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The Relationship Between Internet Misuse and Family and Mental Health Correlates among in School Adolescents: The Impact of Gender and Socioeconomic Status.

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Abstract:
Background: *Internet misuse (IM) constitutes a risk behaviour that could result in internet addiction. Protective and risk factors for adolescent risk behaviour include mental health status, family and friend factors and adolescent abuse with gendered and socioeconomic influences. There is need to include internet misuse screening in adolescent health care.*
Aim and Objectives: *to determine the mental health and family correlates of IM and associated gendered and SES influences.*
Methods: *simple random sampling selection of 679 adolescents. Instruments included: PIUQ-SF, PHQ-2, GAD2, Q9 /PHQ-9, APGAR, Family Circle, a customized questionnaire. P value was .05* ***Results:***
The prevalence of IM was 47.3% significantly related to high SES, late adolescence, long internet use time, social media and music /movies use. Depression was related to IM among girls and lower SES. Anxiety and dysmorphic concern were related to IM among girls without SES effect. Alcohol use and suicide ideation were related to IM in both genders and SES.Family functioning, parental attachment, parental empathy were related to IM among girls with varying SES effects. Ability to confide in parents was related to IM in both genders and SES. Having friends was related to IM among boys and lower SES. Physical and sexual abuse were related to IM among girls and higher SES. Emotional abuse was significant for both genders and all SES.
Conclusion: *the prevalence of IM was high, significantly related to mental health disorders and family correlates with gendered and SES influences that warrant attention in planning and implementation of intervention strategies.*

Key Words: ***A****dolescents, Internet misuse, risk behaviour, mental health disorder, family functioning, parental attachment.*

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I. Background:

The internet has become an important everyday tool to improve performance in all aspects of life cutting across education, social interactions, entertainment, health, information, religion, security, commerce, services and industry.[1,2,3]It has the capacity to bring the world to an individual in a device and so indeed makes the world a global village, enlarging the social context of the user far beyond the meso and macrosystems as previously known. This has, beyond the positive effects, such negative impact on the psychosocial development and well-being of people all over the world including; sleep deprivation, excessive fatigue, decreased immune system functioning, lack of proper exercise, poor personal hygiene, back and eye strain, witnessed snoring, apnea, teeth grinding, and nightmares.[3] Psychosocial effects include negative impact on real life interpersonal relationships, occupation, academic work, social isolation, neglect of daily chores, increased family conflicts, academic problems, cyber bullying, sexual predators and exposure to pornographic materials.[3,4,5]

The health consequences of internet use can be severe enough to warrant treatment similar to that of addictive disorders.[6]Internet addiction has variously been described as a behavioural addiction (an impulse control disorder) as different from a substance addiction but sharing similar criteria.[7] However, it has gained recognition only in the appendix of DSM V and ICD-11 as internet gaming disorder. Diagnostic criteria include five internet related behavioural criteria and 3 psychosocial consequences of internet misuse.[7] These include the individual being

1. preoccupied with the Internet (thinking about previous online activity or anticipating next online session).
2. Needs to use the Internet for increased amounts of time in order to achieve satisfaction.
3. Makes unsuccessful efforts to control, cut back, or stop Internet use.
4. Is restless, moody, depressed, or irritable when attempting to cut down or stop Internet use.
5. Stays online longer than originally intended.

The consequences on psychosocial functioning include 1. Having jeopardized or risked the loss of a significant relationship, job, educational or career opportunity because of the Internet.

2. Has lied to family members or someone else to conceal the extent of involvement with the Internet.
3. Uses the Internet as a way of escaping from problems or of relieving a dysphoric mood (*e.g*., feeling of helplessness, guilt, anxiety, depression).

Online activities vary in their capacity to induce maladaptive use. Social networking, gaming, pornography(and related activities), and entertainment are more risk prone than educational and work related activities.[3,8,9]The adolescent and youth demographic blocks are more at risk for maladaptive internet use due to the massive availability and variety of programs especially targeted at them, privacy/anonymity of engagement, limitations in monitoring and regulation and their increased use and time spent on line.[1]

It therefore requires personal self-regulation, resilience and good judgement for the individual to determine what site and activities to engage in and the amount of time devoted to internet use to achieve a balanced life without jeopardizing other aspects of psychosocial, family and academic functioning that is, a healthy or adaptive internet use culture.[7,10]

Adolescent transition is a critical phase in which the adolescent deals with the challenges of achieving personality development, individuation, self-regulation, autonomy, self-efficacy, and resilience. Evidence has shown that there is a differential in rates of growth in the brain circuitry regulating responsiveness to socio emotional cues (amygdala and the ventral striatum develop rapidly in adolescence) and that of the prefrontal cortex responsible for self-control, decision making and judgement which mature later in early adulthood.[11]The consequence is that adolescents are highly vulnerable to emotional and psychological gratification or distress that results from socioemotional contexts including internet use but at the same time lack the necessary self regulation and judgement to control indulgence in the use of internet.[6,12]

Strong evidence has shown that internet addiction affects brain neurochemistry and structure via impact on dopaminergic pathways in the cognitive, emotional and self-regulatory centers similar to what happens in substance addiction. This is more so in the developing adolescent brain.[6] Being absorbed in the cyber world results in deficiencies in managing real life relationships and situations and so hinders adolescent personality and character development and maturity.[1,4]

Studies have also shown that a significant relationship exists between internet misuse and addiction and mental health disorders (MHDs) including anxiety, depression, suicidal ideations, ADHD etc. including in our locale.[9,13] It has been established that as much as 26.3 -75%% of internet addicts suffer from depression, 23.3-57% have anxiety disorder and 21.7-100% have ADHD.[2]

