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Risk and Protective Factors Associated with Suicidal Ideation Among 3rd-trimester Pregnant Adolescent Girls in Rural Ugandan Communities: A Case of Kyotera and Rakai Districts.

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Abstract

Background: *Despite expanding global literature on suicidal ideation, LMIC pregnant adolescent girls' suicidal ideation is unstudied. This study sought to establish risk and protective factors associated with suicidal ideation among 3rd trimester pregnant adolescent girls (10–19-year-olds) in Kyotera and Rakai districts.*

Methods: *A cross-sectional study in the 22 sub-counties of Kyotera and Rakai districts, that involved the quantitative data collection.' It involved pregnant adolescent girls between 10 and 19 years who were in their third trimester. These adolescents participated in a three-year psychological support implementation research project in ten government health facilities and provided prenatal and postnatal care through community health worker mobilization and adolescent-friendly clinics. The study employed a number of tools including; a self-reported questionnaire; a Wellbeing in Pregnancy tool; and an SGBV questionnaire that collected demographic, pregnancy, family planning, and SGBV data. Data from the PostgresSQL database was extracted, cleaned, and exported to STATA 14 for analysis. The data is presented in frequencies, mean, standard deviation, median, and interquartile ranges for continuous data and percentages or proportions for categorical data.*

Results: *Among the 582 pregnant adolescent girls, 367 were nulliparas, 170 primipara and 47 Multiparas. The mean (SD) age at enrolment was 17.8 ± 1.3 years. Prevalence of SI was 12.7%, which increased as the gestation age progressed i.e., 7 months (10.6%), at 8 months (13.0%), and at 9 months (14.9%). Adolescent girls with somatic distress had a 3.58-fold (95% CI: 1.18 to 10.91) significant (p = 0.025) likelihood of experiencing SI. "Feeling worthless", "crying more than usual" and "feeling unhappy" had a 2.4-fold (95% CI: 1.47–4.03); a 2-fold (95% CI: 1.16–3.45); and 65% (95% CI: 1.01–2.69) increase in SI, respectively. Panic disorders such as "shaking hands" (AOR 1.68: 95%CI: 1.10–2.57) (p = 0017) and breathing difficulties (AOR 1.53: 95%CI: 1.02–2.30) (p = 0041) increased SI. Factors such as "liking physical appearance" (AOR 0.61: 95%CI:0.039 - 0.97) (p=0035) and decision making (AOR 0.59: 95%CI:0.035 -1.00) (p=0048) protected against SI.*

Conclusions: *Adolescent women in their third trimester have higher rates of suicidal ideation. Somatic distress and feeling worthless are two risk factors that should be included in screening protocol during antenatal visits. Adolescent programs that provide comprehensive obstetrics care should screen and treat for suicide ideation in all pregnant girls in 3rd trimester.*

that resonate with natural forms and structures. Overall, the importance of fractal dimension lies in its ability to bridge disciplines, providing insights into complex systems and offering tools for better analysis and understanding of natural and artificial structures. The current exposition provides a plethora of numerous potential fractal open problems to establish a next generation research platform combing fractal oncology, fractal biomedicine, fractal medicine and fractal clinical sciences.

Keywords: Fractal Dimension, Oncology, Medicine, Biomedicine, Clinical Sciences, Dentistry.

List of Abbreviations

- **BAMA:** Babies and Mothers Alive Foundation
- **CI :** Confidence Interval
- **CIDI :** Composite International Diagnostic Interview
- **HCIIIs:** Health Centre IIIs
- **IPV:** Intimate Partner Violence
- **LMICs:** Low- and Middle-Income Countries
- **M/HICs:** Middle- and high-income countries
- **MDE:** Major depressive episode
- **MSPSS:** Multidimensional Scale Perceived Social Support
- **PD:** Panic disorders
- **SBQ-R:** Suicidal behaviour questionnaire
- **SGBV:** Sexual and Gender Based Violence
- **SI:** Suicidal ideation
- **SIB:** Suicidal ideation and behaviour
- **SRQ-20:** The 20-Item Self-Reporting Questionnaire
- **UNCST:** Ugandan National Council of Science and Technology
- **UNICEF:** The United Nations Children's Fund
- **WHO:** World Health Organization

Background

Adolescent pregnancies are a significant challenge to Uganda. Unprepared for the challenges that come with motherhood, teenage mothers experience high rates of prenatal and postpartum depression [1]. Depression and a diminished sense of life satisfaction are significant factors that contribute to the emergence of suicidal ideation (SI). The prevalence of suicidal ideation and behaviour (SIB) among adolescent girls is increasing at a significantly higher pace compared to adolescent boys globally., According to the World Health Organisation (2022), 703,000 people commit suicide annually [2]. In the 90 countries studied, suicide was the fourth leading cause of death among young males and the third for young females. Of the 132,423 deaths of young people aged 15-19 in 90 countries, suicide accounted for 9.1% and SIB constitutes approximately 16% of the worldwide burden of illness among individuals aged 10-19 years [3, 4]. Pregnant women exhibit a higher propensity for experiencing suicidal ideation in contrast to the broader demographic [5]. Research findings indicate that pregnant women who experience depression are 13-fold more likely to develop suicidal ideation. Furthermore, there have been reports indicating that 14.3% of pregnant women belonging to low-income households reveal instances of self-harming ideation [6]. Nevertheless, two-thirds of women who report having suicide thoughts display symptoms of depression that are considered clinically serious. Suicide has a substantial impact on maternal mortality in low-income nations, accounting for almost 28% of these fatalities [7]. The prevalence of adolescent pregnancies in Sub-Saharan Africa region is mostly observed within the context of marriage, which is often impacted by traditional practices, cultural norms, and economic disadvantage. Additionally, a significant number of these pregnancies occur outside of marriage and are commonly unintended [8]. 21 million adolescent pregnancies occur in sub-Saharan Low- and Middle-Income Countries (LMICs). While deaths related to suicide among adolescent population is low, it is the third leading cause of death among the age group.

