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Suicidal ideation among school-attending adolescents in Dar es Salaam, Tanzania

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Abstract
Background: Suicidal ideation is an understudied risk factor for suicidal intent. The present study investigates the patterns and risk factors for suicidal ideation among a sample of school-attending adolescents in Dar es Salaam, Tanzania.
Methods: This study examined secondary data collected in 2006 through the Global School-Based Student Health Survey. The data were collected via two-stage cluster sampling representative of all secondary schools in Dar es Salaam. We compared adolescents who reported suicidal ideation (SI) and those who reported a plan to carry out a suicide attempt (SP), with those reporting neither ideation nor an attempt (controls) within the 12 months preceding the survey. Our analyses targeted demographic, behavioral, social, mental health and family factors.
Results: A total of 2,176 students aged 11-16 years participated. Within the recall period, 7% (n=149) of participants had thought about suicide with 6.3% (n=136) having created a plan to carry out an attempt. Fifty percent of those reporting SP were female. We found that significant associations existed across all categories of psychological health, substance use and among those who reported being bullied. In the multivariate analysis adolescents reporting suicidal intent were more than twice as likely to report having been lonely (RRR=2.33; CI=1.36-4.01); more likely to suffer from depressive symptoms (RRR=2.26; CI=1.56-3.27) and have previously used an illicit substance (RRR=1.97; CI=1.12-3.48). We found an inverse association with age and suicidal planning (RRR=0.74; CI=0.62-0.90) as well as poverty and SP (RRR=0.53; CI=0.29-0.98) and an increased likelihood for adolescents reporting SP to be lonely (RRR=2.76; CI=1.55-4.90) and depressed (RRR=3.98; CI=2.71-5.86). Tobacco use (RRR=2.15; CI=1.22-3.78) and illicit substance use (RRR=1.99; CI=1.10-3.60) were associated with SP as was having parents who were knowledgeable of what adolescents did during their free time (RRR=2.15; CI=1.07-4.31). Respondents who reported having no friends were also more likely to report SP (RRR=3.68; CI=2.22-6.08).
Conclusion: Our results suggest that, as in high-income settings, psychological factors, risky health behaviors such as substance use, and social and familial support impact suicidal ideation. This knowledge should be used to help inform further research as well as prevention and intervention strategies.

Keywords: adolescents, suicidal ideation, self-harm, substance use, school health, Tanzania

Introduction

It is estimated that one million people die annually as a result of suicide, and rates among young people are rising (WHO, 2013). Among adolescents aged 15-19 years suicide ranks as the fourth leading cause of mortality (Wasserman *et al*., 2005) and is the second leading cause of death among youth aged 10-24 years worldwide (http://www.who.int/mental_health/prevention/suicide/suicideprevent/en/) and represents a growing global public health issue among youth and adolescents. Several studies have also indicated that suicidal ideation among youth may be increasing (Spirito & Esposito-Smythers, 2006; Cash & Bridge, 2009). A recent nationally representative survey of school aged adolescents (approximately 14-18 years) in the United States showed that in the 12 months prior to the survey, 15% had reported suicidal ideation while 7% reported having made a suicide attempt (Eaton *et al*., 2008). Adolescents who survive attempts to take their own lives often physically injure themselves seriously enough to require medical attention. In some cases these injuries may leave

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behind disfiguring trauma, short or long term disability (Krug *et al*., 2002) as well as lasting psychosocial sequelae which can impact the families and extended social networks of the adolescent (Peden *et al*., 2008).

