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# Psychosocial Determinants of Marijuana Utilization among Selected Junior High School Students in the Central Region of Ghana

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## Abstract

Marijuana utilization among school aged adolescents is major public and mental health concern in Ghana and other developing countries, with the rate of usage soaring high among school going adolescents. The objective of this study was to investigate the prevalence of marijuana utilization among selected Junior High School (JHS) students in the Central Region of Ghana and explore the relative impact of psychosocial factors accounting for its usage. Using a descriptive cross-sectional survey design with the Global School Based Survey [GSHS] questionnaire, a sample of 1400 school going adolescents students were drawn using multistage sampling procedure. Frequencies, percentages and binary logistic regression results indicated marijuana utilization prevalence of 9% ($n$ = 122). Statistically, gender (OR = 0.52, 95% CI= 0.35 - .765, $p$ = 0.001), religious affiliation (OR = 1.76, 95% CI = 1.0 - 2.95, $p$ = 0.034), socioeconomic background (OR = 0.52, 95% CI = 0.33 - 1.23, $p$ = 0.004) and geographical location (OR = 0.53, 95% CI = 0.31 - .886, $p$ = 0.016) significantly predicted marijuana utilization among school aged adolescents. No statistically significant variations were found in the odds of students' marijuana usage for age (OR = 1.15, 95% CI = 0.69 - 1.88, $p$ = 0.590), parental communication (OR = 0.83, 95% CI = 0.56 - 1.23, $p$ = 0.348) and academic performance (OR = 1.09, 95% CI = 0.66 -1.80, $p$ = 0.744). Findings suggest that school based research should reflect and perhaps replicate existing prevalence, patterns of marijuana and other drug use through multiple school surveys nationwide. This pathway may provide useful information towards the design, evaluation and implementation of

## Introduction

Adolescents' drug use has become a topical issue due to its onset of behaviors and conditions that not only affect health but also lead to later life disorders associated with individuals' functioning. This unhealthy behaviour is closely associated with increased morbidity and mortality that pose major public and mental health challenges. Other negative implications may include but not limited to unemployment, theft, vandalism, accidents, suicide, mental illness, and decreased life expectancy [1,2,3].

Globally, the burden of disease attributable to substance use seemed to have significantly increased among adolescents and young adults [4]. Degenhardt and associates reiterated that "Substance use in young people aged 10–24 years might disrupt key periods of transition that occur as the adolescent brain undergoes cognitive and emotional development, and key psychosocial transitions that are made" (p. 251). The onset of drug use primarily begins during the adolescence period, with the utilization of lawful drugs such as alcohol and tobacco usually preceding the usage of illicit drugs [4].

The major challenges and inherent pressures facing adolescents within the age brackets highlighted above include but not limited to growing academic expectations, changing social relationships with peers and family as well as physical and emotional changes associated with maturation. These age brackets mark a period of increased autonomy in which independent decision-making influence adolescents' health related behaviors and subsequent health status. Behaviors established during this transition period can continue into adulthood, affecting issues such as mental health, the development of health compromising behaviors such as alcohol, tobacco, marijuana and other substance use. The past 3 decades have witnessed several dramatic shifts in the rates of substance use among young people [5]. One substance that has been cited in research literature as the most frequently patronized illicit drug in both developing and developed nations is marijuana [6], with its very addictive properties of nicotine highlighting marijuana as a major global health hazard [7].

Marijuana, popularly known in Ghana as "Wee", is one of the most commonly cultivated and used illicit drugs among adolescents in the country despite it being considered as an illicit drug. Although research literature on marijuana utilization in Ghana is sparse, different reports have shown variations in the prevalence of its usage in the country. For instance, the latest UN World Drug Report [8] indicates that almost 22% of Ghanaian adolescents and young adults use marijuana. This claim is inferred from the number of recorded drug related patients in psychiatric hospitals in the country. A report from the former Chief Psychiatrist of Ghana's Ministry of Health asserts that in 2007, out of 594 drug-related cases admitted to the National Psychiatric Hospital, 400 were marijuana related [9]. Similarly, it was reported that the same hospital recorded 4,000 marijuana related outpatient cases in 2013 [10]. Jafaru [10] reiterated that the National Psychiatric hospital receives 400 outpatient cases daily, with 30% of the cases being marijuana related, out of which 10% are usually admitted to the hospital each year Reuben [11].

