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Prevalence and Risk Factors of Depressive symptoms and Suicidal Behavior among Primary School Adolescents in Dar es Salaam, Tanzania

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Abstract

Background

Although Depression and suicide among adolescents have been studied in sub-Saharan Africa, there is a need to update the findings in Tanzania.It is essential to understand the magnitude of the depressive symptoms and suicidal behavior so that informed interventions can be undertaken regarding policy and program implications to save and improve the lives of young people. The study, therefore, aimed to determine the prevalence and factors associated with depressive symptoms and suicidal expression among adolescents.

Methods

We examined these questions using the Global School Health Surveillance (GSHS) database data. A total of 2176 students from Dar es Salaam schools were involved in the survey. A two-stage cluster sample design was used to produce data representative of all students in grades V to VI aged 11-16 years. A descriptive analysis summarized as frequencies and proportions was used to compute the characteristics of the respondents and the prevalence of depressive symptoms and suicidal expression. Age, sex, food insecurity, eating fruits or vegetables, education, substance use, exposure to bullying and/or violence, physical activities, and having supportive school or home environment were computed in logistic regression models to determine factors associated with the outcome of interest. Variables that reached 20%(p-value ≤0.2) under univariate analysis were further adjusted in a multivariable regression set at a statistical significance level of ≤0.05.

Results

The study revealed that the prevalence of depressive symptoms and suicidal expression was 9.4% and 13.4%, respectively. Being of a male gender AOR:1.74 (95%CI:1.14, 2.65),p=0.0097, using alcohol AOR:2.33(95%CI:1.30, 4.19),p=0.0001, being a victim of bullying or physical attack AOR:3.58 (95%CI:2.40, 5.32),p=0.0001 and regularly going hungry AOR:2.24 (95%CI:1.46, 3.44),p=0.0002 significantly associated with depressive symptoms, while the overall use of tobacco AOR:1.87 (95%CI:1.08, 3.24),p=0.0261 and a history of depression predicted suicidal behavior AOR:2.99 (95%CI:1.92, 4.58),p=0.0001.

Conclusion

The study reveals that depression and suicidal behaviors are common among teenagers and are a matter of public health importance. Further investigations in this subject area are crucial in addressing the problem.

Keywords: *Depressive symptoms, Suicidal behavior, Adolescents, Dar es Salaam, Tanzania.*

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Background

Adolescence is a critical period where both biological and psychosocial changes that significantly influence the future as adults. World Health Organization (WHO) recognizes that investing in adolescents offers triple dividends through the immediate outcome during the adolescent period, in their adult life, and wellbeing of their future children (1). As they transition to adulthood, adolescents face multiple challenges that directly affect their early adulthood and throughout their lifespan(2,3); these challenges include teenage pregnancy, HIV and other sexually transmitted infections, non-communicable diseases, injuries, as well as mental health issues and substance use (4,5).

Mental disorders contribute significantly to the global burden of diseases with significant effects on the loss of quality of life as well as economic and social costs. Depression is among the common mental disorders affecting people of all ages and the leading cause of disabilities worldwide, suicide is the second leading cause of mortality in older female adolescents of 15-19 years of age worldwide (6) and the fourth leading cause of death among 15-29 year-olds globally in 2019 (7).

Depression is a serious public health concern that affects many children, teenagers and adults worldwide (8,9). Although depression may occur during childhood, the prevalence of depression tends to rise during the adolescent period (10,11). Across the world, 3-9% of adolescents meet the criteria for depression at any given time; a study from the United States showed that the cumulative probability of depression increases from approximately 5% in early adolescence to as high as 20% by the end of adolescence period (12–17). A cross-sectional study in Uganda estimated a 21% prevalence of depressive disorders when using screening tools but a prevalence of 6% and 8% for major depressive disorder and dysthymia, respectively, when the same participants were subjected to a more robust diagnostic tool (18). Depression in adolescents impacts family relationships and work performance (19) and has been associated with destructive behaviour, such as substance abuse, risky sexual behaviour and suicide tendencies (20–22). Depression is linked to several risk factors, including parenting styles about which low nurturing and overprotective traits are associated with increased risk for adolescent depression (23). Other factors may include poor relationships with peers, loneliness (24), and exposure to bullying (25).

