substance use per local feasibility), achieved 100% completion, and produced multiple expected subgroup differences (e.g., by gender and maternal education) all hallmarks of a practical, discriminating surveillance tool. These features map well to how the YRBSS is intended to function in population health monitoring (prevalence estimation, subgroup comparisons, and trendable items) and support its contextual validity for Indian urban schools when culturally adapted. Turanovic JJ. (2023)^[15]

CONCLUSION

The present study highlights that high-risk behaviors are highly prevalent among urban school-going adolescents in Ludhiana, with distinct gender-specific patterns. Boys reported greater involvement in physical fights, poor dietary practices, and road safety violations, whereas girls showed higher vulnerability to bullying and excessive screen use. More than half of the adolescents experienced prolonged sadness or hopelessness, underscoring the urgent need for comprehensive school-based mental health interventions. The successful adaptation and application of the Youth Risk Behavior Surveillance System (YRBSS) tool in the Indian urban context demonstrated its effectiveness in capturing a broad range of adolescent health-risk behaviors. These findings emphasize the critical importance of early detection, culturally tailored preventive strategies, and structured health education programs to promote positive development during adolescence.

LIMITATIONS

This study had certain limitations. First, the cross-sectional design restricts causal inference between risk behaviors and associated demographic factors. Second, data were collected through self-administered questionnaires, which may be subject to recall bias and social desirability bias, potentially leading to under- or over-reporting of sensitive behaviors. Third, questions on substance use, sexual practices, and HIV-related risks core domains of the original YRBSS were excluded due to institutional and cultural constraints, thereby limiting the comprehensiveness of behavior surveillance. Fourth, the sample, although large, was drawn from selected urban English-medium schools and may not represent adolescents from rural, government, or lower socioeconomic backgrounds. Finally, the findings are context-specific and may not be generalizable across all regions of India.

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