Recent statistics from the Ghana Narcotic Control Board also reveal that out of a total number of 50,000 drug users, 35000 of these users are adolescents in the Junior and Senior High schools in Ghana [12]. According to Degenhardt et al. [4], there seems to be a paucity and distinct gap concerning epidemiological data on the extent of adolescents' drug usage in Africa. Only few studies have reported the extent of substance use among diverse adolescent populations (e.g., Ghana [13,14,15]; South Africa [16,17,18]; Zambia[19]; Zimbabwe [20]. A recent transnational study investigating the prevalence of marijuana and amphetamine use, and associated risk factors among adolescents in 9 African countries found overall past month marijuana use among school going adolescents to be 4.1% [21]. The highest prevalence of past-month marijuana usage found in Peltzer and Pengpid's study was Ghana (8.1%), a finding that shows an increase compared to earlier local surveys in Ghana that found lower prevalence rates of 2.6% to 7.2% lifetime marijuana use [13,14]. Peltzer and Pengpid [21] interestingly noted in their study that the prevalence of past-month marijuana usage in Ghana was significantly

higher among girls than boys. Other studies have highlighted different results due to the varied methodological designs and populations used. For example, the Global School Based Health Survey (GSHS) [15] reported cannabis usage of 27.9% in 2007, with a similar study in 2008 reporting an increase in the prevalence of 40.2% where more males were significantly likely to use marijuana than females in the senior high schools in Ghana. A much lower prevalence of 8.2% was recorded among junior high school students by the same group in 2012.

Research literature has examined a number of risk factors that have the potential of increasing the likelihood or boost drug use across diverse population domains [22]. Different factors as varied as gender, age, ethnicity, peer, parental communication and family have all been found to predict substance use [22,23,24]. For example, conventionally, marijuana use has been found to be higher among males than females because males have greater opportunity to use marijuana although males and females with same access to marijuana may initiate usage at comparable rates [25]. However, longitudinal data suggest that the difference in rates between the sexes is decreasing [26], with the United Nations Office on Drugs and Crime (UNODC, [27]) affirming that the prevalence of substance use among girls is becoming closer to that of boys globally.

Research data on whether differences in the prevalence of marijuana use are associated with race, socioeconomic status, and residence in urban, suburban, or rural areas are inconsistent [28,29,30,31,32,33,34]. For instance, adolescents with strong family associations, positive involvement, high parental academic expectations, and a high level of parental communication and supervision have lower rates of marijuana use [35,36,37]. Comparatively, those with dysfunctional families [38,39] or in which parents use drugs and make them accessible at their homes have higher rates [40]. Additionally, religious belief, mainly in a fundamentalist religion (e.g., Christianity, Islamic) is related with lower rates [40], whereas religious affiliations that have values that deviate from cultural norms are linked with higher rates [23,42]. Further, several studies have also shown that adolescents who are linked with marijuana smokers' peer groups or family members report higher rates of usage [23,37,43]. Many measures such as poor performance in school, disliking school, and truancy are also associated with adolescents' marijuana usage [43,44,45]. A recent study calculated that marijuana users are two to three times more likely to drop out of school than are nonusers [46]. However, a study of Swedish adolescents found marijuana use more strongly associated with level of career aspirations than with level of interest or performance in school [31].

While some studies have been conducted on the prevalence of marijuana usage and related risk factors in other societies, little is known about marijuana prevalence, the relationship between patterns of marijuana use, and the risk factors in Ghana. To date very sparse published research studies have explicitly investigated marijuana use and associations between different psychosocial factors promoting its usage among Ghanaian school going adolescents. More research is therefore warranted to increase research understanding on factors associated with substance use of a sample from an African origin since previous research has predominantly focused on white populations [47]. The research pursuit for the identification of key determinants of the onset of early marijuana usage among school going adolescents may uncover a wealth of information that may help reduce the potential risk factors that research has described to have negative effects on mental health, especially in young adolescents whose cerebral functioning and enduring personality have not yet fully developed [48,49]. This triggers a cycle where individuals cease to become functional as effective members of society but instead are subdued by their drug dependence [50].

One possible way of explaining individuals' possibility of marijuana utilization is to highlight what psychosocial factors such as age, gender, religion, socioeconomic status, academic performance, parental communication and geographical location might be responsible as associated factors for its usage. Based on previous studies, it was hypothesized in the current study that insofar as school going adolescents are concerned, all selected factors would predict marijuana use.

