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# The Efficacy of Motivational Enhancement Therapy as an Intervention for Pathological Internet Use Amongst At-Risk Adolescents in Secondary Schools in Dagoretti Sub-County, Nairobi.

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## Abstract

The aim of this study was to assess the efficacy of motivational enhancement therapy (MET) in treatment of pathological Internet use (PIU) among at-risk adolescents in Ruthimitu and Dagoretti Secondary Schools in Dagoretti Subcounty in Nairobi. The researcher applied a pretest-posttest design, a type of quasi-experimental research design. The quasi-experimental design required an experimental group and a control group which were used in determining the efficacy of MET as a therapeutic treatment. This study adopted purposive sampling technique to select the 135 respondents for the study from each school. The intervention comprised 4 sessions split into two comprising 8 group- weekly counselling sessions based on motivational enhancement therapy. There was a 3 month follow up after the intervention. The Statistical Package for Social Science (SPSS) version 24.0 statistical software was used in organizing the data. The results revealed that the treatment group PIU mean at baseline was 2.9630 $\pm$ (.18956 SD), which significantly reduced to 2.0074 $\pm$ (.19302 SD) at midline with a further reduction to 1.5259 (.50119) at endline. The measure of sampling adequacy by Kaiser-Meyer Olkin showed that the reduction adequacy was significant (p=0.000), but no significant (p=0.953) reduction was observed in the control group. In regard to the respondents' PIU at baseline the effect size was (d= 2.948; 95% CI: 2.983- 2.913) which was a large effect size. At the midline, the effect size was (d= 2.985; 95% CI: 3.012-2.958) while at the endline the effect size value was (d=2.978; CI: 3.040-2.915). The results were an indication that MET had a strong effect on the treatments of pathological Internet use among adolescents in secondary schools. Given the effect sizes in this study, there is all indication that MET is effective for reduction and treatment of PIU. Further studies should focus on possible predictors of efficacy such as gender, age, employment status of guardian, mental health, initial expectations, readiness to change, and whether study samples are drawn from treatment-seeking or non-treatment-seeking populations. Also, the components of MET could be compared to identify which are most responsible for maintaining long-term changes.

*Key words:* pathological Internet use, Internet addiction, efficacy, motivational enhancement therapy

## Introduction and Background

Internet has been considered a basic necessity and an integral part of present-day life. However, regardless of being a remarkable invention in the area of communication, Internet is not wholly safe, for it has a negative side to young people. The adolescents in schools are prone to spending most of their time in online activities such as online video games, excessive chatting, online gambling, online pornography and cyber bullying. Internet accessibility, easy availability and diverse uses among the adolescent population as a target group, has significantly increased (Maheshwari & Sharma-Preksha, 2018). For this reason, it is pertinent for mental health

professionals to realize the imminent danger of pathological Internet use (PIU) in the life of students as it can cause serious intrapersonal and interpersonal impairments. To avoid further escalation of this complex phenomenon, it is pertinent that all the stakeholders focus on enactment of preventive, diagnostic and treatment strategies (Kopp, Ramseier, Ratka-Krugger & Woelber, 2017).

As opposed to the previous confrontational strategies used to treat dependency issues such as PIU, Miller and Rollnick (2002) recommended an alternative technique called motivational enhancement. MET as a clinical strategy seeks to enrich the motivation of clients for change purposes. This intervention tends to be collaborative and mediated by a strong working alliance between clients and psychotherapists (Wagner & Ingersoll, 2013). This concept was frequently ignored in earlier confrontational addiction interventions. MET is a psychotherapy style for eliciting behaviour change by supporting clients in the exploration and resolution of ambivalence. MET has proved to be an effective intervention approach for reducing both pathological Internet use and risky Internet use related problems (Maheshwari & Sharma Preksha, 2018; Wagner & Ingersoll, 2013). In this regard, Miller and Rollnick (2013) suggested five key principles that inspire MET. The first underlines the person's current interests and problems. The second includes selective reaction to the individual's speech in a manner that helps resolve ambivalence and motivates change. The third applies a method of communication instead of a set of specific techniques. The fourth emphases on intrinsic motivation for change. Finally, in the context of the approach, change happens based on its importance to the client's own values (Miller & Rollnick, 2002). Earlier on Rollnick and Miller (1995) had proposed five key techniques of MET comprising: expressing empathy, developing discrepancy, avoiding argumentation, rolling with resistance, and supporting self-efficacy.