This co morbid status is noted to be similar to that of MHDs and substance abuse disorder. The relationship has been variously attributed as being causal or bidirectional in many studies. Causal relationship is proposed to be such that mental health disorders make internet use an avenue to relieve psychological distress and therefore predisposes to excessive and addictive use. It has also been suggested that excessive internet use and exposure to maladaptive content results in the consequence of disrupted social functioning in family and school and therefore cause psychological distress. Other authors see both conditions as co morbidities where-in they both result from the same fundamental psychological and personality maladaptive traits like psychoticism, paranoia and interpersonal sensitivity, low self-esteem, distrust, unassertiveness and avoidant coping style.[1,4]Depression and internet addiction are postulated to have common genetic linkages in serotonin pathways.[1] Whatever the pathway may be, it is very important that both MHDs and internet misuse are screened for and detected early to facilitate treatment and prevention of severe morbidity.[2]

Internet misuse has continued to grow exponentially along with the growth of internet use and varies around the world and demographic blocks.[1,2]

The prevalence of internet addiction worldwide is about 2.6-10.9% across all age groups but among adolescents, 1.98% to 35.8%, estimated at 15.3-17.9% in Taiwan and potential addiction of 14.8% and addiction of 3% in South Korea.[1,9,14] Internet addiction is noted to be more prevalent among Asian adolescents than those in western countries. Prevalence of Internet misuse in Iran is about 55.3%.[8]In Nigeria, internet misuse among adolescents and youth not in the university and aged 14-24yrs was found to be 46.5% predicted by male gender, low intellect and low conscientiousness.[15]

Beyond the intrinsic factors related to internet addiction discussed above. Other important factors like socioeconomic status (SES), gender and family factors also determine internet misuse and addiction acting as risk or protective factors.[14,16]

Adolescent psycho-emotional and personality development are critically determined by the family, its structure and processes.[16,17] The family socio-economic status determines the availability of both devices and data for the use of the internet and also the level to which technology plays a role in the everyday life of the adolescent.[14]

Studies have shown that family factors like family functioning, parenting styles and parent adolescent relationship affect internet misuse and addiction in a bidirectional way.[3,6]There is also evidence that the impact of family functioning and parent adolescent relationship or attachment are mediated through the psycho-emotional distress encountered in these dynamics resulting from or leading to excessive internet use. Adolescent perception of attachment to their parents is expressed in their perceived emotional closeness, support, trust, responsiveness and warmth. These have been captured in this study with the family circle depicting perceived emotional closeness, and single close ended questions on perceived parental empathy and ability to confide problems and worries to their parents.

Parenting styles and efficacy could also possibly operate via impact on personality development affecting such factors as self-efficacy, resilience self-control, motivation, commitment, and having a personal vision for the future that creates a focus for their life etc.[18]

Personality, character, mental and physical growth among Adolescents have been evidenced to have gendered influences with girls maturing earlier than boys.[17] Traits like impulsivity, risk-taking and sensation seeking have been found to be higher among boys than girls.[4] Gendered influences on risk behaviour and mental health among adolescents are established and have also been demonstrated in our environment in previous studies.[19,20]

Risk behaviour has been defined as any behaviour that may endanger the wellbeing of the self or others either through immediate risk of physical injury or by violating rules, laws or norms established to prevent negative consequences.[21]Risk behaviours constitute the major cause of morbidity and mortality among adolescents.[22]

Although the use of internet has become a necessary tool in the development and achievements of today's adolescents, it should however be seen as a risk behaviour as it is well documented that increasing use leads to internet addiction and mental health consequences necessitating medical treatment.[23]There is also evidence that there is higher tendency to engage in risky behaviors among those with internet addiction.[12] Unlike other risk behaviours which are ordinarily seen and known to be risky with negative outcome, internet addiction is different because it starts from positive engagement and insidiously develops into the negative outcome with limited opportunity for external monitoring and control. The management of internet addiction like other addictions poses a lot of challenges and demands that considerable effort should be devoted to it's prevention especially in the adolescent age group given their vulnerability and consequence on developmental outcome.

Adolescent health care provides for screening and education of adolescents on health and behavioural risk factors and intervention to mitigate these risks.[22] It is imperative that in adolescent health, internet misuse and addiction should receive the critical attention that it deserves by including screening for internet misuse.[7,14]

Interventions to manage internet misuse and related risk factors among adolescents need to be developed urgently in order to raise awareness among adolescents, their parents and other caregivers.[8,12,14,23]

Nigeria has a largely youthful population with adolescents making up about 22% (41M)of total population, with a teledensityrate of 50% and over 90% of people aged 16-64years having a smart phone.[24,25] Adolescent health care is highly under resourced with grievous consequences given the population and huge burden of risk factors for mental health disorders.[26]There is need to define the continuum from adaptive(healthy) internet use culture to a risky or maladaptive use to facilitate early detection of those at risk for internet addiction. A study showed that 12-20% of adolescents who met criteria for excessive internet use did not qualify for diagnosis of internet addiction.[16] This makes it necessary to use instruments defining problematic use for screening. The problematic internet use questionnaire serves this purpose and has been validated among Nigerian adolescents.[27]

Family Physicians need to develop strategies for advocacy and implementation of interventions which include regular comprehensive screening at primary care and in school health for psychosocial profile and risk behaviors including internet misuse.[19.20] Evidence is required to develop these strategies.

Statement of the problem:

Internet use is a necessary tool for adolescent development and achievements which however carries a huge risk of negative impact requiring self-regulation to control its use. The neurobiological and psychosocial developmental challenges of adolescent transition make them particularly vulnerable to internet misuse and

addiction. These dynamics are evidenced to have gendered and socioeconomic influences which may also impact internet misuse.[4,17]In our environment, the awareness of the inherent risks attached to internet misuse is low, there is a paucity of adolescent health care provision and a high burden of mental health disorders and psychosocial risk factors.[20,26]There is an urgent need to raise awareness of internet misuse and associated factors among adolescents, their parents, other care givers and health care providers especially Family Physicians.
There is need to provide evidence to drive advocacy, plan and implement interventions to address this important problem. This study is an effort in this regard.

Aim and Objectives:
To determine the impact of gender and socioeconomic status on the relationship between internet misuse and family and mental health correlates among adolescents.