Depression and suicide commonly occur together, and the majority of suicide attempters have a comorbid history of depression (26,27). The magnitude of suicidal ideation and behaviour among adolescents has not been adequately documented in low-income countries, particularly in sub-Saharan Africa. However, a few studies have ranked suicide among the leading causes of adolescent mortality worldwide, with current evidence suggesting the rising

incidence of suicidal behaviour (28,29). Determinants of suicidal behaviours are largely influenced by a lack of supporting resources that address their age-specific challenges, which include stable living situation, intimate friendships, a structural framework and economic resources (30). Suicidal factors usually intensify during the adolescent period (31); these include poor relationship with parents, poverty, being bullied, and substance use (32–35). Studies have shown that females have higher rates of suicide attempts, but males have higher rates of suicide completion (36). however, these factors may not reflect those influencing adolescents in low-income countries, where data acquisition is less accurate (37). As the magnitude of adolescent depression in African settings is not well documented, the question of whether or not suicide is a common phenomenon in this population is not well addressed. The main objective of the study was to determine the prevalence of depression, and suicidal expression among early adolescents in Dar es Salaam primary schools. Furthermore, the study also aimed to identify specific risk factors associated with depressive symptoms and suicidal expression among a population of study participants.

Methods

Study setting

The study was conducted in Dar es Salaam, the commercial capital of the United Republic of Tanzania with a population of 5,465,420the highest in the country as per the 2022 country-level census (38). The majority of Dar es Salaam residents live in an unplanned area where a significant portion of the population is of low socio-economic standard in which the majority of study participants reside (39). The study only included primary school students who usually start primary school at seven years as per national policy; however, many, due to socio-economic factors, may start schooling at an older age. In other cases, some may have to repeat classes if they cannot be promoted to the next grade; these two factors could explain why some children are in their late teens and still in primary school.

Study design and sampling

The study was of a cross-sectional design which was conducted in 2006 and involved only students in primary schools located in Dar es Salaam. A two-stage cluster sample design was used to produce data representative of all students in grades V to VII aged 11-17 years living in Dar es Salaam. In the first stage, schools were selected with a probability proportional to the enrollment size. In the second stage, classes were randomly selected, and all students in the selected classes were eligible to participate. The school response rate was 100%, the student response rate was 87%, and the overall response rate was 87%. A total sample of 2,176 students participated in the Dar es Salaam Global School-based student health survey

(GSHS). Students self-reported their responses to each question on a computer-scannable answer sheet.

Measures

All measures were screened using the GSHS Country Questionnaire, which was based on the WHO/CDC GSHS Generic English Questionnaire. It comprised 53 questions that had all the modules, which included alcohol use, dietary behaviours, drug use, Hygiene, mental health, physical activity, protective factors, sexual behaviours, tobacco use and violence and unintentional injury(40,41). The questionnaire development process involved producing the final English Country Questionnaire, its translation into the national language, Swahili, and pre-testing it (42).

For depressive symptoms, all of the following three criteria had to be met: [A] the student must have felt lonely at some point in the past 12 months, [B] the student must have felt so worried about something that they could not sleep at some time in the last twelve months, and [C] the student must have felt sad or hopeless almost every day for two weeks or more in a row and stopped doing usual activities.

Suicidal behaviour was defined as the individual either having seriously considered attempting suicide during the past 12 months or having an actual suicide plan. Additional variables included age, sex, food insecurity (experiencing hunger sometimes, most of the time or always in the past 30 days), eating or not eating fruit(s) or vegetables in the past 30 days, and 'adolescents' level of education.

Alcohol use was defined as the use of alcohol at least once in the past 30 days; tobacco use was defined as the use of cigarettes or any other form of tobacco in the last 30 days; illicit drug use was defined as whether or not the individual used marijuana, amphetamines, inhalants, or prescription drugs during their lifetime or in the past 30 days.