Essentially, MET was designed to be a brief intervention; to "strengthen personal motivation for and commitment to a specific goal by eliciting and exploring the person's own reasons for change within an atmosphere of acceptance and compassion" (Miller & Rollnick, 2013, p. 29). The MET brief intervention approaches were defined as any therapeutic or preventive short-term client-centered yet directive technique for enhancing intrinsic motivation to change by exploring and resolving client ambivalence (Wagner & Ingersoll, 2013). The sessions ranged between one to five; carried out either by a clinical psychologist, psychotherapist, counselling or other certified mental health-care professional (McMaster (2013). In essence, the brief interventions intend to enhance intrinsic motivation to relinquish addictive behaviors. In this, the individual learns new behavioral skills, open-ended questioning, reflective listening, empathy, affirmation, and summarization that support them explore and resolve ambivalence concerning addiction (Maheshwari & Sharma Preksha, 2018).

As Omilani and Akintolu (2017) stated, motivation denotes the reasons underlying behaviour, while intrinsic motivation refers to motivation that is energized by personal satisfaction or pleasure. Intrinsic motivation, according to Guay, Chanal, Marsh, Larose, and Boivon (2010) rejuvenates through the voluntary gratifications essential in real volitional action. It is exhibited in behaviour for example in play, exploration, and contests people usually do for visible rewards". According to Okeke (2010), motivation is contrast to manipulation; arguing that

motivation entails a stimulus to action supported by the considerate incentive of something. This suggests that determined motives change specific behaviors. Similarly, the level of motivation has been constantly recognized as a significant element in the treatment of pathological Internet use (Yakovenko, Quigley, Hemmelgarn, Hodgins & Ronksley, 2014). MET is imperative in giving new concepts for dealing with resistance and ambivalence. Motivation essentially ensures that the individual puts more effort into appreciating these concepts all the way to success. Motivational incentives can be the driving forces which induce individuals to be committed and meticulous in their endeavors to embrace change of behavior. They act as drives to gratify an unfulfilled need (Miller & Rollnick, 2013). As for the case of pathological Internet use, helping the client identify the risky or negative effects of pathological use of Internet can impart the motivation to change.

Adolescents in secondary schools have developed pathological Internet use (PIU) given the recent easy availability of Internet-enabled devices, hence causing serious social and emotional impairments. From time to time, educational institutions, governments, and other interested parties have made attempts to introduce preventive actions to treat or combat PIU. In general, the traditional strategies (though confrontational) are given priority in treatment of PIU and are used in setting ratifications for appropriate Internet use. Recently, MET has been reported as the most preferred psychosocial therapy for the treatment of many psychiatric disorders, including Internet use disorder or PIU (Nkayama, Mihara & Higuchi, 2017). Even in many cases where various psychotherapies have been used together, MET still prevailed as a vital component of the treatment since it provided motivation to the clients to recover and learn new skills for using the Internet appropriately. In some countries, as Nkayama et al., (2017) have reported, MET has been utilized for preventive education (in lectures and group discussions) and for the treatment of pathological Internet use among adolescents in treatment camps. This is evidence that MET has been appreciated as an effective intervention in reducing PIU symptoms for adolescents in secondary schools in Kenya.