II. Methodology

Materials and Method:
STUDY AREA:

Benin City is the capital of Edo State in the south- south region of Nigeria, a metropolitan town rich in culture and inhabited by civil servants, artisans, famers, business owners and the academia etc. There are both private and public schools in the city. Public schools are funded by the government at no tuition cost to the students. Private schools are run for profit and the school fees vary widely depending on the facilities they provide. The low to middle class citizens generally attend the public schools while the private ones are attended by children from the middle to upper class homes. The secondary schools are divided into junior and senior schools of three years each.

Study Design:
The study was of a community based cross sectional descriptive design.
Duration: Data was collected over 4 weeks.
Study population: the adolescents in selected mixed non boarding secondary schools aged between 10-19 years. One private and one public school in the same local government area were used to capture the basic variations in socioeconomic differences in the school and home environments among the students. Nonboarding schools also have the additional advantage of having children who are in constant contact with their parents, the school and the society without institutional restrictions on access to internet. They offer the highest likelihood of adolescents in their natural milieu.
Selection criteria: All students within age 10-19 who consented to participate were recruited.
Sample Size calculation: Leslie Kish formula was used.[28]Calculated sample size was 320 but over 700 questionnaires were distributed. 679 were returned with adequate data.
Sampling method: Simple random sampling by balloting was used to select the secondary schools and also to select the students in the schools.
Method of Data collection:
Study instrument: The study instrument consisted of a semi customized, semi structured, self- administered instrument consisting of six sections.
Section A: A customized questionnaire covering sociodemographic variables and psychosocial factors. **Section B**: screening for mental health disorders consisted of three instruments: PHQ-2 A validated instrument for screening for depression among adults and adolescents.[29]It has a sensitivity of 79% and specificity of 86%[30]A total score of 3 or more is positive for depression.
The GAD -2: a validated instrument for screening for anxiety among adults and adolescents with a sensitivity of 86% and specificity of 83%.[30] A total score of 3 or more is positive for anxiety disorder. Suicide ideation was screened using the 9th item on suicide in the Patient Health Questionnaire (PHQ-9) which has a specificity of 88% and sensitivity of 88%.[31]
Section C: The CRAFFT Questionnaire: A validated screening instrument to assess the risk of drug and alcohol use among adolescents with a sensitivity of 76% -92% a specificity of 76%-94%.[32] Those who had a "yes" response to any section A question but score of zero in section B were assessed as having low risk alcohol or drug use. Those who had a score of 2 or more in section B were assessed as positive for high risk alcohol or drug use. Those who scored zero in A and B had no involvement with alcohol or drug use.
Section D: The Problematic Internet Use Questionnaire short form. PIUQ-SF-6: a validated instrument for screening for problematic internet use among adolescents and adults.[27,33]It has six items and is scored on a 5point Likert scale giving a total of 30 points. Cut off score is 15 above which is highly suggestive of problematic internet use. This instrument has a specificity of 98% and sensitivity of 85%.
Section E: The APGAR Questionnaire. It is a standardized validated self-administered family function screening instrument developed by Smilkstein.[34] It consists of one question in each of five domains testing the candidate's perception of processes in his family. Total score ranges from 0-10. Scores 7-10 denotes highly

functional, 4-6 denotes moderate dysfunction and 0-3 denotes severe dysfunction. This instrument has a Cronbach alpha of.80-.85 for reliability and Cronbach alpha of .64-.80 for validity.

Section F: Family Circle; a graphic representation of an individual and his family drawn by the candidate.[35] Maternal and paternal attachment were represented on 4 levels.

Very close: if their circle intercepts that of the candidate.Close: if their circle is close to the centre.

Not close: if their circle is on or close to the periphery. Not important: if their circle is outside the sphere.

Summing up maternal and paternal attachment to derive parental attachment, 3 levels were defined:

Very Healthy Attachment; if the candidate is close or very close to both parents.Healthy Attachment: if candidate is close or very close to one parent.Poor Attachment: if candidate indicates both parents as not close or not important.

Procedure for data collection: In the schools, the questionnaires were distributed to participants who gave assent after having the study explained to them and permission and consent had been duly obtained from the school authorities. The filled questionnaires were retrieved same day at break time.

Ethical consideration: Ethical approval was obtained from the Ethics and Research Committee of the University of Benin Teaching Hospital with Protocol No. ADM/E 22/A/VOL.VII/14710. In the schools, approval was from the Principals in writing and assent obtained from the students.

Data Management:

Data was collated and analysed using the SPSS version 21. Categorical data were analysed in frequencies and percentages. The relationship between categorical variables was analysed using the chi square test and continuous variables with t test. P value was set at 0.05.

III. Results

Distribution of Sociodemographic Characteristics among the Respondents in the Cohorts. (Table 1) A total of 679 adolescents returned questionnaires with data adequate for analysis. Three hundred and seventy-five respondents from public school and 304 from the private school. Age distribution was normal with mean (SD) age for total respondents at 14.28(+/-1.919) and median and mode at 14yrs. Mean age was significantly higher in the public school (15yrs) than in private school at 14yrs (t-score= 3.932, p=.000). Most of the respondents in the private school were in the early phase of adolescence (54.3%) but in the public school most were in the late adolescent phase (58.1%). This difference was highly significant at (X^2= 101.474. p=.000). There were more females (57.4%) than males (42.6%) in the total population. There were significantly more females in the public school than in the private school (X^2= 5.200, p=.023). Majority of the mothers of the respondents had secondary education (38%) and above (50.1%) and was significantly higher in the private school at X^2= 156.086, p=.000. Majority of the fathers of the respondents had secondary education (37.8%) and above (53.9%) and significantly higher in private school at X^2= 129.395, p=.000. The composite scores of parents' educational status (co-parent educational status) was used as an index of socioeconomic status of the respondents. Majority of the respondents (58.5%) had high co-parent educational status. The difference in co-parent educational status between the private and public schools was highly significant at 124.604, p=.000.

Distribution of Problematic Internet Use Status Among the Respondents (Table 2).

The prevalence of problematic internet use among the total respondents was high at 43.7%. The prevalence was significantly higher in the private school (50%) than public school (38.7%) at X^2= 8.763, p=.000.

Relationship between Sociodemographic Variables and Problematic Internet Use (PIU) among the Respondents(Table 3).