The relationship between SIB and pregnant adolescent girls is of great relevance to health workers in their attempts to identify those at highest risk of suicide [9] . Adolescent SIBs have been reported in various contexts in situations of family conflict, autonomy struggles, academic and disciplinary issues, and peer relationship disruptions, which become increasingly important as youths get older. Among pregnant women, SIB is associated with psychiatric illness, notably major depressive episode (MDE) and any anxiety disorder. However, given the diverse range of developmentally appropriate interventions derived from clinical trials, no definitive judgment can be made regarding the superiority of one intervention over another in the management of suicidal adolescents [6]. According to the 2009-2016 Global School-based Student Health Surveys conducted in 53 countries, the prevalence rate of suicidal ideation among individuals aged 12-16 was found to be 10.4% [7]. Notably, the United States exhibited the highest prevalence rate among the countries surveyed [7]. On the African continent, Zambia had the highest prevalence of suicidal ideation (31.9%) among students, followed by Kenya (27.9%), Botswana (23.1%), Uganda (19.6%) and Tanzania (11.2%). In their 2020 study Mebruhtu et al associated maternal suicidal ideation with poorer child cognitive outcomes [8].

Adolescents are disproportionately affected by mental health conditions. However, there is a paucity of data about common mental health disorders among adolescents in low- and middle-income countries (LMICs). This data could play a pivotal role in the formulation of efficacious policies and programs aimed at mitigating adolescent mental health concerns. In order to address data deficiency, UNICEF has emphasized the development of measurement tools and collaboration with partners to conduct population-level assessments of mental health and implement interventions targeted at young people. Pregnant adolescents need better screening for antepartum suicidal ideation. Due to their focus on antepartum and postpartum depression, screening tools are scarce.

A substantial proportion of women with suicidal ideation do not meet clinical thresholds of depression and that the stress–diathesis model shows susceptibility to suicidal behaviour independent of depressive disorders, innovative approaches to screening and detecting antepartum suicidal ideation are urgently needed [3]. The prevalence of suicide by hanging or suffocation among female youth, particularly in certain racial/ethnic groupings, is increasingly reaching levels comparable to those observed among male youth [10]. This decreasing disparity highlights the pressing need to establish suicide prevention techniques that effectively cater to the distinct developmental requirements of adolescent females. Further investigation is necessary to explore the risk and protective factors particular to each gender about juvenile suicide, as well as the potential implications of these determinants for the development of effective interventions. This study aimed to determine the burden of prenatal suicidal ideation and risk/protective factors among pregnant adolescent girls 10 to 19 years in Kyotera and Rakai Districts.

Problem Statement

Adolescent pregnancy disrupts the social and cultural safety of

girls thereby complicating the triadic interactions between adolescents, family and community. Adolescent pregnancies are considered socially unacceptable in rural Uganda, resulting in adverse consequences for the family's social standing and consequent stigmatisation and disgrace experienced within traditional communities. The Ugandan legal framework classifies the conditions under which teenage girls conceived as sexual violence and violence against children. To elude legal consequences and avert social disapproval, the community and family orchestrate coerced marriage for these mothers in order to conceal the 'crime'. Teenage mothers who go through this experience often feel even more depressed, stressed,socially alienated, and rejected by their families and communities. In certain instances, girls experience grief due to being expelled from school and losing their career aspirations. The present trajectory of mental disorders indicates a potential to surpass heart disease and road traffic injuries as the leading cause of mortality among the general population [11, 12]. In Low- and middle-income countries (LMICs), the prevalence of maternal mental disorders is much higher compared to high-income countries (HICs) where it is estimated to range from 5.2% to 32.9% [13, 14].

Given the absence of a systematic screening protocol for maternal mental disorders in the primary health care environment of Uganda, little is known about suicidal ideation before, during, and after pregnancy among adolescent mothers. The maternal care guidelines in the country normally advise an average of four antenatal clinic visits, with an attendance rate of roughly 59.9% among the expecting population [9]. Antenatal care emphasizes physical examination, whereas postpartum care emphasizes newborn well-being, including immunization, growth monitoring, and HIV testing. This strategy fails to integrate maternity, child, and mental health primary care. Thus, maternal mental health conditions such as SIB are poorly identified and treated. The primary objective of this study is to assess the prevalence of prenatal suicidal ideation among pregnant teenage girls aged 10 to 19 years in the districts of Kyotera and Rakai.