Other factors included exposure to bullying in the past 30 days or physical attack in the previous 12 months, physical activities defined as whether the student is active on any day of the past week for at least sixty minutes and walked or rode a bike in the past week. Having a supportive school or home environment was defined as "finding others being helpful at school, parents checking homework, parents understanding trouble, and parents knowing what the students do outside of school.

Data analysis

Data analysis was done using SAS version 9.4. Descriptive statistics using frequencies and percentages were used to estimate the prevalence of depressive symptoms and suicidal expression. Risk factors of depressive symptoms and suicidal expression were analyzed

using univariate and multivariable logistic regression models, taking into account weighting and cluster design. Odds ratios and corresponding 95% confidence intervals and p-values were reported. Depression and suicide were categorized as outcome variables, while all the risk factors were considered predictors. Those factors with p-values ≤0.2 from the univariate analysis were also computed for multivariable analysis.

Results

The majority (80.0%) of the student's ages ranged from 12 to 15 years, whereas only 4.8% were above 16 years of age and 13.6% were below 12 years old. Males and females were almost evenly distributed at 1026(47.9%) and 1114(52.1%) respectively. As for the level of education, the majority of students was in grade V to VI (97.5%), while only 52 (2.42%) were in grade VII (see Table 1).

Table 1: Social-demographic characteristics of study participants by age (N=2,154), gender (N=2,140) and level of education (N=2,150)

Variable	Count	Percentage (%)
Age		
11 years old or younger	293	13.6
12 years old	540	25.1
13 years old	611	28.4
14 years old	380	17.6
15 years old	226	10.5
16 years old or older	104	4.8
Total	**2154**	**100**
Gender		
Male	1026	47.9
Female	1114	52.1
Total	**2140**	**100**
Level of education		
Grade V	845	39.3
Grade VI	1253	58.3
Grade VII	52	2.4
Total	**2150**	**100**

Prevalence and risk factors of depressive symptoms and suicidal expression

Among the participants (9.4%) had depressive symptoms, and 13.4% expressed suicidal behaviour during the past 12 months. There were (3.3%)of the adolescents reported going hungry in the past 30 days, (4.6%) reported smoking or using any form of tobacco in the past 30 days, (4.8%) consumed alcohol in the past 30 days, and (4.3%) reported having ever used illicit drugs. A total of 463 (21.6%) reported having experienced bullying of any

form or physical attack, while (28.6%) reported regular physical activity, (84.5%) had a tendency to eat fruits or vegetables regularly, and (33.6%) reported having "helpful home or school environment", Table 2.

Table 2: Summary of the frequencies and proportions for depressive symptoms, suicidal expression, and related risk factors

Variables	Males N (%)	Females N (%)	Total counts N (%)
Depressive symptoms [1]	121 (11.8)	79 (7.1)	200 (9.4)
Suicidal expression[1]	147 (14.4)	141 (12.7)	288(13.5)
Smoking or tobacco use in the past 30 days[1]	67 (6.5)	31 (2.8)	98 (4.6)
Alcohol use in the past 30 days[2]	56 (5.9)	40 (3.9)	96 (4.8)
Eating fruits or vegetables[1]	841 (82.0)	968 (87.0)	1809 (84.5)
Bullied or physically attacked[1]	238 (23.2)	225 (20.2)	463 (21.6)
Undertook physical activities[1]	319 (31.1)	292 (26.2)	611 (28.6)
Supportive home or school environment[1]	309 (30.1)	409 (36.7)	718 (33.6)
Regularly went hungry in the past 30 days[3]	42 (4.1)	34 (3.1)	76 (3.6)
Ever engaged in illicit drug use[4]	50 (5.0)	39 (3.3)	89 (4.3)

[1,2,3 and 4] correspond to N=2140, 1984, 2030 and 2093, respectively, due to missing data.