Despite the grave potential consequences of suicidal ideation and suicide attempts, youth suicide prevention remains a neglected public health priority globally. Correlates and determinants of suicidal behavior have been extensively investigated in high income country settings, However, there is only a paucity of comparable research reflecting the prevalence, incidence and determinants of suicidal behavior in low and middle income country settings, particularly in sub Saharan Africa (SSA) (Muula *et al.*, 2007; Rudatsikira *et al.*, 2007b). In SSA, several barriers exist which limit the reproducibility of studies carried out in HICs. In the few countries where health registry data are available, information on suicide is often unusable due to misclassification or underreporting due to prevailing cultural norms which complicate accurate reporting (Adinkrah, 2011; WHO, 2002). For example, attempting suicide is a punishable offense in Ghana (Adinkrah, 2011), and hospitals may refrain from registering cases (WHO, 2002), making hospital-based surveillance poorly suited to inform the evidence base.

In the United Republic of Tanzania, little is known about suicidal ideation among adolescents, and there are no prior studies which have examined relevant social and behavioral correlates among Tanzanian youth which might inform the state of their mental health. The aim of this study was to report on the prevalence of suicidal behaviors among secondary school students in Dar es Salaam, Tanzania and examine factors associated with self-reported suicidal ideation.

Suicidal ideation among adolescents is associated with several psychosocial indicators for well-being including: depression (Cash & Bridge, 2009), loneliness (Rudatsikira et al., 2007a), anxiety (Cash & Bridge, 2009), substance use (Cash & Bridge, 2009; Muula et al., 2007), poverty (Burrows & Laflamme, 2008; Christiansen et al., 2011), bullying (Owusu et al., 2011), poor relationship quality with parents (Bridge et al., 2006), and low social support (King & Merchant, 2008). However, these results mainly represent data collected in high-income country (HIC) settings which are not matched by comparable studies reflecting the situation in low- and middle-income country settings (LMICs).

Materials and Methods

Sample

This study examines secondary data collected in 2006 from Dar es Salaam via the Global School-Based Student Health Survey (GSHS), which was administered in a collaborative effort by the World Health Organization and the US Centers for Disease Control and Prevention. The GSHS is a self-administered questionnaire that collects information on risk and protective factors among adolescents of school age, mainly in LMICs (WHO, 2011). Students were free to accept or decline participation. More information about the survey is available athttp://www.who.int/chp/gshs/en/.

The data were collected via two-stage cluster sampling representative of all secondary schools in Dar es Salaam. First, schools were selected with a probability being proportional to enrollment size. Second, classes were randomly selected with all students in selected classes being eligible to participate. The school response rate was 100% and the overall student response was 87%. A total of 2,176 students aged 11-16 years participated. We excluded 22 adolescents for whom we did not have complete data, resulting in a sample of 2,154 (52% females).

We compared adolescents who reported suicidal ideation (SI) and those who reported a plan to carry out a suicide attempt (SP), with those reporting neither ideation nor an attempt (controls) within the 12 months preceding the survey. Our analyses targeted demographic, behavioral, social, mental health and family factors.

We obtained our dependent variables from the responses to two questions: *"During the past 12 months, did you ever seriously consider attempting suicide?"* and *"During the past 12 months,*

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did you make a plan about how you would attempt suicide?" The response options were *"yes/no".* Those who responded *"yes"* to SI and *"no"* to SP were considered part of the ideation only group. Those who responded *"yes"* to SP regardless of whether they had prior SI were considered part of the SP group.

We then created several independent variables using the following survey questions:
To examine associations with economic deprivation, anxiety and loneliness we used: *"During the past 30 days, how often did you go hungry because there was not enough food in your home?", "During the past 12 months, how often have you been so worried about something that you could not sleep at night?"* and *"During the past 12 months, how often have you felt lonely?"*. The response options to each of these questions were *"never", "rarely", "sometimes", "most of the time", or "always"* and we dichotomized these into *"yes"* corresponding to *"most of the time/always"* and *"no"* corresponding to *"never/rarely/sometimes".*

To assess associations with depression we used *"During the past 12 months, did you ever feel so sad or hopeless almost every day for two weeks or more in a row that you stopped doing your usual activities"*? The responses were *"yes/no".* For social support we used *"How many close friends do you have?"* Response options were *"0", "1", "2", and "3 or more friends"*, with *"0"* friends being used as the reference category.