Materials and Methods

Study Design

A cross-sectional study carried out among pregnant adolescent girls in their third trimester who were attending peer-led psychosocial support sessions on prenatal, delivery, and postnatal care. The research was carried out at 10 adolescent friendly clinics found in 10 health facilities of the Kyotera and Rakai Districts. The study participants were divided into 89 clusters, with each cluster consisting of 12 girls. These clusters met every month at a health facility near their homes. The peer-led psychosocial support group meetings were led by a community health worker referred to as a Mama and Papa Ambassadors.

Study Area

The districts of Kyotera and Rakai are located in the larger Masaka region in the south-central section of Uganda. These districts have a poor income and their major economic activity is agriculture. Participants in the study came from two general hospitals located in Kalisizo and Rakai, as well as the Kakuuto Health Centre IV and Mitukula-Kamwanyi, Kasaali, Kirumba, Kabira, and Kasasa HCIIIs located in Kyotera while Kimuli, and Lwanda HCIIIs are located in Rakia district.

Study Population

The study population consisted of adolescent girls between the ages of 10 and 19, who were in the third trimester of their pregnancy and were permanent residents of the communities around the 10 health facilities in the Kyotera and Rakai districts.

Eligibility Criteria

This study focused on pregnant adolescent females between the ages of 10 and 19 who are currently in the third trimester of their pregnancy. Participation in the study was specifically limited to those who are permanent residents of the Kyotera and Rakai districts.

Sample Size

We used a single sample to estimate the sample size

$$n = \frac{z^2\ X\ (p*(1-p))}{e^2} = \frac{1.96^2 * (0.196*(0.5-0.5))}{0.041^2} = 571$$

Where α = 0.05 at a 95% confidence interval giving u Z of 1.96. The study team consider an allowable error of the sample of 4.1% i.e. e = 0.041. We also consider the proportion of suicidal ideation among Ugandan Students of 19.6% as our P and P = 0.5. Considering these were teenage women, we estimated to control for 3 factors of difficulty in understanding questions, privacy, and difficulties in recalling information. Hence a 2% non-response rate was used giving the minimum acceptable sample of 583 adolescent mothers.

Depression and Suicidal Ideation

The 20 item Self-Reporting Questionnaire (SRQ-20) was developed to screen for non- psychotic disorders and consists of 20 yes/no questions asking respondents about symptoms and problems likely to occur in people with neurotic disorders in the past 30 days. Each of the 20 items is scored 0 for No or 1 for Yes. A score of 1 indicates that the symptom was present during the past month, a score of 0 indicates that the symptom was absent. The maximum score is therefore 20. The SRQ-20 is effective in identifying participants with major depression, anxiety disorders or suicidality and displays good internal consistency. The optimal cutoff scores were 4/5 and 6/7 for men and women respectively. The factor structure differed by gender. The recommended cutoff threshold of SRQ-20 in this study was 7/8 (i.e. scores of 8 and above indicate clinically significant distress), which has been validated and applied in South Africa, India and Vietnamese women [15, 16]. Suicidal ideation was measured by the SRQ-20 item 17, "Has the thought of ending your life been on your mind?". Item 17 of the SRQ-20 reflects language commonly used to assess suicidal ideation in clinical interviews [15]. There were two possible answers for each question. If the person answered "no" to any of them, the question got a score of 0, and if they answered "yes," the question got a score of 1.

Data Collection Tools and Variables

To mitigate the impact of information bias, we employed data collection instruments that had undergone validation across diverse contexts. A comprehensive survey was conducted to gather participant data on demographic characteristics, socio-economic status, obstetric history, pregnancy-related information, and previous mental health records. The assessment of risk factors for psychological distress during pregnancy involved the utilization of the Self-Reporting Questionnaire (SRQ) tool. This instrument, designed by the World Health Organization (WHO), serves as a screening tool for mental disorders such as depres-

sion, anxiety-related disorders, and somatoform disorders. Perceived support from family, friends and partners was evaluated using the Multidimensional Scale of Perceived Social Support (MSPSS) [17]. The MSPSS is a brief, easy-to-administer self-report questionnaire with twelve items assessed on a seven-point Likert scale from 'very strongly disagree' (1) to 'very strongly agree' (7). MSPSS measures the extent to which an individual perceives social support from three sources: Significant Others (SO) (Items 1, 2, 5, and 10), Family (FA) (Items 3, 4, 8, and 11) and Friends (FR) (Items 6, 7, 9, and 12). This tool which has proved to be psychometrically sound in diverse samples and to have good internal reliability and test-retest reliability, and robust factorial validity was used to assess MSPSS for the adolescent mother in the program [17-19]. The pregnancy-specific Well-being in Pregnancy (WiP) questionnaire measures positive and negative pregnant feelings and thoughts. Maternity care focusses on positive health and well-being, not simply disease prevention, therefore measuring both positive and negative thoughts and emotions is important. The 12-item WiP questionnaire measures three basic subscales: 1) Concerns over postpartum support; 2) Positive pregnancy; 3) Motherhood confidence; and a five-item LTC-specific scale. Sub-scales are converted into a 0-100 metric, with 0 indicating low well-being and 100 high. Scores are calculated by aggregating item scores, with certain replies inverted to ensure larger scores indicate higher well-being. To assess the presence of intimate partner violence (IPV) among study participants, a questionnaire was developed and used to collect data every quarter.