Factors associated with depressive symptoms

Under multivariable logistic regression, an increase in age from 13 years and above has greater odds for depression, while adolescents who were 11 years or less had significantly lesser odds for depressive disorders. Compared to females, male adolescents (AOR: 1.74, 95CI 1.14, 2.65) were more significantly associated with depression. Alcohol use (AOR: 2.33, 95CI 1.30-4.19), experiencing hunger regularly (AOR:2.24 95CI 1.46,3.44), being bullied or physically attacked (AOR: 3.58, 95CI 2.40, 5.32), doing physical activities (AOR: 1.25, 95CI 1.14, 1.36), and a helpful school and or home environment (AOR 1.77, 95CI 1.25,2.50) were also significantly associated with depression. There was no significant association between depression and other variables such as level of education, eating fruits or vegetables and history of using an illicit drug in the past thirty days or ever (see Table 3).

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Table 3: Factors associated with depressive symptoms

Characteristics	Univariate		Multivariate	
	OR (95% CI)	P-Value[a]	AOR (95% CI)	P-Value[a]
Age category (years)		<.0001		<.0001***
<=11	0.83 (0.70,1.00)		1.03 (1.00, 1.06)	
12	1.13 (0.91,1.40)		1.21 (1.05, 1.39)	
13	Reference		Reference	
14	1.19 (0.81,1.73)		1.13 (0.82, 1.55)	
15	1.54(1.42, 1.68)		1.31 (0.69, 2.50)	
>=16	1.97(0.89, 4.36)		1.72 (0.64, 4.65)	
Sex		<.0001		0.0097***
Male	1.80(1.39, 2.33)		1.74 (1.14, 2.65)	
Female	Reference		Reference	
Alcohol use		<0.0001		0.0046***
Yes	3.28(2.50, 4.30)		2.33 (1.30, 4.19)	
No	Reference		Reference	
Tobacco use		<.0001		0.2907
Yes	2.67(2.33, 3.06)		1.33 (0.78, 2.27)	
No	Reference		Reference	
Eat fruits or vegetables		0.8586		
Eat neither fruits nor vegetables	1.07(0.52, 2.22)			
Eat fruits or vegetables	Reference			
Bullied/physically attacked		<0.0001		<0.0001***
Neither bullied nor physically attacked	Reference		Reference	
Bullied or physically attacked	3.65(2.29, 5.84)		3.58 (2.40, 5.32)	
Physical activity		0.0024		<.0001***
No	Reference		Reference	
Yes	1.59(1.18, 2.15)		1.25 (1.14, 1.36)	
Helpful school and home environment		<.0001		0.0012***
No	Reference		Reference	
Yes	1.79(1.43, 2.24)		1.77 (1.25, 2.50)	
How often one goes hungry in the past 30 days		<.0001		0.0002***
Regularly	2.19(1.61, 2.98)		2.24 (1.46, 3.44)	
Not regularly	Reference		Reference	
History of illicit drug use		0.8862		
Never	Reference			
Have used	0.99(0.86, 1.14)			

***Significant at □=0.05. The level of significance was set at α≤0.05. [CI=confidence interval, OR=odds ratio, AOR=adjusted odds ratio]

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Factors associated with suicidal behaviour

Under multivariable analysis, tobacco use (AOR: 1.87. 95CI 0.83, 3.25) and History of Depression were significantly associated with increased risk for suicidal behaviour. Other factors were significant under univariable but not multivariable analysis, these included the sex of the participants (0R: 1.17, 95CI 1.08,1.28), alcohol use (0R: 1.64, 95CI 0.83,3.25), a dietary habit of eating fruits or vegetables(OR: 2.14, 95CI 1.17,3.89), exposure to bullying or physical attack OR: 1.79 95CI 1.66,3.24), history of drug use (OR: 4.11, 95CI 3.50,4.83) while having a helpful home or school environment(OR: 0.77, 95CI 0.66,0.89) reduced the risk for suicidal behaviour. (See Table 4).