## Materials and Methods

### Participants' Selection Criteria

Using a cross-sectional survey design, the study employed multistage sampling technique that incorporated a cluster, simple random and a convenience sampling procedures to obtain 1,400 school aged adolescents after using Cohen 'G' power with effect size of .40, confidence level of 95% and confidence interval of .05 to determine a small size effect for logistic regression analysis. Clustering the districts in the Region into three geographical zones (i.e., southern, central and northern), two districts were selected from each of the zones purposively. Proportionate simple random sampling was employed to select 10% of schools from each zone. Convenient sampling method was then used to sample averagely 40 students from each of the 34 schools, with equal representation of boys and girls. The selected students signed an inform consent form after being assured of their anonymity and confidentiality at all stages of the data collection process and that data collected were solely for academic reasons. Study participants were subsequently told that their involvement was purely voluntary and that they could withdraw from the survey process at any time they felt like doing so. The Institutional Review Board of University of Cape Coast, Ghana [UCCIRB/CES/2016/04] approved the ethical clearance of this current study.

### Instrumentation

A modified version GSHS [15] questionnaire was adapted based on the purpose of this study. Thirteen (13) items on the inventory that were related to marijuana utilization and some psychosocial determinants such as age, gender, religion, academic performance, parental communication, socioeconomic status, and geographical location were used for the data collection. Marijuana utilization was measured by ever usage of the drug, age of first usage, who introduces participants as first time users and reasons for first usage. The items on questionnaire were assessed on nominal scale. The instrument, pretested before data collection yielded a reliability coefficient of Kuder-Richardson [KR20] formula of 0.89, indicating homogeneity of the items and as an instrument with acceptable internal consistency. KR-20 was selected because of its suitability for binary variables (i.e. answers that are deemed either right or wrong). Scores on KR-20 ranged from 0 to 1, with 0 indicating no reliability and 1 depicting a perfect reliability. The nearer the score is towards 1, the more reliable the test [51].

### Procedure

The questionnaire was self-administered by the researchers in the selected schools. In order to minimize disruptions in the teaching and learning processes in the schools, pre-arranged sessions were held before contacting the participants in their respective schools for the distribution, answering and collection of data over a period of six weeks. To avoid any contextual influence from participants' teachers and other staff, introductory sessions were held to brief study participants on the purpose of the study. Standard instructions needed for the completion of the instrument in the classrooms in the absence of their teachers were given and that there were no wrong or right answers. Researchers advised participants on honesty and assured them of anonymity and confidentiality of their responses. These precautions were taken in an attempt to minimize social desirability related issues that are commonly associated with self-reporting particularly on sensitive issues such as marijuana usage among students. Study participants completed the self-administered questionnaire and noted their responses directly on the questionnaire sheet for collection.

### Data Analysis

Pre-screening data was done manually to check on completeness of the responses after which statistical screening was done to check for missing values. Normality, multicollinearity and other statistical assumptions were done to examine the accuracy of the data. Descriptive statistics (frequencies and percentages) were utilized to report on the proportion of marijuana utilization prevalence among school aged adolescents in the region. Bivariate logistic regression analysis was then employed to determine the relative association between selected psychosocial factors and marijuana usage among the students in the region. A p value of < 0.05 was considered significant. The strength of association was expressed as the Odds Ratio with a 95% confidence interval. The Statistical Package for

Social Sciences ([SPSS] version 22.0 for Windows) was used to run the analysis.

## Results

### Marijuana Prevalence and Pattern of Usage

Figure 1 shows a lifetime marijuana prevalence of 9.3% (n = 122 ) among school going adolescents in the Central Region of Ghana

Out of the number of students who had ever used cannabis, 48% (n = 57) used it because of group membership, 29% (n = 36) to study and 24% (n = 29) to be assertive or powerful. Additionally, the results further revealed that 58% (n = 71) of the marijuana users' level of education at first usage was at the JHS whereas the rest 42% (n = 51) were in the primary school. On the source of first time marijuana usage, 52% (n = 63) of the respondents received the drug from friends and 48% (n = 59) were sent to buy it.