Data Collection Process

Data was actively collected during peer-led support group sessions by a registered midwife and data assistant trained and supervised by a clinical social counselor. The midwives and data assistants administered the screening questionnaires and psychosocial risk instruments (such as MSPSS, WHO SRQ20 and WiP). Women who were noted to have significant mental symptoms or suicidal ideation according to the Self-Reporting Questionnaire (SRQ) were immediately referred for assessment and management by the BAMA clinical social worker for counseling. Counseling was also given to other adolescent mothers with non-mental health disorders but showed clear signs of mental distress. The counselor examined the client in person to detect mental health issues. Adolescent mothers screened with suspicion of serious mental disorders or suicidal ideation were referred for specialized services at the community development office found at the district sub-county office or a mental health expert at the Kyotera Community Health Centre. All tools were administered as an interview. Data was collected between August 2020 and January 2021.

Data Analysis

Data analysis was performed using STATA version 14. Data was described using simple statistics. Multicollinearity was assessed among independent variables within the regression model. Significant associations were examined using non-parametric tests: the Wilcoxon sum of rank test, the Fisher exact test and the two-sample t-test. After controlling for confounding factors, bivariate (binary regression) analysis (univariable and multivariable) was used to analyse important predictive factors related to suicidal ideation. In multivariate logistic regression model, suicidal ideation was the dependent variable, the covariates were the variables that showed significant differences between the suicidal ideation group and no suicidal ideation group. The threshold of $p < 0.05$ is statistically significant.

Study Results

Demographics of Pregnant Adolescent Women

The cohort consisted of 365 nulliparas, 170 prim para and 47 Multiparas. The mean(sd) age of the participants at enrolment was 17.9 (1.28) years. 73.5% of the 582 pregnant adolescent women who participated in the study were in the late adolescent stage, 84.9% had no education, and 13.9%were students at the time of data collection the SRQ was used to assess a total of 582 adolescent girls and young women who reported having suicidal thoughts. Overall, 12.7% of pregnant adolescent mothers reported experiencing suicidal thoughts. The rates of suicidal ideation at 7, 8, and 9 months were 10.6%, 13.0%, and 14.9% respectively. 15.4% of the cohort lived in households with only one parent, and 64.1% lived with their spouses.

Table 1: Sociodemographic Characteristics of 3rd Trimester Pregnant Adolescent Women 10 to 19 years in Kyotera and Rakai Districts

	Suicidal Ideation		
Characteristics	N (%;) n= 508	Yes n(%) n=74	Total (%; n= 582)
Age Mean (SD)	17.9 (1.21)	17.6 (1.62)	17.9 (1.28)
Stages of adolescent			
Early (10-14)yrs	8 (72.7)	3 (27.3)	11 (1.9)
Middle (15-17)yrs	122 (85.3)	21 (14.7)	143 (24.6)
Late (18-19) yrs	378 (88.3)	50 (11.7)	428 (73.5)
Maternal Education Level			
None	432 (85)	62 (83.8)	494 (84.9)
Primary	28 (5.5)	3 (4.1)	31 (5.3)
Secondary	38 (7.5)	8 (10.8)	46 (7.9)
Tribe			
Muganda	347 (88.3)	46 (11.7)	393 (67.5)
Munyankole	101 (84.2)	19 (15.8)	120 (20.6)

Other	60 (87)	9 (13)	69 (11.9)
School going girl			
No	440 (87.8)	61 (12.2)	501 (86.1)
Yes	68 (84)	13 (16.1)	81 (13.9)
Persons lived with			
Husband	323 (88.3)	43 (11.8)	366 (64.1)
Both Parents	38 (84.4)	7 (15.6)	45 (7.9)
Single parent	77 (87.5)	11 (12.5)	88 (15.4)
Siblings	12 (80)	3 (20.0)	15 (2.6)
Grand parents	21 (84)	4 (16.0)	25 (4.4)
Acquaintances	28 (87.5)	4 (12.5)	32 (5.6)
Gestation age			
7 months	161 (89.4)	19 (10.6)	180 (30.9)
8 months	227 (87)	34 (13.0)	261 (44.9)
9 months	120 (85.1)	21 (14.9)	141 (24.2)
Number children			
None	313 (86)	51 (14.0)	364 (62.5)
One	152 (89.4)	18 (10.6)	170 (29.2)
Two	20 (83.3)	4 (16.7)	24 (4.1)
Three	8 (100)	0 (0.0)	8 (1.4)
More	14 (93.3)	1 (6.7)	15 (2.6)
No response	1 (100)	0 (0.0)	1(0.2)

Description of Common Mental Disorders

According to the findings that were obtained, the majority of pregnant adolescents presented with somatic symptoms, which were then followed by feelings of despair and anxiety, decreased energy, and thoughts of depression. On the anxiety and depression scale, the most reported symptom (38.3%) was feeling nervous, tense, or worried. 18.9% reported crying more than usual. In the somatic symptoms scale, most (49.4%) reported headaches, and 23.0% reported poor digestion. In the reduced vital energy scale, 14.2% reported daily work suffering, and 26.9% had trouble thinking clearly. In the depressive thoughts scale, the most commonly reported symptom was lost interest in things (33.5%), followed by Unable to play a useful part (24.2%), and feeling worthless (23.9%), and thoughts of ending one's life (12.7%) (Table 1).