We assessed associations with truancy by using *"During the past 30 days, on how many days did you miss classes or school without permission?".* Response items were *"0", "1-2", "3-5", "6-9" and "10 or more days"*. Students were considered truant if they missed more than 3 days of school within the reference period.

Experiences of being bullied were assessed using *" During the past 30 days, on how many days were you bullied?"* Response items were *"0", 1-2", "3-5", 6-9", 10-19", "20-29"* and *"all 30 days".* One category for any bullying in the last 30 days was created using one or more days.
We assessed parental involvement in school, parent-child relationship quality and whether parents were knowledgeable about their child's leisure time activities using: *"During the past 30 days how often did your parents or guardians check to see if your homework was done?", "During the past 30 days, how often did your parents or guardians understand your problems and worries?"* and *"During the past 30 days, how often did your parents or guardians really know what you were doing with your free time?"*. The response options to each of these were *"never", "rarely", "sometimes", "most of the time", and "always"* and we dichotomized the responses by merging *"most of the time/always"*, which we designated as a *"yes" response,* for comparison with *"never/rarely/sometimes"*, or a *"no" response*.

Associations with tobacco use were assessed using: *"During the last 30 days, on how many days did you smoke cigarettes?"*. The responses options were: *"0", "1-2", "3-5", "6-9", "10-19", and "all 30 days"*. One category for lifetime cigarette use was created using one or more days.

Associations with illicit substance use were assessed using: *"During your life, how many times have you used drugs such as bang or cocaine?".* The response items were *"0", "1-2", "3-9"* and *"10 or more times"*. One category for any lifetime substance use was created using one or more days.

Finally, we examined associations with lifetime alcohol misuse by using: "During your life, how *many times have you ever had a hang-over, felt sick, got into trouble with your family or friends, missed school, or got into fights, as a result of drinking alcohol?"*. Responses were *"0", "1-2", "3-9"* and *"10 or more times"*. One category for lifetime alcohol misuse was created using one or more days.

Data analysis

In the bivariate analyses, groups were compared using χ^2 for categorical variables and ANOVA for continuous variables. The results of the χ^2 analyses were reported as proportions, with means and standard deviations (SD) given for continuous variables along with their significance.

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We then used a multinomial logistic regression to examine associations with SI and SP while adjusting for covariates. The results for the regression analyses were reported using Relative Risk Ratios (RRR) with 95% confidence intervals (CI). Statistical significance for all analyses was established at p<.05. All data were analyzed using Stata 12 (StataCorp, 2011).

Results

Within the recall period, 7% (n=149) of participants had thought about suicide with 6.3% (n=136) having created a plan to carry out an attempt. Fifty percent of those reporting SP were female. The mean age of the sample was 13 years (CI=12.95-13.07). Twenty-three percent of respondents reported depression, with 7% reporting loneliness and 14.3% percent reporting anxiety. Fifteen percent of respondents reported alcohol misuse, 7% had used illicit substances and 8% reported prior use of tobacco. Twelve percent reported economic deprivation in the 30 days prior to the survey.

Table 1: Bivariate analyses for suicidal ideation (SI) and suicidal planning (SP) among a sample of Tanzanian adolescents (2006).

Variable	SI (n=149)	SP (n=136)	Controls (n=1,869)	P-value
Mean age (SD)	12.97 (1.35)	12.85 (1.36)	13.02 (1.35)	0.988
Gender (% female)	46.98	50.00	51.85	0.491
Truancy (%>3days)	12.08	17.65	9.04	0.003
Bullied (%)	46.31	44.12	29.70	<0.001
Psychological health (%)				
Loneliness	15.44	16.91	5.14	<0.001
Anxiety	22.15	22.79	13.06	<0.001
Depression	40.94	51.47	19.48	<0.001
Substance use (%)				
Tobacco	16.78	19.12	6.05	<0.001
Other illicit substance	14.09	15.44	5.46	<0.001
Alcohol	24.16	22.79	13.32	<0.001
Social/Family Support (%)				
0 friends	4.03	22.39	7.98	<0.001
1 friend	16.78	14.93	12.73	-
2 friends	18.79	11.94	20.66	-
>3 friends	60.40	50.75	58.63	-
Parents help with homework	49.66	44.12	57.89	0.002
Parents knowledgeable about free time	12.08	13.97	13.43	0.877
Understanding parents	26.17	27.21	38.20	0.001
Poverty (%)	15.44	11.76	11.29	0.314