There was a significant relationship between phase of adolescence and PIU among the total respondents (X^2 = 30.776, P=.000), and this relationship was maintained in both school cohorts. There was no significant relationship between PIU and SES and gender in the total respondents and in both school cohorts..

Relationship between Internet Use factors and Problematic Internet Use (PIU) among the Respondents (Table 4).

In the total sample population, there was a highly significant relationship between total time spent online and PIU at X^2= 111.957, p=.000. There was a significant relationship between PIU and engaging in social media (X^2 =50.867, p=.000) and movies and music (X^2 =24.129, p=.000). There was no significant relationship between PIU and engaging in learning activities and gaming.

Relationship between Sociodemographic factors and internet activities among the Respondents (Table 5). Gaming was significantly more among boys (at X^2= 33.339 p=.000) and early phase adolescents (X^2= 39.420, p=.000). PIU and social media use were significantly more among late phase adolescents at X^2= 30.776, p=.000 and X^2= 9.010, p=.011 respectively. Engaging in social media, movies /music and gaming were significantly more prevalent among respondents of higher co-parent educational status but not for learning and PIU status.

Table 6: **Relationship between Mental Health Disorders and Problematic Internet Use (PIU) among the Respondents: the impact of SES.**

Positive screening for anxiety was significantly related to PIU in the total respondents ($\mathbf{X^2}$ 21.687, p=.000) and in both private (X^2 = 8.983, p=.003) and public (X^2 =12.230, p=.000) schools. Positive screening for depression was significantly related to PIU in the total respondents (X^2=10.851, p=.001) and public (X^2= 10.015, p=.002) but not private school attendees. Positive screening for suicide ideation was significantly related to PIU in the total respondents (X^2= 25.145, p=.000) and in both private (X^2=11.485, p=.001) and public school (X^2 =13.074, p=.000). Positive screening for dysmorphic concern was significantly related to PIU among the total respondents (X^2 =6.725, P=.010) but not in the school cohorts. Positive screening for risky alcohol use was significantly related to PIU among the total respondents (X^2 =20.523, p=.000) and both private (X^2 =12.755, p=.001) and public school (X^2 =9.557, p=.000.) cohorts. Positive screening for mental health disorder status was significantly related to PIU among the total respondents (X^2 =31.732, p=.000) and both private (X^2 =13.589, p=.000) and public school (X^2 =16.207, p=.000.) cohorts.

Relationship between Mental Health disorders and Problematic Internet Use (PIU) among the Respondents: The Impact of Gender (Table 7).

Female gender significantly influenced the significant relationship between PIU and anxiety (X^2 =28.757,p=.000) depression (X^2 =8.293,p=.004) dysmorphic concern (X^2 =6.205,p=.013). There was no gender influence on the significant relationship between positive screening for suicide ideation and PIU and similarly for alcohol use and mental health disorder status.

Relationship between Family factors and Problematic Internet Use (PIU) among the Respondents: The impact of SES (Table 8).

PIUwas significantly higher among respondents from severely dysfunctional families in the total respondents (X^2 =7.783, p=.020) and among private school attendees (X^2 =9.169, p=.008) but not among the public school respondents. Parental attachment was not significantly associated with PIU among the total respondents and in both school cohorts.PIU was significantly higher among respondents with poor perceived parental empathy among the total respondents (X^2=7.074, p=.008) and in the public school (X^2 =5.019, p=.025) but not in the private school.PIU was significantly higher among respondents with poor perceived ability to confide in their parents among total respondents (X^2 =25.386, p=.000) and also in the private (X^2 =11.485, p=.001) and public school (X^2 =11.649, p=.001).

Relationship between Family Factors and Problematic Internet Use (PIU) among the Respondents: The impact of gender (Table 9).

Female gender significantly influenced the relationship between PIU and severe dysfunction (X^2 =12.404, p=.002)poor parental attachment (X^2 =6.822, p=.001) and poor perceived parental empathy (X^2 =6.392, p=.000). There was no gender influence on the significant relationship between PIU and poor perceived ability to confide in parents.

Relationship between Having friends and PIU: the effect of gender and SES among the Respondents (Table 10).

Problematic internet use was significantly higher among respondents who had friends among the boys (X^2 =6.782, p=.009) but not among girls. Problematic internet use was significantly higher among respondents who had friends among the public school attendees (X^2 =6.116, p=.013) but not among the private school cohort.

Relationship between Adolescent Abuse and Problematic Internet Use (PIU) among the Respondents: the impact of SES. (Table 11).

PIU was significantly higher among respondents who have suffered adolescent abuse in the total respondents (X^2 = 18.812, p=.000) and in both private (X^2 = 13.279, p=.000) and public school (X^2 = 6.065, p=.014). PIU was significantly higher among respondents who have suffered sexual abuse in the total respondents (X^2 = 10.689, p=.001) and among private school attendees (X^2 = 10.530, p=.001) but not in the public school.PIU was significantly higher among respondents who have suffered emotional abuse in the total respondents (X^2 = 17.272, p=.000) and both private (X^2 = 7.577, p=.006) and public school(X^2 = 8.035, p=.000). PIU was significantly higher among respondents who have suffered physical abuse in the total respondents (X^2 = 6.926, p=.008) and among private school attendees (X^2 = 5.187, p=.023) but not for the public school.

Relationship between Adolescent Abuse and Problematic Internet Use (PIU) Status among the Respondents: The impact of gender (Table 12).

Female gender significantly influenced the relationship between PIU and sexual abuse (X^2 = 8.171, p=.004) and physical abuse (X^2 = 5.755, p=.016) but not for emotional abuse and any abuse status.

IV. Discussion

Distribution of socio demographic characteristics of the respondents shows that there were more females than males in the total population and significantly more females than males in the public school. This is a contrary to the population statistics showing more males are enrolled in school in south-south Nigeria.[36] This could be attributed to the girls being more interested in participating in the study.