Table 2: Prevalence of Common Mental Disorders 3rd Trimester Pregnant Adolescent Women

Categories of mental disorders	Yes n(%)	No n(%)
Depressive/anxious	357 (61.3)	225 (38.6)
Feel nervous, tense or worried	223 (38.3)	359 (61.7)
Easily frightened	218 (37.5)	364 (62.5)
Feel unhappy	180 (30.9)	402 (69.1)
Cry more than usual	110 (18.9)	472 (81.1)
Somatic symptoms	429 (73.7)	153 (26.3)
Often have headaches	259 (44.5)	323 (55.5)
Sleep badly	132 (22.7)	450 (77.3)
Uncomfortable feelings in the stomach	207 (35.6)	375 (64.4)
Poor digestion	109 (18.7)	473 (81.3)
Poor appetite	206 (35.4)	376 (64.6)
Hands shake	156 (26.8)	426 (73.2)
Reduced vital energy	389 (66.8)	193 (33.2)
Easily tired	300 (51.6)	282 (48.5)
Difficult to make decisions	125 (21.5)	457 (78.5)
Difficult to enjoy your daily activities	141 (24.2)	441 (75.8)

Daily work suffering	166 (28.5)	416 (71.5)
Feel tired all the time	274 (471)	308 (52.9)
Trouble thinking clearly	133 (22.9)	449 (77.2)
Depressive thoughts	294 (50.5)	288 (49.5)
Unable to play a useful part	141 (24.2)	441 (75.8)
Lost interest in things	195 (33.5)	387 (66.5)
Thought of ending your life	74 (12.7)	508 (87.3)
Feel that you are a worthless person	139 (23.9)	443(6.1)

Suicidal Ideation

12.7% of adolescent women in third trimester of pregnancy were found to have suicidal thoughts. 46% of the SI cases were eight months pregnant. When it comes to the staging of adolescents, it was found that the SI prevalence was higher in the late-stage of adolescence, and this was observed across all three gestational ages during the third trimester. Of the total number of cases of suicidal thoughts among the study population, married teenagers accounted for 67.6%.

Prevalence of Suicidal Ideation by Characteristics in 3rd Trimester Pregnant Adolescent Women

Table 3. Prevalence of SI by Socio-Demographic Factors Among Pregnant Adolescent Women

Characteristics	Non-SI n (%;)	SI n(%)	Total n(%)	p-value
Headache (Often)				<0.0001
No	299 (58.9)	24 (32.4)	323 (55.5)	
Yes	209 (41.1)	50 (67.6)	259 (44.5)	
Poor Appetite				<0.0001
No	346 (68.1)	30 (40.5)	376 (64.6)	
Yes	162 (31.9)	44 (59.5)	206 (35.4)	
Sleep Badly				0.002
No	403 (79.3)	47 (63.5)	450 (77.3)	
Yes	105 (20.7)	27 (36.5)	132 (22.7)	
Easily Frightened				<0.0001
No	335 (65.9)	29 (39.2)	364 (62.5)	
Yes	173 (34.1)	45 (60.8)	218 (37.5)	
Hands Shake				<0.0001
No	390 (76.8)	36 (48.7)	426 (73.2)	
Yes	118 (23.2)	38 (51.4)	156 (26.8)	
Feeling Nervous				<0.0001
No	330 (65)	29 (39.2)	359 (61.7)	
Yes	178 (35)	45 (60.8)	223 (38.3)	
Intimate Partner Violence				<0.0001
No	469 (92.3)	59 (79.7)	528 (90.7)	
Yes	39 (7.7)	15 (20.3)	54 (9.3)	
Assault				<0.0001
No	439 (86.4)	49 (66.2)	488 (83.9)	
Yes	69 (13.6)	25 (33.8)	94 (16.2)	
Raped				0.041
No	469 (92.3)	62 (83.8)	531 (91.2)	
Yes	38 (7.5)	12 (16.2)	50 (8.6)	
Planned Pregnancy				0.101
No	203 (40)	37 (50)	240 (41.2)	
Yes	305 (60)	37 (50)	342 (58.8)	
Difficulty in breathing				<0.0001

No	398 (78.4)	41 (55.4)	439 (75.4)	
Yes	110 (21.7)	33 (44.6)	143 (24.6)	
like physical appearance			<0.0001	
No	88 (17.3)	28 (37.8)	116 (19.9)	
Yes	420 (82.7)	46 (62.2)	466 (80.1)	
Having a birth plan				0.002
No	218 (42.9)	46 (62.2)	264 (45.4)	
Yes	290 (57.1)	28 (37.8)	318 (54.6)	
Have One Year Plan				0.023
No	279 (54.9)	51 (68.9)	330 (56.7)	
Yes	229 (45.1)	23 (31.1)	252 (43.3)	
Feeling Good				0.012
No	100 (19.7)	24 (32.4)	124 (21.3)	
Yes	408 (80.3)	50 (67.6)	458 (78.7)	