In the bivariate analyses (Table 1), we found that significant associations existed across all categories of psychological health, substance use and among those who reported being bullied. Social and family support also demonstrated an association with suicidal behaviors, particularly concerning relationships with friends and having parents who were involved with educational tasks and understanding of their child's concerns. While poverty was not significantly associated with suicidal behaviors, a significant association did exist with truancy.

Table 2: Multivariate analysis for suicidal ideation (SI) and suicidal planning (SP) among a sample of Tanzanian adolescents (2006)

Variable	SI	p-value	SP	p-value

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	RRR (CI)		RRR (CI)	
Age	0.94 (0.82-1.07)	0.323	0.96 (0.75-0.99)	0.036
Gender (female)	0.92 (0.65-1.32)	0.668	0.95 (0.65-1.41)	0.593
Truancy (>3 days)	0.90 (0.51-1.57)	0.709	1.39 (0.81-2.34)	0.231
Bullied	1.34 (0.91-1.96)	0.135	1.11 (0.74-1.67)	0.622
Psychological health				
Loneliness	2.33 (1.36-4.01)	0.002	2.76 (1.55-4.90)	0.001
Anxiety	1.06 (0.67-1.68)	0.805	0.99 (0.61-1.62)	0.975
Depression	2.26 (1.56-3.27)	<0.001	3.98 (2.71-5.86)	<0.001
Substance use				
Tobacco	1.76 (1.03-3.02)	0.080	2.15 (1.22-3.78)	0.008
Other illicit substance	1.97 (1.12-3.48)	0.019	1.99 (1.10-3.60)	0.023
Alcohol	1.32 (0.84-2.06)	0.224	1.02 (0.67-1.80)	0.698
Social/Family Support				
0 friends	0.49 (0.21-1.16)	0.105	3.68 (2.22-6.08)	<0.001
1 friend	1.12 (0.69-1.83)	0.640	1.10 (0.64-1.91)	0.732
2 friends	0.92 (0.59-1.45)	0.730	0.71 (0.40-1.23)	0.247
>3 friends	Reference	-	-	-
Parents help with homework	0.90 (0.63-1.29)	0.561	0.71 (0.48-1.05)	0.087
Parents knowledgeable about free time	1.64 (0.84-3.18)	0.144	2.15 (1.07-4.31)	0.030
Understanding parents	0.52 (0.31-0.86)	0.010	0.58 (0.33-1.01)	0.054
Poverty	0.98 (0.59-1.63)	0.932	0.53 (0.29-0.98)	0.043

In the multivariate analysis (Table 2) adolescents reporting SI were more than twice as likely to report having been lonely (RRR=2.33; CI=1.36-4.01). They were also more likely to suffer from depressive symptoms (RRR=2.26; CI=1.56-3.27) and have previously used an illicit substance (RRR=1.97; CI=1.12-3.48). We found no significant associations with anxiety or bullying. Having family support in the form of parents who were understanding was protective against SI (RRR=0.52; CI=0.31-0.86).

We found an inverse association with age and SP (RRR=0.74; CI=0.62-0.90) as well as poverty and SP (RRR=0.53; CI=0.29-0.98) and an increased likelihood for adolescents reporting SP to be lonely (RRR=2.76; CI=1.55-4.90) and depressed (RRR=3.98; CI=2.71-5.86). Tobacco use (RRR=2.15; CI=1.22-3.78) and illicit substance use (RRR=1.99; CI=1.10-3.60) were associated with SP as was having parents who were knowledgeable of what adolescents did during their free time (RRR=2.15; CI=1.07-4.31). Respondents who reported having no friends were also more likely to report SP (RRR=3.68; CI=2.22-6.08).