The mean age of total respondents was about 14 years but was significantly higher in the public school (at 15yrs, t-score 3.932, p=.000) suggesting a socioeconomic impact on the age of commencement of education with those from higher socioeconomic status (private school) commencing school earlier in keeping with expectation. The co-parent educational status of the respondents (an indexof socioeconomic status [SES]) in private school was statistically significant higher at X^2=124.605, p=.000 in keeping with expectation and supporting the observation on age above.[20]

The prevalence of problematic internet use was high among the total respondents at 43.7% similar to that found in Ibadan and other studies around the world.[8,14,15] The prevalence was significantly higher among respondents of higher SES (private school (50%) than lower SES (public school (38.7%) at X^2=8.763, p=.000 attributed to greater access to devices and capacity to afford data to use the internet. Internet misuse was significantly higher among older adolescents in the total respondents without SES difference and contrary to findings in other studies.[16] It is attributed to the possibility that older adolescents have less restrictions to smart phone ownership and usage than early adolescents in our environment. Another factor could be that older adolescents who are known to have more psychological distress may use the internet excessively to seek relief of their dysphoria.[16]Inthis study population, older adolescents in lower SES had a significantly higher prevalence of MHDs (demonstrated in another publication) offering an explanation for the higher incidence of internet misuse in this subgroup.[20]

Gender had no significant relationship with internet misuse among the total respondents and both school cohorts similar to some findings in literature and contrary to others.[3,10,16] Within the school cohorts, co parent educational status was not significantly related to internet misuse suggesting that the difference in internet misuse prevalence between the two schools may be influenced not only by socioeconomic status but may include such factors like social culture in the schools as found in a study in Turkey.[10]

Factors associated with internet misuse included total internet time (X^2=137.297, p=.000.), social media use (X^2=50.867, p=.000), and movies and music (X^2=24.129, p=.000) similar to findings in literature.[3,10,37] Engagement of friends via the social media and involvement in movies and music are very important to adolescents and reflects a normal behaviour necessary for achieving autonomy which is a major developmental task in adolescence. These media establish youth culture.[38] However, excessive/ maladaptive use reflects poor self-regulation or an avenue to overcome poor social skills or interpersonal sensitivity which are not a hindrance to online relationships.[4] Learning and gaming were not statistically significantly associated with internet misuse consistent with literature for learning but contrary for gaming.[13,37] This is attributed to the possibility that socioeconomic factors limit the availability of games and data and possibly other factors, than the respondents in comparable studies in other climes.[1,2]

The relationship between gender and internet use activities was not significant for social media, learning, movies and internet misuse status. However, for gaming it was significantly associated with the male gender (X^2=33.339, p=.000) similar to other studies.[13]

Mental health disorder status was found to be more prevalent among respondents who had internet misuse without any SES influence. This finding is similar to literature.[2,3,7,38] Poor emotional self-regulation, reduced resilience and other psychological factors underly internet misuse and addiction and are related to affective disorders and impulsivity. The individuals affected use internet to relieve dysphoria.[17,39,40]

Internet misuse was significantly more prevalent among respondents who screened positive for anxiety (61%), depression (52%), suicide ideation (61.7%) and dysmorphic concern (51.5%) in keeping with literature. The prevalence of MHD conditions in this study are similar to that cited by Ho et al but are higher than that found in their own study.[2,3]

High SES impacted the relationship between depression and internet misuse but for anxiety and suicide ideation there was no difference between SES groups. This pattern is consistent with that of these mental health disorders in this sample population (demonstrated in a previous article)thereby offering explanation for the observation.[20]

Internet misuse was significantly higher among respondents who had high-risk alcohol use (57.7%) without any SES differences. This is in keeping with literature. Novelty seeking tendencies and stress relieving effect underlie substance use and internet addiction and hence the association between the two.[14]

Also, the poorly regulated exposure to internet content promoting use of alcohol and hard drugs influences adolescents to adopt these habits.[41]

The relationship between internet misuse and mental health conditions was shown to have gendered influences in this study. The relationships between positive screening for anxiety, depression, dysmorphic concern and internet misuse were statistically significant among the females but not among males. This is in keeping with literature which has shown that girls are more vulnerable to affective disorders than boys.[16] This explanation is validated by the finding in this study population of significantly higher prevalence of these disorders among the girls (demonstrated in a prior publication).[20]The female gender impact on body dysmorphia

is in keeping with literature showing that girls are more affected by dysmorphic disorder which is noted to have increased with the use of social media and has influenced adolescent girls to seek plastic surgery to achieve their snapchat appearance in real life.[42,43]

The relationships between positive screening for risky alcohol use, mental health disorder status and suicide ideation and internet misuse were statistically significant for the total respondents without gendered influences. In this study population, risky alcohol use showed no gendered differences corresponding to the internet misuse /alcohol relationship but mental health disorder status and suicide ideation were significantly more prevalent among girls unlike the relationship with internet misuse).[20] This could mean that in relation to internet misuse factors beyond relief of dysphoria are operating. Suicidality has increased over the last decade in line with the exponential increase in the use of the internet. The exposure of adolescents to content that promotes negative view of themselves or their life situations and cyberbullying increases their vulnerability to anxiety and depression which in addition, predispose to suicide. Also, social media content includes suicide ideas, methods and attempts encouraging them to see this as a means of dealing with their problems.[41]

These findings support the evidence on gendered psychological pathways to internet addiction and mental health disorders.[4]

The relationship between family factors and internet misuse was also demonstrated in this study showing both SES and gendered influences. Among the total respondents, higher SES impacted the relationship between family functioning and PIU. Parental attachment assessed with the family circle as perceived emotional closeness to parents was not related to internet misuse among the total respondents and showed no SES influence contrary to expectation and literature.[16] Specific elements of parent adolescent attachment explored in the study included perceived parental empathy and ability to confide problems to parents. Parental empathy represents adolescent perception of warmth and responsiveness from parents as an element of attachment and has been evidenced to influence internet misuse.[16] In this study, perceived lack of parental empathy was significantly associated with internet misuse impacted by lower SES similar to findings in Korea where poor parenting among lower SES was linked to internet misuse.[14]