Factors Associated with Suicidal Ideation in 3rd Trimester Pregnant Adolescent Women

An analysis of statistical data pertaining to mental health, well-being in pregnancy (WIP) and sexual and gender-based violence (SGBV) revealed that the following six factors significantly increased the risk of suicidal ideation among third-trimester pregnant adolescent women in the districts of Rakai and Kyotera: feeling worthless, crying more than usual, difficulty breathing, feeling unhappy, shaking hands, and being somatic. Adolescent girl s' likelihood of having suicidal ideation was increased by 3.58 folds when she experienced somatic distress with a 95% CI ranging from 1.18 to 10.91 (p = 0.025). Sub-grouping of dysphoria enabled the program to observe the effect of each sub-component to SI. Dysphoria was defined as the state of being unhappy, dissatisfied, restless, discouraged, or frustrated that is often followed by depression or anxiety[14]. For the girls who had dysphoria, "feeling worthless" and "crying more than usual" caused an 2.4-fold (95% CI: 1.47–4.03) and a 2-fold (95% CI: 1.16–3.45) significant increase in SI, respectively. On the other hand, "feeling unhappy" caused a 65% increase with a 95% CI: 1.01–2.69 significant (p = 0.046). Experiencing panic disorders such as shaking hands (AOR 1.68: 95%CI:1.10 - 2.57) (p=0.017), and breathing difficulties (AOR 1.53: 95% CI:1.02 - 2.30) (p=0.041) increased SI by over 68% and 53% among the study population respectively.

Table 4. Univariate and Multivariable Analysis of the Predictors of Si Among Adolescent Girls in the 3rd Trimester Pregnancy

Univariate Analysis			Univariate Analysis			
Characteristics	Risk Ratio	95% CI	p-Value	Risk Ratiox	95% CI	p-Value
Maternal Education						
Primary	0.77	0.26 - 2.31	0.641	0.40	0.12 - 1.33	0.136
Secondary	1.41	0.72 - 2.76	0.312	1.04	0.45 - 2.39	0.923
Tertiary/Uni	0.72	0.11 - 4.76	0.736	0.69	0.12 - 3.93	0.675
Adolescent stage						
Middle	0.54	0.19 - 1.53	0.245	0.49	0.14 - 1.70	0.262
Late	0.43	0.16 - 1.17	0.099	0.53	0.15 - 1.80	0.308
Gestation age						
8 months	1.24	0.73 - 2.11	0.419	1.17	0.70 - 1.94	0.549
9 months	1.41	0.79 - 2.52	0.245	1.26	0.72 - 2.22	0.422
Feeling Worthless	4.65	3.05 - 7.11	0.000	2.43	1.47 - 4.03	0.001*
Crys more than usual	4.76	3.17 - 7.15	0.000	2.00	1.16 - 3.45	0.012*
Plan when baby is 1-year old	0.59	0.37 - 0.93	0.025	0.72	0.45 - 1.15	0.168*
like physical appearance	0.41	0.27 - 0.63	0.000	0.61	0.39 - 0.97	0.035*

Difficult breathing	2.46	1.62 - 3.74	0.000	1.53	1.02 - 2.30	0.041*
Abdominal Pain	1.22	0.79 - 1.86	0.370	0.67	0.45 - 1.00	0.050*
Feeling unhappy	3.68	2.38 - 5.69	0.000	1.65	1.01 - 2.69	0.046*
Forced marriage	1.88	0.9 - 3.93	0.093	1.17	0.53 - 2.62	0.694*
Intimate Partner Violence	2.48	1.51 - 4.06	0.000	1.19	0.73 - 1.94	0.491*
Hands Shaking	2.89	1.91 - 4.39	0.000	1.68	1.10 - 2.57	0.017*
In school	1.31	0.76 - 2.28	0.333	0.97	0.51 - 1.85	0.921*
Difficult decision making	2.24	1.46 - 3.43	0.000	0.59	0.35 – 1.00	0.048*
Somatic	8.48	2.71 - 26.55	0.000	3.58	1.18 - 10.91	0.025*

Multivariable analysis; Adjusted for age and gender. * $p < 0.05$, **$p<0.005$

On the other hand, we also found that a woman's satisfaction with her physical appearance (AOR 0.61: 95%CI:0.039 - 0.97) (p=0035) and experiencing difficulty in making decisions (AOR 0.59: 95%CI:0.035 -1.00) ($p = 0.048$) during the third trimester of her pregnancy significantly reduction in risk by between 59 and 61 percent, thereby offering a protective cover against SI.

Discussion

The study investigated the risk and protective factors associated with suicidal ideation in adolescent girls in their 3rd trimester of pregnancy. We determined the prevalence of suicide ideation among pregnant adolescent women in the third trimester to be 12.7%. This prevalence rose as the gestational age progressed, particularly during the 7th, 8th, and 9th months, with rates of 10.6%, 13.0%, and 14.9%, respectively. The study identified six risk factors and two protective factors that were found to influence suicidal ideation among pregnant adolescent women in their third trimester. Risk factors included somatic symptoms, dysphoria (i.e., feelings of worthlessness, increased crying, feeling unhappy) and panic disorders (i.e., shaking hands, and experiencing breathing difficulties) while protective factors were liking physical appearance and decision-making.