Discussion

The rate of SI found among this sample of Tanzanian youth (7%) was significantly lower than rates found among adolescents in HICs (15%) (Eaton *et al.*, 2008), as well as adolescents in other SSA countries (20-36%) (Muula *et al.*, 2007; Omigbodun *et al.*, 2008; Page & West, 2011; Rudatsikira *et al.*, 2007a). This may be due in part to Tanzania's relative social and political stability compared with other countries in the region. Instability and conflict have been shown to negatively impact quality of life and psychological well-being (Araya *et al.*, 2007; Scholte *et al.*, 2004). In addition, the Tanzanian GSHS only sampled adolescents living within DES, thus results may not be representative of adolescents living in other areas of the country. It may be that differences exist between Tanzanian adolescents living in urban vs. rural environments which could impact SI, including economic and educational factors, social isolation, and other social and cultural forces, and some previous research has suggested that rates of suicide tend to be higher in rural areas (Dudley *et al.*, 1998; Ji *et al.*, 2001) (WHO, 2002). In addition, the lower rates of SI found may also

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reflect stronger cultural taboos against suicide in DES or in Tanzania generally and could be reflective of a reporting bias.

We found no significant gender association with risk of SI or SP, however, these findings are in contrast to several other studies within the region (Page & West, 2011; Rudatsikira *et al.*, 2007a) and globally (CDC, 2009; Liu *et al*., 2005; Rudatsikira *et al*., 2007b) which have largely shown females having an increased risk of SI or reporting suicide attempts. Our finding may reflect a general underreporting bias of suicidal ideation and/or planning which does not allow for gender differences in ideation to be found. However, a Nigerian study (Omigbodun *et al.*, 2008) using the Diagnostic Interview Schedule for Children (Lucas *et al*., 2001) also found no gender-specific mediation of SI or attempts, although this may be explained by higher levels of social and political instability in the country, which may have been high enough as to confound gender differences.

In multivariate analysis, loneliness, depression, and lifetime illicit substance use remained significantly associated with both SI and SP. These findings are in accordance with studies of suicidal behaviors in high and low-income countries which have shown loneliness (Page & West, 2011; Rudatsikira *et al.*, 2007a), depression (Spirito & Esposito-Smythers, 2006; Muula *et al.*, 2007; Cash & Bridge, 2009; Page & West, 2011), and illicit substance use (Muula et al., 2007; Page & West, 2011; Spirito & Esposito-Smythers, 2006) to be associated with increased suicide risk. Interestingly, anxiety was not found to be associated with SI or SP in multivariate analysis as expected. It may be that anxiety was not operationalized sufficiently to capture the somatic experience of anxiety, or that anxiety alone was not sufficient to warrant an association with SI. Similarly, no association was found between being bullied and SI, as has been the case in other studies (Rudatsikira et al., 2007a; Omigbodun *et al.*, 2008; Owusu *et al.*, 2011). It may be that in our study there was a lower prevalence of bullying overall or that differences exist in rates of bullying by geography (e.g., urban vs. rural), as some other studies have suggested (Dulmus *et al.*, 2004; Zaborskis *et al*., 2005).

Congruent with findings in the literature, adolescents who reported having no friends were significantly more likely to have planned a suicide attempt (Hesketh *et al.*, 2002; Granero *et al*., 2008; Arria *et al.*, 2011). This reinforces the importance of social and peer support in the role of maintaining mental well-being.