Perceived inability to confide in their parents was significantly associated with internet misuse without socioeconomicstatuseffect. This element of attachment and its relationship to internet misuse suggests that adolescents who are unable to share their worries with their parents possibly use the internet as outlet and in search of comfort demonstrating the important role parents could play in mitigating the risk for internet misuse by alleviating adolescent psychological distress.[14,16]

The gendered differences in the relationship between family factors and internet misuse status showed that family functioning, parental attachment and perceived lack of parental empathy were significantly associated with internet misuse among the females but not among the males. This could be attributed to the fact that girls are more sensitive to emotional frictions in the family and respond with increased internet use for relief.[16] Inability to confide in parents was significantly associated with internet misuse for both males and females, emphasizing the importance adolescents attach to being able to share their worries with their parents as discussed above.[16] The interaction between internet misuse and having friends to confide in among adolescent is evidenced to have mixed findings which were also demonstrated in this study.[16] In the total population, internet misuse was more prevalent among those who had friends supporting the literature that posits that larger friendship networks increase internet use with increased risk of internet addiction and negative peer influence.[16] The gendered impact was significant among boys only. Girls are known to have good social skills more than boys.[16] This study did not differentiate between real life friends and online friends. However, it' s possible that among boys this relationship reflects increased use of internet to make friends thereby overcoming limitations in social skills.[4] This has been noted to lead to increased real life isolation, failure to learn the needed social skills and maturity for real life relationships and predisposition to psychopathology.[16] Lower SES impacted this relationship with internet misuse being higher among respondents who had friends among the lower SES respondents. In this study population, having a friend confidant was significantly less among lower SES respondents. This is explained as above that possibly those with lower SES find it easier to make friends online, supported by evidence that children from lower SES have less social skills.[44]

Internet misuse was higher among respondents who have suffered from any type of abuse without SES or gender differences as found in literature.[6] Emotional abuse was significantly related to internet misuse among all the respondents without SES and gender influences. The relationship between internet misuse and sexual abuse and physical abuse were driven by effects of higher SES and female gender. This is explained by the fact that all types of abuse were found to be significantly related to mental health disorders in this study population in keeping with literature.[2,20,45]There is evidence that child/adolescent abuse causes disrupted neuro development in the brain affecting the amygdala and orbitofrontal cortex among other regions. These areas are involved in emotional, cognitive, and behavioural self-regulation thus resulting in affective disorders (anxiety, depression, suicide ideations), risk taking and sometimes delinquency.[11,45]The impact of gender and SES status however require further studies to understand.

The findings in this study are important for adolescent health care planning and implementation. The evidence suggests gendered and socioeconomic impact on the dynamics of factors related to internet misuse which have implications for personalised interventions. Excessive internet use can be observed and reported by parents and other adolescent care givers. Given the significant relationship between internet misuse and mental health disorders and adolescent abuse, internet misuse could be a red flag to identify adolescents at risk or suffering from mental health disorders and abuse. This is very important as these psychosocial adversities are highly stigmatized, unrecognized and silent among adolescents.[20]

Conclusion: Internet misuse is highly prevalent among adolescents, significantly related to mental health disorders and family factors and impacted by gendered and socioeconomic influences providing a red flag for psychosocial screening and personalized interventions.

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Results:

Table 1: Distribution of Sociodemographic Characteristics among the Respondents in the Cohorts.

Cohort	**Total Sample Population**		**Private School**		**Public School**		**X^2/ t-score p value**
Variable	**Frequency**	**%**	**Frequency**	**%**	**Frequency**	**%**	

Age							
Range	**10-19**	-	**10-19**	-	10-19	-	
Mean	**14.28 (1.919)**	-	**13.96**	-	14.53	-	t-score=
(SD)	**14.00**	-	**(1.787)**	-	(1.985)	-	3.932
Median	**14.00**	-	**14.00**	-	15	-	df=660
Mode			**14.00**		15		p=.000
Gender							
Female	**390**						
Male	289	**57.4**	**160**	**52.6**	**230**	**61.3**	X^2 5.200
Adolescent Phase		42.6	144	47.4	145	38.7	p=.023
Early							
Middle	**264**						X^2= 101.474
Late	136	**38.9**	**165**	**54.3**	**99**	**26.4**	p=.000
	279	20.0	78	25.7	58	15.5	
Father Educ. Status		41.1	61	20.1	218	58.1	
None							
Primary							X^2= 129.395
Secondary	**19**						P=.000
Tertiary	37	**2.8**	**4**	**1.3**	15	**4.0**	
Mother Educ. Status	257	5.4	11	3.6	26	6.9	
None	366	37.8	52	17.1	205	54.7	
Primary		53.9	237	78.0	129	34.4	X_2=
Secondary							=156.086
Tertiary							P=.000
Co- Parent Educ.	**32**						
Status	49	**4.7**	**5**	**1.6**	27	7.2	
Low	258	7.2	9	3.0	40	10.7	
Medium	340	38.0	57	18.8	201	53.6	
High		50.1	233	76.6	107	28.5	
	45						
	237	**6.6**	**8**	**2.6**	**37**	**9.9**	X_2 =
	397	34.9	47	15.5	190	50.7	124.605
		58.5	249	81.9	148	39.5	**p=.000**

Table 2: **Distribution of Problematic Internet Use Status among the Respondents.**

Total PIUQ Scores	**Total Respondents** Frequency %		**Private school** Frequency %		**Public school** Frequency %		X_2 **P value**
Positive	297	43.7	152	50.0	145	38.7	X^2= 8.763
Negative	382	56.3	152	50.0	230	61.3	p=.003
Total	**679**	**100**	**304**	**100.0**	**375**	**100**	

Table 3: **Relationship between Sociodemographic Variables and Problematic Internet Use (PIU) among the Respondents.**

Sociodemographic Variable	**Total Respondents**	**PIU Status** X^2 **P value**	**Private school**	X^2 **P value**	**Public School**	X^2 **P value**

Adolescent Phase	**Pos.**	**Neg.**		**Pos.**	**Neg**		**Pos.**	**Neg**	
Early	86	178	X^2 =	67	98 42	X^2 =	19	80	X^2 =
Middle	55	81	30.776	36		16.532	13	45	38.232
Late	156	123	P=.000	43	18	P=.000	113	105	P=.000
Gender	**Pos.**	**Neg**		**Pos.**	**Neg**		**Pos.**	**Neg**	
Female	169	221		77	83		92	138	
Male	128	161		75	69		53	92	
			X^2 =						
			.062			X^2 =			X^2 =
			P=.804			.475			.446
Co- parent Edustat	**Pos.**	**Neg**		**Pos.**	**Neg**	P=.491	**Pos.**	**Neg**	P=.504
Low	21	24		5	3		16	21	
Medium	96	141		28	19		68	122	
High	180	217		119	130		61	87	
			X^2 =						
			1.577						X^2 =
			P=.455			X^2 =			1.396
						2.726			P=.498
						P=.256			

Table 4: Relationship between Internet Use factors and Problematic Internet Use (PIU) among the Respondents.