The observed SI prevalence in this study falls within the reported global SI rates range for pregnant women of 3% to 33% and are near studies conducted in Southwest Ethiopia 13.3%, Pakistani 11.8% and Spain (11.70%). However, the study results are higher than 9.57% reported in the island of Gran Canaria, Peru 8.8%, India 6%, and Brazil 6.3% [5, 20-25]. The variation in prevalence can be attributed to a number of factors among which include study population, period of pregnancy (trimester), and study tools used to assess SI. In the case of population and period of pregnancy, the Indian study considered all pregnant women between five and 20 weeks of gestation but excluded those who reported to have had a history of mental health disorders, using depressants and acute illness. With exception of Brazil which employed the WHO SRQ-20 and similar question to determine SI, the tools used in other countries include the suicidal behaviour questionnaire (SBQ-R) and WHO Composite International Diagnostic Interview (CIDI) with varying levels of accuracy.

This study SI findings are lower than those reported among pregnant women populations in, Brazil (23.53%), Egypt (20.4%), Peru (16.8%), South Africa with 18.0% [26-30] . In addition to using different assessment tools, the observed difference in SI could be driven by religious and cultural beliefs in regards to suicide. Compared to the liberal nature of the cited countries, the Ugandan rural society is entrenched in religious teaching and as a communal society has a strong heritage on cultural practices that stigmatized families and household in which suicide has occurred hence may serve as a deterrence and possibly explains the lower prevalence of suicidal ideation in our study compared to above mentioned studies. Variation might also have risen for different studies employing variant inclusion and exclusion criteria controlling for history of mental disorders or substance use, marriage and gestation period between 20 and 40 weeks compared to this study that consider only adolescent girls 10 to 19 years in their 3rd trimester.

Understanding the risk factors for pregnancy-related suicidal behaviour may support prevention of suicidal ideation and appropriate intervention as these women may be more quickly identified through this form of screening. To prevent related self-harm behaviours and ultimately suicide itself, it is helpful to be aware of the risk factors for suicide ideation during pregnancy. In this study, self-reported somatic problemswere observed to be significantly linked to a four-fold greater SI prevalence in adolescents. Similar findings have been reported, with somatic disorders found to be an independent factor with a 1.8 times increase in suicidal behaviour [31]. Michael et al. in 2020 found that somatic symptoms and related illnesses are not only connected with an increased risk for suicidal thoughts but also with an increased risk for a suicide attempt. According to Torres et al.'s systematic review, the rates of suicidal ideation and attempts range from 24% to 34% and 13% to 67%, respectively [32]. Adolescent pregnant girls with major depression disorder such as somatic distress are 2.75 times more likely to exhibit suicide behaviour [33].

This study found that symptoms associated with a sad mood/dysphoria, such as feeling unhappy (with an adjusted odds ratio of 1.65, $p = 0.046$), feeling worthless (with an adjusted odds ratio of 2.43, $p = 0.001$) and crying more than usual (with an adjusted odds ratio of 2.0, $p = 0.012$), significantly increased the risk of suicidal ideation. The risk for suicidal ideation for the three identified dysphoria symptoms ranged from 1.68 to 2.43 times. These traits frequently encompass a feeling of being unimportant and are closely associated with a sense of despair, self-con-

demnation and impulsive decision-making. In an African rural environment, dysphoria, particularly among school-going adolescent girls, is observed to intensify as their body undergoes significant physiological changes with pregnancy. This transformation, which occurs after months of concealing their pregnancy, leads to concerns about parental and familial disapproval, as well as social stigma from their peers. Hiding from their parents and friends or concealing their pregnancy kickstarts a vicious cycle of social exclusion that has serious consequences for their physical and mental health as well as their social and economic well-being. Contrary to findings reported in this present study, systematic literature review and cross-sectional studies by Kleiman et al, found self-worth to be protective factors for SI in adolescence. Similarly, studies have reported emotional-oriented characteristics such as crying and feeling unhappy in the presence of depression to increase the risk of suicidal ideation among adolescent [34-36].

The study showed panic disorders (PD) such as shaking of hands and difficulty breathing significantly increasing the risk of suicidal ideation by 1.68 times (p= 0.017) and 1.53 times (p=0.041) respectively. According to Val et al 2023 [37] , mental health is often overlooked during pregnancy, which lowers the mother's and baby's quality of life and increases the chance of comorbidity medical issues. Pregnancy itself poses a risk for the development or exacerbation of panic disorders [38]. However, with the provision of psychological support, the intensity of panic disorder symptoms decreases from pregnancy to 6 weeks after giving birth [39]. Similar to the study findings are the results reported by Pinheiro et al in 2012 which showed panic disorder to be 6.36 times higher in those with suicidal thoughts among pregnant teenagers [33].