### Psychosocial Predictors of Marijuana Usage

Binary logistic regression results indicated that the overall logistic regression model significantly predicted marijuana use among school going adolescents in the Central Region (-2LogL =768.116, $\chi^2$ = 43.545, $p$ = 0.001). The Nagelkerke $R^2$ of 0.071 showed that the independent variables explained 7.1% of variance in marijuana usage in the region. From Table 1, statistically significant variations were found in the odds of using marijuana for gender, religion, socioeconomic status and geographical location. Girls

were less likely to use marijuana than boys (OR = 0.58, 95% CI = 0.35-0.77, $p$ = 0.001). Muslims were also found to be 1.8 times more likely to use marijuana than Christians (OR = 1.76, 95% CI = 1.05-2.96, $p$ = 0.034). Further, school going adolescents from high socioeconomic background were less likely to use marijuana than those from low socioeconomic backgrounds (OR = 0.52, 95% CI = 0.33-0.81, $p$ = 0.004). School going adolescents from the central part of the region were less likely to use marijuana than those from the southern and northern parts (OR = 0.53, 95% CI = 0.31-0.88, $p$ = 0.016). However, no statistically significant variations were found in the odds of using marijuana for age (OR = 1.15, 95% CI = 0.69-1.88, $p$ = 0.590), parental communication (OR = 0.83, 95% CI = 0.56-1.23,$p$ = 0.348), and academic performance (OR = 1.09, 95% CI = 0.66-1.80, $p$ = 0.744).

## Discussion

The current study sought to examine marijuana prevalence, the relationship between patterns of marijuana use, and the associated psychosocial risk factors in Ghana. The risk factor approach is useful in understanding vulnerability to substance use across varied population. Conceptually, the current findings support the multiple pathway model of drug use, where different psychosocial factors may lead to substance use. Different psychosocial pathways were associated with adolescents' marijuana utilization among Ghanaian
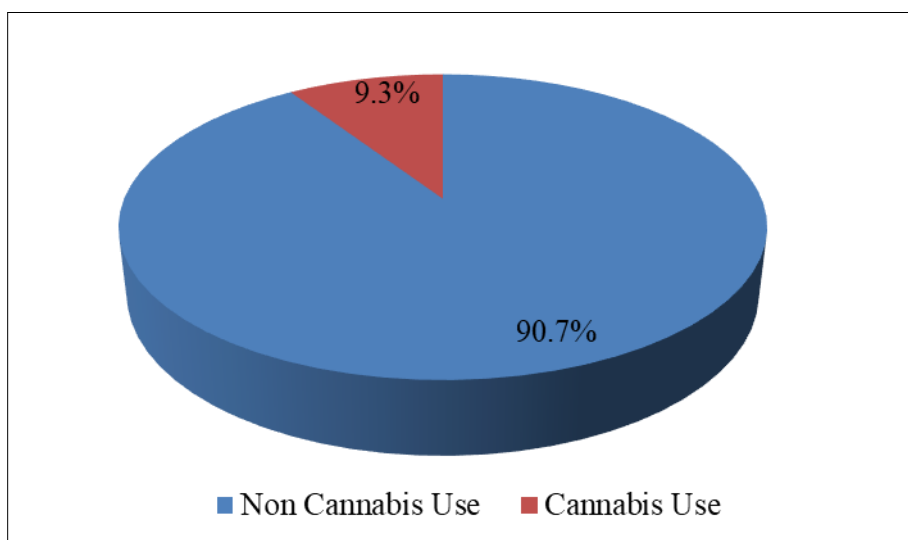