Table 4. Factors associated with suicidal behaviour

Characteristics	Univariate		Multivariate	
	OR (95% CI)	P Value[a]	A0R (95% CI)	P Value[a]
Age category (years)		0.0135		0.0760
<=11	1.17 (0.86, 1.61)		1.32 (0.99, 1.76)	
12	0.85 (0.72, 1.00)		0.97 (0.70, 1.35)	
13	Reference		Reference	
14	0.92 (0.68, 1.24)		0.86 (0.49, 1.53)	
15	0.77 (0.52, 1.13)		0.82 (0.38, 1.79)	
>=16	0.79 (0.37, 1.68)		0.74 (0.38, 1.45)	
Sex				
Male	1.17 (1.08, 1.28)	0.0001	1.10 (0.82, 1.48)	0.5179
Female	Reference		Reference	
Alcohol use				
Yes	2.77 (1.92, 4.01)	<.0001	1.64 (0.83, 3.25)	0.1518
No	Reference		Reference	
Tobacco use				
Yes	4.12 (3.77, 4.50)	<0.0001	1.87 (1.08, 3.24)	0.0261***
No	Reference		Reference	
Eating fruits or vegetables				
No	1.63 (1.47, 1.81)	<.0001	1.48 (0.99, 2.21)	0.0576
Yes	References		References	
Bullied/physically attacked		<.0001		0.4456
No	Reference		Reference	
Yes	1.79 (1.66, 1.94)		1.19 (0.76, 1.84)	
Physical activity				
No	Reference	0.6137		
Yes	1.04 (0.88, 1.24)			
Depressive symptoms				
Yes	3.09 (2.80, 3.40)	<0.0001	2.97 (1.92, 4.58)	<0.0001***
No	References		References	

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Characteristics	Univariate		Multivariate	
	OR (95% CI)	P Value[a]	A0R (95% CI)	P Value[a]
Helpful school and home environment				
No	References	0.0005	References	0.1585
Yes	0.77 (0.66, 0.89)		0.77 (0.54, 1.11)	
Going hungry in the past 30 days		0.9496		
Regularly	0.96 (0.28, 3.27)			
Not regularly	Reference			
History of illicit drug use		<0.0001		0.1086
Never	Reference		Reference	
Have used	4.11 (3.50, 4.83)		2.16 (0.84, 5.51)	

*** *significant at □=0.05*
The level of significance was set at α≤0.05. [CI=confidence interval, OR=odds ratio, AOR=adjusted odds ratio]

Discussion

The few studies that exist regarding the prevalence of adolescent depression in Tanzania and other sub-Saharan African countries have focused on specific groups, such as those living with HIV (43–46). The reported prevalence of 9.3% for depressive symptoms in this study is closer to the 3-9% range reported in previous epidemiologic studies conducted in the United States of America (14,47) but much lower than the 23% observed in a large Irish study conducted in 2010(48). The difference could be due to the different social and cultural dynamics that predict diversity in mental health in the developed world relative to that of a developing country that. Furthermore, in contrast to our study, the Irish study included older participants of up to 25 years of age that might have pooled the prevalence of depression higher, as reflected in previous observations that the incidence of depression tends to rise from the late teens to the mid-twenties (14,49,50). Similarly, this study found that adolescents who were sixteen years of age or older had significantly higher odds of depressive symptoms.

The risk factors for depression were identified as male gender, older age group, alcohol use, being bullied or physically attacked, poor access to food, and having a supportive home or school environment. Similarly, a community-based study in African sites, including ' 'Tanzania, showed that the older age of adolescent, alcohol use and exposure to bullying or physical attack was significantly associated with depressive symptoms (51). For expression of suicidal behaviour, tobacco use and a history of depression showed significant associations with suicidal behaviour. Having a supportive home or school environment was protective against suicidal behaviour. Others, such as older age group, alcohol use and exposure to bullying, were significant only under univariable regression.