Study results revealed that satisfaction with physical appearance during the third trimester of pregnancy was associated with a 38 percent (p = 0.041) significant risk reduction, thereby offering a protective cover against SI among the adolescent mothers. Similar to findings to this study have been reported in a literature review by Sabo et al, and cross-sectional studies by Kleiman et al that found appearance to be protective factors for SI in adolescence. Other authors have postulated comparable results concerning the impact of perceived self-competencies, such as physical appearance, on the reduction of SI during adolescence [35, 40] Decision making was another identified protective factor resulting in 41% risk reduction. The capacity to make decisions is typically influenced by changes in psychological and physiological states during pregnancy, resulting in cognitive and affective changes in women. By participating in peer-support group sessions, the pregnant adolescent girl felt more empowered to make decisions about her current circumstances, which led to a 59% decrease in the likelihood of experiencing suicidal ideation. However, contrary to our findings, Yari et al. (2015) provide insight into the impact of decision-making deficiencies, suggesting that the inability to accurately resolve problems related to mental pain may increase the risk of suicidal behavior [41]. In the context of this paper, protective factors are defined as factors that reduce the disadvantageous outcome effects of suicidal ideation [42]. Therefore, our findings indicate that an adolescent pregnant woman's positive perception of her physical appearance and her capacity to employ personal decision-making skills during the third stage of pregnancy contribute to her self-assurance, thereby fostering a positive emotional attitude towards the imitation of suicidal thoughts.

However, perceived social support from family, friends, and spouses, along with psychosocial support, could mediate the observed effects and help create a confidence-building atmosphere for adolescent females. For example, regular social support from family, friends, and classmates reduces stress levels by up to 11%, thus promoting the adolescent girl's mental health and well-being.

Study Limitation

The study design has limitations that prevent establishing causal link between risk/protective factors and suicidal ideation, hence a need to employ the research methodology that can help establish causality. The study design does not provide clear evidence of controlling for potential confounders, such as removal of participants with mental health and acute illness, participants using antidepressant medication, which may have influenced the results.

Conclusions

The current study has furnished data to enhance our comprehension of the risk and protective elements associated with suicidal thoughts among teenage girls in the third trimester of pregnancy. A significant prevalence of suicidal ideation among adolescent females in the third trimester of pregnancy was observed. Somatic distress, dysphoria characteristics such as "Feeling worthless", crying more than usual" and "feeling unhappy" and panic disorders such as while “shaking hands” and breathing difficulties were identified as factors that increase the risk of suicidal ideation while physical appearance and decision making were identified as factors that protect (reduce) against suicidal ideation.

It is recommended to assess adolescent girls and young women in their third trimester for suicidal ideation during their antenatal care visits. Protective factors play a crucial role in preventing suicide and can be included in risk assessment protocols and counselling sessions during antenatal clinic visits. These measures can be implemented in both healthcare institutions and community settings for the benefit of individuals and families. This has the potential to enhance coping mechanisms and enhance overall well-being throughout pregnancy. Placing more importance on protective characteristics can help physicians in the long-term prevention of suicidal behaviour and the management of hazards. It is important to investigate the possible connections between protective factors at the individual, societal, and environmental levels. Environmental levels in this paper refer to geographical locations with green space. Localities that have a substantial or moderate amount of green space have a lower suicide risk than those with a lower amount of green space. Therefore, the promotion of mental health is more prevalent in natural outdoor environments such as green spaces (e.g., grass, forests, or parks), blue spaces (e.g., visible bodies of fresh or saline water), and coastal proximity [43]. Community-based health institutions should strive to build and incorporate mental health programming specifically designed for pregnant adolescent girls and young women (AGYW) within their existing maternal and child health (MCH) services. Identifying protective and risk factors in early interventions, such as the ANC (Ante-

natal Care), provides crucial and potentially life-saving information to pregnant adolescents regarding suicide. With further research and the eventual development of targeted interventions for suicide, there is reason to hope that a reduction in suicide rates may occur in the future.

Declarations

Ethics Approval and Consent to Participate: Ethical approval was obtained by the researchers from the ethics committee affiliated with the School of Public Health, Makerere University. Written informed consent from the adolescent girls was obtained. The requirement for parental consent was not applicable to individuals below the age of 16. As per the Ugandan National Council of Science and Technology (UNCST), mothers who are younger than 16 years old are classified as "emancipated minors" and are presumed to have the capacity to provide informed consent for their participation in research autonomously. In our methodology, the research team and foundation adhered to the Ugandan national regulations.

Consent for Publication

Not Applicable

Availability of Data and Materials

The data and any other study materials that support the findings of this study are available from the corresponding author i.e., Michael Webba Lwetabe, upon reasonable request.

Competing Interests

The authors declare no conflict of interests.

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Authors' Contributions: Michael Webba Lwetabe designed the study, drafted the first manuscript, performed the statistical analyses and lead the discussion. Vivian Naava, Orivious Tumusiime, Rose Nabayinda, Sandra Najjuko, Richard Kimaka, Assumpta Mubiru, William Mulindwa, and Ronald Ssegoma are clinical and data person who played a critical role in the collection, cleaning and curation of the study dataset. Dr. Marc Sklar, Dr. Daniel Murokora and Dr.Eleanor Nakintu participated in the design of the study and provided guidance on the discussion. Each version of the draft was circulated to all authors for comments and endorsement of consensus, and all authors contributed to drafting, interpreting, and critically revising the paper. All authors have read and approved the manuscript to be published and agreed to be accountable for all aspects of the work.

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