Figure 1: Prevalence of Marijuana Use among School Going Adolescents

| Table 1: Binary Logistic Regression of Psychosocial Predictors of Marijuana Use Among School Going Adolescents | | | | | | | |
|---|---|---|---|---|---|---|---|
| *Predictors* | *N* | *%* | *B* | *Wald* | *OR* | *95%CI* | *Sig.* |
| Age | | | | | | | |
| 12-13 years (ref) | 22 | 8.0 | | | | | |
| 14-15 years | 100 | 82.0 | 0.136 | 0.290 | 1.145 | 0.77-1.87 | 0.590 |
| Gender | | | | | | | |
| Boys (ref) | 76 | 62.3 | | | | | |
| Girls | 46 | 37.7 | -0.658 | 10.93 | 0.518 | 0.35-765 | 0.001* |
| RA | | | | | | | |
| Christians (ref) | 101 | 82.8 | | | | | |
| Muslims | 21 | 7.2 | 0.564 | 4.518 | 1.758 | 1.0-2.95 | 0.034* |
| PC | | | | | | | |
| Difficult (ref) | 48 | 39.3 | | | | | |
| Easy | 74 | 60.7 | -0.190 | 0.881 | 0.827 | 0.56-1.23 | 0.348 |
| SES | | | | | | | |
| Low (ref) | 95 | 77.9 | | | | | |
| High | 27 | 22.1 | -0.664 | 8.080 | 0.515 | 0.33-0.81 | 0.004* |
| AP | | | | | | | |
| Below average (ref) | 26 | 21.3 | | 0.168 | | | 0.919 |
| Average | 62 | 50.8 | 0.084 | 0.107 | 1.088 | 0.66-1.80 | 0.744 |
| Above average | 34 | 27.9 | 0.008 | 0.001 | 1.088 | 0.57-1.79 | 0.979 |
| GL | | | | | | | |
| Southern (ref) | 42 | 34.4 | | 16.124 | | | 0.001* |
| Central | 26 | 21.3 | -0.644 | 5.824 | 0.525 | 0.31-.886 | 0.016* |
| Northern | 54 | 44.3 | 0.377 | 2.755 | 1.458 | 0.93-2.28 | 0.097 |
| Constant | | | -1.850 | 27.809 | 0.157 | | .001 |

*Significant results

AP- Academic performance; GL- Geographical location; PC- Parental communication; RA- Religious affiliation; SES- Socioeconomic status

school going adolescents and findings add to the sparse empirical literature on drug use in the country.

The overall prevalence of marijuana use among school going adolescents in the Central Region was 9%. This prevalence was lower compared to previous findings of 40% and 17% of marijuana usage among JHS students in Bosomtwi, Atwima-Kwanwoma and Dangme East Districts in Ashanti and Greater Regions of Ghana [52,53]. The possible reason for the difference in the prevalence rates could be attributable to reported high cultivation rates of marijuana plantation in Assabil's previously studied areas and the high presence of 'city ghettos' or slums in the Dangme East District [53]. The age at first substance usage was 11 years perhaps due to the relative accessibility of marijuana in the region, a finding that contradicts the view of Quay and Werry [54] that young children ought to have valueless attitudes to substances of abuse. This current finding is similar to what have been reported in other studies [51]. We argue that the early onset of marijuana use often occurs during adolescence and further involvement with other psychoactive substances such as alcohol and tobacco with different periods of intermittent experimentation. These trials with marijuana and perhaps other drugs may provide a pathway "gateway effect" into compulsive patterns of future usage, hence promoting both psychological and physical dependence [55]. This unwarranted adventure suggests that adolescents who begin smoking marijuana at an early age are more likely to be users of other psychoactive substances during late childhood and adolescence. These negative health compromising behaviours can lead to school problems, social and emotional depressive disorders, and later drug dependence, thus impairing adaptive psychosocial development [56,57].

The key reasons for the use of marijuana among school adolescents in the region were peer group membership and enhancement of learning, supporting previous research findings [52, 53,58] that found perceived benefits as enabling factors of marijuana use. Importantly, adolescents' marijuana utilization in the current study might have been greatly influenced by normative peer group culture, often associated group membership characteristics regardless of geographical location. Social competence development among adolescents in many countries can be traced to peer group popularity and exploration of new experiences; in others, this may symbolize low family connectedness, low school commitment and affiliation with likewise disengaged peer group. Equally, refraining from this group engagement may mean social reservedness [59,60,61]. Alternatively, adolescents in this study may have enjoyed the marijuana effect because of the possibility of aiding the process of group socialization and the prominent role in recreational activities [62]. Marijuana use then becomes valuable to these adolescents. According to Glassner and Loughlin [62], its usage promotes notable pathways such as an available activity; something one does with peers; as a facilitator for group interaction; as central to a gathering; and as a commodity of exchange for group membership.