Internet Use	**PIU Status**		**Total**	**X^2**
	Positive	**Negative**		**P value**
Total Internet time				
Less than 1hr	117	293	410	111.957
2-4hrs	63	58	121	p=.000
4-6hrs	55	13	68	
More than 6hrs	60	20	80	
SocialMedia				
Yes				X^2
No	131	72	203	50.867
	166	310	476	P=.000
Learning				
Yes				
No	114	148	262	X^2 =.009
	183	234	417	p=.924
Movies and music				
Yes				
No	125	93	218	X^2 =24.129
	172	289	461	p=.000
Gaming				
Yes				
No	84	106	190	X^2= .024
	213	275+1	488	p=.878

Table 5: Relationship between Sociodemographic Factors and Internet Activities among the Respondents.

Socio- demographic Variable	**Social Media**	**Learning**	**Movies**	**Gaming /music**

Gender								
Female	Yes	No	Yes	No	Yes	No	Yes	No 121
Male	113	277	154	236	269 77	313		
	90	199	108	181	97	192	114	175
	X^2=.372		X^2=314		X^2=.491		X^2=31.873	
	P=.542		P=.575		P=.484		P=.000	
Adol phase								
Early	Yes	No	Yes	No	Yes	No	Yes	No
Middle	62	202	98	166	75	189 48	98	166
Late	43	93	57	79	88		48	88
	98	181	107	172	95	184	44	235
	X^2= 9.010		X^2= .880		X^2=2.773		X^2=35.195	
	P=.011		P=.644		P=.250		P=.000	
	Yes	No	Yes	No	Yes	No	Yes	No
Parent Co Edustat	8	37	21	24	10	35	8	37
Low								
Medium	55	182	83	154	65	172	44	193
High	140	257	158	239	143	254	138	259
	X^2=13.672		X^2=2.757		X^2=7.188		X^2=21. 806	
	P=.001		P=.252		P=.027		P=.000	

Table 6: **Relationship between Mental Health Disorders and Problematic Internet Use (PIU) among the Respondents: The Impact of SES.** **Mental health Condition PIU Status**

	Total		**X^2**	**Private**		**X^2**	**Public**		**X^2**
	Respondents		**P value**	**School**		**P value**	**School**		**P value**
Anxiety	Pos.	Neg.	**X^2** =21.687	Pos.	Neg		Pos.	Neg	
Positive	85	54	P=.000	46	24	X^2 =	39	29	X^2 =
Negative	212	329		106	128	8.983	106	201	12.230
						P=.003			P=.000
Depression									
Positive	118	106		64	55		54	51	
Negative	179	276	X^2 =	88	97	X^2=	91	179	X^2 =
			10.851			1.119			10.015
Suicide Ideation			P=.001			P=.290			P=.002
Positive	92	57		48	23		44	34	
Negative	205	325		104	129		101	196	
			X^2 =			X^2 =			X^2 =
Dysmorphic concern			25.145			11.485			13.074
Pos.			P=.000			P=.001			P=.000
Neg.	100	94		56	41		44	53	
	197	288		96	111		101	177	
CRAFFT alcohol			X^2 =			X^2 =			X^2 =
No Involvement	Pos.	Neg.	6.725	Pos.	Neg	3.407	Pos.	Neg	2.472

LR involvement	180	293	P=.010	95	123	P=.065	85	170	P=.116
HR involvement	72	56		34	18		38	38	
	45	33		23	11		22	22	
MHD status			X^2 =			X^2 =			X^2 =
Positive			20.523			12.755			9.557
Negative	186	156	P=.000	99	67	P=.001	87	89	P=.000
	111	226		53	85		58	141	
			X^2 =			X^2 =			X^2 =
			31.732			13.589			16.207
			P=.000			P=.000			P=.000

Table 7:Relationship between Mental Health Disorders and Problematic Internet Use (PIU) among the Respondents:The Impact of Gender.

Mental Health Condition	**PIUStatus**					
	Females		**X^2 P value**	**Males**		**X^2 P value**
Anxiety	Pos.	Neg		Pos.	Neg	
Positive	64	32+1	X^2 =	21	21	X^2 =
Negative	105	188	28.757	107	140	.649
			P=.000			P=.420
Depression						
Positive	76	68		42	38	
Negative	93	153	X^2 =	86	123	X^2 =
			8.293			3.021
Suicide Ideation			P=.004			P=.082
Positive	65	37		27	20	
Negative	104	184		101	141	
			X^2 =			X^2 =
Dysmorphic Concern			23.391			3.397
Positive			P=.000			P=.047
Negative	66	60		34	34	
	103	161		94	127	
CRAFFT alcohol						
No Involvement						
LR involvement			X^2 =			X^2 =
HR involvement	Pos.	Neg	6.205	Pos.		1.175
	108	171	P=.013	Neg	72	P=.278
	36	31		122	36	
				25		
MHD status	25	19		20	14	
Positive			X^2 =			X^2 =
Negative	117	97	8.637	69	59	12.322
	52	124	P=.013	59	102	P=.002
			X^2 =			X^2 =
			24.832			8.610
			P=.000			P=.003

Table 8: Relationship between Family Factors and Problematic Internet Use (PIU) Status among the Respondents: The Impact of SES.