Multivariate analyses also showed that younger adolescents had a greater risk of SP, but not SI. This is in accordance with Muula *et al*. (2007) who found that younger adolescents were more likely to have engaged in SI overall, but in contrast to findings from other studies within the region (Rudatsikira et al., 2007a; Burrows & Laflamme, 2008) and globally (Liu *et al*., 2005; Cash & Bridge, 2009) which have found a greater likelihood of SI and attempt among adolescents with increasing age. These results bring up many intriguing questions. First, although our results are similar to those of Muula *et al*. (2007), that study did not differentiate between SI and SP as we did in ours. Nonetheless, our results may suggest that although SI is low in this population, when it does occur it may be more severe among younger adolescents, perhaps due to a lack of fully developed coping or problem solving skills or emotional maturity and development (Spirito & Esposito-Smythers, 2006; Muula *et al.*, 2007). However, these results could also be impacted by an underreporting bias among older adolescents, who may be more likely to be influenced by prevailing cultural taboos and mores against suicide.

The multivariate analysis also showed some mixed associations between parental relationship quality and SI and SP. Having understanding parents was shown to have a protective effect on SI. This is in accordance with other studies which have shown poor parental relationships and family discord to be associated with suicidality among adolescents (Spirito & Esposito-Smythers, 2006; Cash & Bridge, 2009). An interesting finding in our study, however, was that having parents who were knowledgeable about what children did in their free time was associated with SP. This association may be the result of ambiguity in how the question was interpreted by respondents, who may have understood this item to mean that their parents were

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overprotective via their knowledge of what they were doing all of the time. As such, it could also be that adolescents who felt their parents were controlling or overbearing may not have open, trusting relationships with their parents, which may be indirectly associated with a greater risk of SP. It is unclear however why this result was not found for SI, and further research is recommended to validate these findings.

This study provides valuable and much needed insight to the relatively small amount of literature regarding adolescent suicidal behaviors in LMICs, and is the only study to examine suicidal behaviors among adolescents in Tanzania. However, our results are tempered by some limitations. First, our study sample is representative only of school-age adolescents attending school in the DES region. Further research efforts should include a more representative sample of adolescents in order to validate the current study findings and to better elucidate factors associated with suicidality among all adolescents. Secondly, although the GSHS was designed to be administered cross-culturally, there may have been some ambiguity in how select questions were interpreted by respondents. For example, psychological ailments such as depression, anxiety, and loneliness may manifest themselves differently cross culturally (Segal & Mayadas, 2005), and as such these symptoms may not be accounted for when using Western measurement scales. Further research with culturally competent, standardized, multiple item measurements for depression, anxiety, loneliness, as well as parent-child relationship quality are recommended. In addition, cultural taboos against suicide may also have impacted our findings in the form of an underreporting bias, and the 12-month recall period for SI and SP may have also resulted in participant recall bias. Finally, the cross-sectional design of this study does not allow for the determination of causal relationships between SI and associated factors.

Mental health promotion and suicide prevention efforts continue to be overlooked in LMICs, particularly in SSA, in favor of focusing resources on infectious disease management (WHO, 2005; Muula *et al*., 2007), which suggests that the need for mental health interventions is even more critical in such regions. In addition, epidemiological knowledge of suicidality is necessary to inform policy and to create a better understanding of culturally specific determinants of suicide.

Despite limited resources, other studies have shown that affordable and effective mental health interventions can be executed in LMIC settings (Meehan & Broom, 2007; Fleischmann *et al.*, 2008). In addition, a recent study of mental health researchers and local stakeholders in LMICs revealed that depression, anxiety, substance use, and suicide were among the top five research priorities of these individuals, with children and adolescents ranking as the number one priority population to target for mental health research (Sharan *et al.*, 2009). This suggests a great opportunity for researchers and stakeholders to work together to test and implement appropriate adolescent mental health interventions targeting both individual and contextual factors that contribute to poor mental health, SI, and suicide attempts.

This study provides an important first look at SI and SP among adolescents in Tanzania and makes a significant contribution to the paucity of knowledge which currently exists on this subject. Our results suggest that, as in HICs, psychological factors, risky health behaviors such as substance use, and social and familial support impact SI. This knowledge should be used to help inform further research as well as prevention and intervention strategies.

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