Gender prediction of marijuana usage among school adolescents in the region was also realized. Boys were at a higher risk of using marijuana than girls. Gender has been one of the most studied demographic characteristics related to youth substance use [63]. Epidemiological research to date suggest that males are more likely to use marijuana than females [52,64,65,66,67,68], findings that are mirrored in the current study. However, the current finding shows inconsistency in gender differences reported in other studies in Ghana but corroborate with other results in other African countries and elsewhere in the use of marijuana [21]. One possible reason for the male dominant findings currently prevailing in research literature could be argued from a masculinity-feminism paradigm that previous research has ignored. Societies that are ranked to be more masculine dominant on the continuum may show more societal approval, tolerance, male preference for marijuana usage and deviance as well as the selection of deviant peers compared to societies that may be considered feministic, hence may restrict females in the use of this drug and deviant behaviours due to societal disapproval and intolerance for females perceived to engaging in male dominant roles (e.g., smoking) according to the masculinity-feminism classification. For Ghanaian females, cultural related influences restrict the expression of deviant attitudes and behaviours. Other possible reasons for this outcome could be that boys are more sociable and more exposed to experiment

cannabis than girls [58]. Even though the current trend in male dominant marijuana usage is reversing [11, 21,26,27], it is possible that males and females with same access to marijuana may initiate usage at comparable rates [25]. Some local researchers, Doku et al. [69] have posited that in Ghana, smoking has been declining in the past few decades and the decline was faster among boys than girls. Therefore, issues surrounding marijuana should be considered equally important for both genders (males and females). There is a compelling need to explore more research on gender differences in marijuana utilization using perhaps a longitudinal approach and varied research protocols (e.g., multi-trait and multi-method approaches) in order to clarify current inconsistent findings.

Socioeconomic status also predicted marijuana use among students in the region. Adolescents from low socioeconomic backgrounds were at a higher risk of using marijuana than those from high socioeconomic backgrounds. This finding affirmed previous research findings that familial socioeconomic status of school going adolescents is highly associated with marijuana use among adolescents, with low socioeconomic group having higher probability of using marijuana, compared to those from higher socioeconomic group [14,69,70,71]. Although Humensky's [72] finding is similar to the current study, the attributed reason was that late adolescents with higher familial socioeconomic status had the propensity to use marijuana than adolescents from a lower familial socioeconomic background. The possible reason for this difference in the findings could be assigned to the characteristics of the sample used for the study. Humensky used a sample from European background where marijuana usage is common among the youth regardless of their socioeconomic status. Additionally, measuring socioeconomic status as a dichotomous variable (i.e., low versus high) currently prevailing in research literature without considering its multidimensional nature may also account for the somewhat inconsistent findings. Future research should consider the importance of separating socioeconomic status into income, education, occupation, and perceived social status. This separation may help provide consistent results.

Geographical location significantly influenced marijuana usage among the current study sample. School going adolescents living in the southern and northern parts of the Central region were at more risk of using marijuana than their counterparts from the central part of the region. This finding supports Currie's et al. [73] study that the engagement in health behaviours reflects geographical differences in that certain health behaviours depict certain patterns across geographical locations. Arguably, health outcomes may be elicited by certain pattern of life, culture, traditions and weather conditions of the geographical zones of people. The southern part of the region is predominantly endowed with a lot of educational institutions and other social exposures that mostly coax these adolescents through peer initiation compared to other parts of the region. The premise is that social exclusion and relative deprivation of certain societal conditions may contribute to drug use (e.g., living in poor communities or deprived areas (slumps, [74]). The "duality of structure" perspective is a process whereby 'structural conditions' (i.e., insecure and disengaging family and school environment) may constrain or trigger certain social actions (i.e., the construction of a favoured negative social identity) and enable others (i.e., strong group bond or membership). This structural consequence of these actions may trigger adolescents to develop entrenched disengagement from their teachers at school and parents at home, leading to the reproduction of health compromising behaviours such as different pattern of drug use. In addition, media reports commonly suggest that the northern part of the region is an area where cultivation of the marijuana plant is high, the reason accounting for a higher risk of marijuana utilization. Hence, putting school going adolescents in the northern and southern parts at risks of devastating health consequences of marijuana use.

Religious affiliation significantly predicted marijuana usage among adolescents in the region. Adolescents practicing Muslims were at higher risk of using marijuana than their Christians counterparts. Although previous research confirms the current finding [75,76,77], other available supportive evidence provide contradictory information. For example, Muslims have been found to strongly condemn the use of psychoactive substances and are less likely to even drink

alcohol than their other religious counterparts in other societies [78,79]. However, regular church attendance, personal religious devotion (importance of religion, religious seeking/prayer), religious conservatism (belief of the Bible and belief that God rewards and punishes), and institutional conservatism (religious denomination) have been found to hinder marijuana use among adolescents [75,76,77]. The possible reason for the current outcome is that many practicing Muslims of African descent explore the usage of leaves, shrubs and herbs for curative purposes and as part of African traditional medicine. Another plausible reason could be that most studies previously have measured religiosity and drug use from a unidimensional perspective (e.g., mosque or church attendance as a crude indicator), leading to flawed or inconsistent results [80]. Therefore, future research should consider exploring religiosity and drug use from a multidimensional perspective (i.e., religious affiliation, religious service attendance, and religious importance (i.e., the "tripartite" construct, [81]).