Family Factors	**PIU Status**							
	Total Respondents		X^2 **P value**	**Private School**		X^2 **P value**	**Public School**		X^2 **P value**
Family Functioning	Pos.	Neg.	X^2	Pos.	Neg		Pos.	Neg	
Sev dysfunction	46	40	7.783	27	18	X^2 =	19	22	X^2 =
Mod Dysfunction	116	130	P=.020	61	43	9.169	55	87	1.249
Highly Functional	135	212		64	91	P=.008	71	121	P=.553
Parental attach.									
Poor attachment	28	26		13	6		19	22	
Healthy attach.	123	142		65	55		55	87	
Very Healthy attach.	146	214		74	91		71	121	
			X^2 = 3.698 P=.157			X^2 = 5.164 P=.076			X^2 = .618 P=.734
Parent Empathy									
No									
Yes.	68	57		34	24		34	33	
	229	325		118	128		111	197	
Parent Confidant									
No			X^2 = 7.074 p=.008			X^2 = 2.131 p=.144			X^2 = 5.019 P=.025
Yes	83	48		48	23		35	25	
	214	334		104	129		110	205	
			X^2 = 25.386 p=.000			X^2 = 11.485 p=.001			X^2 = 11.649 P=.001

Table 9:Relationship Between Family Factors and Problematic Internet Use (PIU) among the Respondents: The Impact of Gender.

Family Factor	**PIU status Females**		X^2 **P value**	**PIU Status Males**			X^2 **P value**
Family Functioning	**Pos**.	**Neg**.		Pos.	**Neg**		
Sev. dysfunction	36	29	X^2 =	10	11	54	X^2 =.123
Mod Dysfunction	62	60	12.404	70			P=.940
Highly Functional	71	132	P=.002	64	80		
Parental attachment	**Pos**.	**Neg**.		**Pos**.	**Neg**.		
Poor attachment	21	19		7	7		
Healthy attach.	77	80		46	62		
Very Healthy attach.	71	122		75	92		
			X^2 = 6.822 P=.033	**Pos**.	**Neg**.		X^2 =.337 P=.845
Parent Empathy	**Pos**.	**Neg**.		20	18		
No	48	39		108	143		
Yes.	121	182					
				Pos.	**Neg**.		
Parent Confidant	**Pos**.	**Neg**.	X^2 =	26	15		
No	57	39	6.392	102	146		
Yes	112	188	P=.011				X^2 = 1.234 P=.627
			X^2 = 19.059 P=.000				X^2 = 7.082 P=.008

Table 10: Relationship between Having friends and PIU: The Effect of Gender and SES among the Respondents.

	Total Population PIU Status		X_2 P value	PIU Status		X_2 P value	PIU status		X^2 P value
Friend Confidant				**Females**			**Males**		
Yes	**Pos.**	**Neg.**	X^2 =7.653	**Pos.**	**Neg.**	X^2 =1.994	**Pos.**	**Neg.**	X^2=6.782
No	243	278	P=.006	135	163	P=.158	108	115	P=.009
	54	104		34	58		20	46	
Friend Confidant				**Private Sch.**		X^2 =1.031	**PublicSch.**		X^2=6.116
Yes				**Pos.**	**Neg.**	P=.310	**Pos.**	**Neg.**	P=.013
No				126	119		117	159	
				26	33		28	71	

Table 11: Relationship between Adolescent Abuse and Problematic Internet Use (PIU) among the Respondents: The Impact of SES.

Adolescent Abuse	**Total Respondents**		**X^2 P value**	**PIU Status Private School**		**X^2 P value**	**Public School**		**X^2 P value**
Abuse Status	**Pos.**	**Neg.**	X^2 =	**Pos.**	**Neg**		**Pos.**	**Neg**	
Pos.	122	97	18.812	66	36	X^2 =	56	61	X^2 =
Neg.	175	285	P=.000	86	116	13.279	89	169	6.065
						P=.000			P=.014
Sex Abuse	**Pos.**	**Neg.**		**Pos.**	**Neg.**		**Pos.**	**Neg.**	
Pos Neg.	28	13		15	2		56	61	
	269	369		137	150	X^2 =	89	169	X^2 =
Emotional Abuse			X^2 =			10.530			2.598
Pos.			10.689			P=.001			P=.107
Neg.	**Pos.**	**Neg.**	P=.001	**Pos.**	**Neg.**		**Pos.**	**Neg.** 33	
	77	51		44	24		27		
	220	331		108	128		112	203	
Physical Abuse Pos.	**Pos.**	**Neg.**	X^2 =	**Pos.**	**Neg.**	X^2 =	**Pos.**	**Neg.** 36	X^2 =
Neg.	75	65	17.272	39	23	7.577	42		8.035
	222	317	P=.000	113	129	P=.006	109	188	P=.005
			X^2 =			X^2 =			X^2 =
			6.926			5.187			2.328
			P=.008			P=.023			P=.127

Table 12: Relationship between Adolescent Abuse and Problematic Internet Use (PIU) among the Respondents: The Impact of Gender.

Adolescent Abuse	**PIU Status**					
	Females		X^2 = P value	**Males**		X^2 = P value
Abuse Status	**Pos.**	**Neg**		**Pos.**	**Neg**	
Pos.	73	56	X^2 =	49	41	

Neg.	96	165	13.794 P=.000	79	120	X^2 = 5.461 P=.019
Sex Abuse	**Pos**.	**Neg**.		**Pos**.	**Neg**.	
Pos.	21	10		7	3	
Neg.	148	211	X^2 = 8.171 P=.004	121	158	X^2 = 2.775 P=.096
Emotional Abuse						
Pos.	**Pos**.	**Neg**.		**Pos**.	**Neg**. 32	
Neg.	45	29		22		
	124	192		96	139	
Physical Abuse	**Pos**.	**Neg**. 47	X^2 = 11.361 P=.001	**Pos**.	**Neg**. 28	
Pos.	39			26		X^2 = 6.030 P=.014
Neg.	122	182		100	135	
			X^2 = 5.755 P=.016			X^2 = 1.539 P=.215