Contrary to previous reports, which suggest females have a higher risk for depression (52),

male participants in this study showed significantly higher odds of having depressive symptoms compared to their female counterparts. The developmental changes in the adolescent brain, including changes in the brain circuits involved in responses to rewards and danger, social information processing and increased reported stress levels, predispose an individual to the onset of mood and anxiety disorders should the dysregulation of this complex circuitry occur at this critical period of development (53,54). Evidence suggests that specific pubertal changes, including those related to estradiol levels, hypothetically should make girls more prone to depression than boys (55,56). The higher odds for depression in males in this study may have been partly due to the predominance of males using alcohol and other illicit drugs, which are linked to increased risk for depression (57,58). Furthermore, females tend to present their depression with somatic complaints more so than their male counterparts (59,60), whereas the symptoms screened in this survey focused more on emotional symptoms.

Among the substances used, only alcohol use was found to be significantly associated with depression, although the use of tobacco showed a significant association with suicidal expression. Current evidence suggests that substance use may predict either depression or suicide (61,62). It is stressed that substance use may be one of the coping strategies for depressed adolescents (62). When in distress, adolescents are less likely to seek help in cases of emotional problems (63) and instead may turn to substance use as a way of self-medication (29).

Previous studies have reported that depression is among the strongest predictors of suicidal ideation and planning among adolescents but shows a weaker relationship with suicide attempts, whereby only a third of teenagers with suicidal ideation attempted the act (59). Although previous studies have documented the link between Depression and suicide, this study presented a substantial proportion of participants who expressed suicidal behaviour without having depressive symptoms, suggesting that although Depression and suicide are linked, they may involve different pathways and not always be dependent on one another.

Our study demonstrated comparable findings from other urban settings indicating that exposure to bullying or physical attacks in the school environment are significantly associated with depression (65). Although bullying was significantly associated with depression, suicidal expression was not significantly associated with exposure to bullying or physical attacks in multivariate analysis. Suicide and exposure to bullying have a complex link; the interaction with factors such as the nature of bullying, the gender of the victim or perpetrator, the country of origin, and the severity of bullying can also influence the link (66). However, these factors were not available for analysis, as the data were secondary.

As for supportive home or school environments, adolescents whose parents were supportive, checked their assignments, understood their troubles or knew what the students were doing were less likely to express suicidal behaviour. Still, they were significantly more likely to present depressive symptoms. It is thought that positive relationships between parents and teenagers tend to improve the overall mental wellbeing of adolescents (67), including depression, and further mitigate suicidal expression. It is not clear how adolescents with parents who checked their assignments, understood their troubles or knew what they were doing had higher odds of depression. One possible explanation could be that the students were depressed, so the parents were more active in checking up on them, or these parenting factors may be a by proxy indication of overprotective traits, which have been linked with adolescent depression (15), however, delineating the causal link is beyond the scope of the available cross-sectional nature of our data.

The current study showed that a dietary habit of eating fruits or vegetables was protective against suicidal expression at univariable regression but not depression. Fruits and vegetables are considered to have many bioactive compounds that could be responsible for a positive effect on mental health, including depressive disorders (68). There is growing evidence that modifiable lifestyle factors, particularly diet, have a beneficial impact on the occurrence and recurrence of mental illnesses, including depression (69,70). However, it is not clear whether poor dietary habits act as a symptom or a cause of depressive symptoms since the study was cross-sectional.

Study limitations

Based on the nature of the available secondary data, the analysis of our study was limited to a "data-driven" approach, as opposed to a "research question-driven" approach. Some of the research questions and analysis plans had to be modified based on the nature and availability of the variables within the dataset. Furthermore, the cross-sectional design of this study makes discerning a temporal relationship between the variables of interest difficult.

Conclusion

This is the first large study to report the significance of depressive symptoms and suicidal expression in a school setting as a matter of public concern among adolescents in Tanzania. Adolescents are prone to depression and suicidal tendencies, and the associated factors are common and largely modifiable. More robust studies in this subject area will be beneficial for understanding the magnitude of the problem so that informed and rational interventions can be undertaken.

Author's contributions

AN designed the study and analysis plan, AI analysed and arranged data, and WF guided the whole manuscript preparation process. All authors participated in the writing process.

Competing interests

The authors declare no conflicts of interest concerning this article's research, authorship, and publication.

Ethics approval and consent to participate

The Ethics Committee of the University of Dodoma evaluated the study plan, and ethical approval was granted.

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