Unlike in previous studies [22,23,24], this study did not find any connection between age, parental communication and academic performance for marijuana utilization. For instance, research findings [82,83,84,85] to date on academic performance have been inconclusive on its association with risky behaviours. Surprisingly, age which has strongly been associated with prevalence of drug use among young people across a wide range of factors was not related to marijuana use in this study. This perhaps might be due to the early age of onset of marijuana use among school going adolescents in the region thereby causing a narrowing gap between younger adolescents and their older ones. Parental communication also did not predict marijuana use, meaning school going adolescents with easy or difficult parental communication were at same or similar risk of using marijuana in the region, contradicting previous research findings [86,87], perhaps due to used samples from European backgrounds with heterogeneous characteristics.

## Practical Implications

Current study results have specific implications for interventions. By examining psychosocial risk factors, including onset and prevalence of marijuana use, the findings might provide useful information for future research and implementation of some specific interventions. For example, school-based surveys among adolescents should be encouraged in the Central Region and perhaps at a broader country level. The central focus ought to aim at behavioural risk factors and protective enhancing factors such as peer group membership, school, and geographically underpinned community based prevention programmes [88]. These diverse programmes should be provided through community based schools and health care systems that target specific case findings with corresponding referral, treatment or modifiable risk factor reduction [89]. Interventions that promote positive school values and minimize students' dissatisfaction may play an effective complementary role towards drug prevention interventions that improve individual knowledge, attitudes, skills, and peer norms [90]. According to Das et al. [91], the most effective long term primary prevention programmes for the reduction of marijuana utilization among adolescents, especially aged between 10-15 years are antidrug information combined with refusal skills, self-management skills, and social skills training. Additionally, individually tailored programmes that include mentoring [92], counseling, or psychotherapy [93,94] might be very useful.

## Limitations

The present study has limitations that call for further empirical scrutiny. First, due to the cross-sectional and retrospective nature of the research design, causal inferences cannot be assumed. It is possible that adolescents might have used marijuana just once while other substance users may have continued doing so, hence the need for longitudinal studies to map these trends. Second, findings were based on self-report measures that are vulnerable to recall biases and memory distortions, particularly with respect to sensitive questions concerning a deviant behaviour like adolescents' marijuana use. Replication using a quite valid based multi-method and multi-trait approach is warranted. Further, even though it is possible that the examined risk factors directly accounted for the current predictions on marijuana use, it is likely that other unmeasured factors might also be responsible for the association of this drug use.

## Conclusions

Despite the current observations, marijuana utilization in the region could be described as low, compared to empirical findings in other regions of the country. However, the number of school going adolescents using marijuana in the region could pose public health problems. Marijuana is considered to be one of the most commonly used illegal drug in Ghana among the adolescent and youth populations while the highly addictive properties of nicotine make it a major worldwide health hazard [7]. Even when used separately, these substances appear to create numerous public health problems. For example, marijuana use had the potential of causing structural brain abnormalities and altered neural activity among adolescents, subsequently leading to higher impulsivity and other neurocognitive effects [58,95]. Since school-based delivery avenues may provide congenial evaluative platforms for targeting school going adolescents for marijuana use, compelling attempts should be made by stakeholders in delivering substance use interventions that target adolescents for drug use, especially marijuana. Such intervention programmes should vigorously aim at educating school going adolescents with varied group member characteristics from deprived communities where their socioeconomic conditions, especially in the northern and southern parts of the region are below average in order to help prevent and minimize drug use among adolescents. More awareness and continued research on protective factors such as enhancing family bonding, i.e. the attachment between parents and children and taking a more active role in children's lives, e.g., monitoring their activities and friendships, and being involved in their learning and education may mitigate against the major peer influence in deviant behaviours [14,27].

## Conflict of Interest

Authors have no financial or personal connection with people or educational institutions involved in the current study that may have inappropriately influenced this research.

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