Results from previous studies that examined the effects of interventions conducted with Motivational Interviewing principles indicated that MET was efficacious in preventive and treatment of PIU. For instance, a study by Su, Fang, Miller, and Wang (2011) examined the effect of an Internet-based intervention on PIU. The study used an online expert system known as the Healthy Online Self-Help Center (HOSC) as an intervention tool to help those who wished to reduce their online usage. The HOSC was based on MET procedures, utilized a client-centered conversation style and consisted of four modules, namely Ready to Start, Understanding Myself, Goal for Change, and Method of Change. A total of sixty- ve adolescents with PIU in a college setting were the respondents in the study. The respondents were randomly allocated to each of the following four conditions: using HOSC within a laboratory environment, using MET principles and HOSC within a natural environment (their home or dormitory), using a noninteractive program, and a non-intervention control group. The result revealed that respondents in MET-HOSC group exhibited signi cant reductions in their PIU levels than in any other group (Shingleton & Palfai, 2016).

Another study examined the effectiveness of motivational strategy within a multi-level psychotherapy program for respondents with PIU. This program was based on MET techniques and family psychotherapy. Most of the fifty nine respondents who participated in the study were adolescents. Results showed a signi cant improvement in the PIU score, but not as much improvement in family functioning was reported. The researchers concluded that the greatest efficacy for MET even when used with other approaches was due to its non-confrontational style application. On the other hand, Hall, Staiger, Simpson, Best, and Lubman (2016) argued that such efficacy of MET could also be linked to specific respondent variables such as severity of impairment.

In yet another study by Thorens, Achab, and Billieux et al. (2014) the impact of MET was investigated in a hospital setting frequented by patients with PIU. Fifty-seven patients with PIU were split to two groups. One group was administered standard addiction CBT and the other MET adapted for the treatment of PIU. Each group received six sessions with a mean treatment duration of 19 weeks. The researchers found that MET was more efficacious than standard addiction CBT: Overall, 12.3% of the patients were very much improved, 26.3% were much improved, 26.3% were minimally improved, 14.0% showed no change, and 24.6% had dropped out of the study. There were no patients in MET group that showed no change or dropped out of the study. Therefore, MET was found to be more efficacious than other active interventions targeting PIU (Wagner & Ingersoll, 2013). The current study's objective was to assess whether MET is more efficacious than no treatment in reducing PIU and whether MET is as efficacious as other conventional treatments.

## Methodology

The study was carried out in Ruthimitu and Dagoretti secondary schools in Dagoretti sub-County, Nairobi. It utilized quasi-experimental research design, required an experimental group and a control group which were used to determine the association between MET as a therapeutic treatment and the reduction of PIU symptoms. In this study therefore, MET intervention was only administered to the adolescents in the experimental group who had been diagnosed with PIU symptoms using the PRIUSS; a standardized screening scale. During the initial baseline meeting for the study, the respondents were verbally informed by the principal researchers about the objective of the study, the procedures and the number of sessions required for the completion of the intervention.

The respondents were 270 adolescents, aged 14-22 (mean age = 17.5); 155 males and 115 females. The intervention consisted of 8-group sessions based on MET. There was a 3-month follow up after the intervention. The one-hour group sessions were held once in a week. Although, these were group sessions, the focus was client-centered based on the theory of motivational interviewing (Miller & Rollnick, 2002). For every group psychotherapy session, certain objectives to be accomplished by the respondents in the subsequent meeting were agreed and deliberated. The objectives focused mainly on increasing motivation (motivation= importance + confidence +readiness to change), in an attempt to reduce symptoms of PIU.

The entire structure of the psychotherapy support was designed on the basis of two theories: Motivational interviewing (Miller & Rollnick, 2002) and Transtheoretical model ( Prochaska & Diclemente, 1984). Data collection had three main phases which comprised a baseline, midline and endline survey assessments after the intervention with students from form two to form three. In each session the principles of MI were emphasized and adhered to in order to explore the existing level of motivation for each respondent to make a health behavior change (Kopp, Ramseier, Ratka-Krugger & Woelber, 2017). The core motivational group model for this study comprised the following eight specific session titles for the treatment group: The interviewer introduction to the group and rapport building; Review limits of confidentially and exploration of habits; Administration of readiness ruler: to evaluate group members' readiness to change the target behavior and utilize MI to target the client's current stage of change; The stages of change and awareness:- included enhancing self-confidence and self-awareness; Looking forward: Assisting clients develop a sense of hope for their possible futures and develop discrepancy with current choices; Decisional balance: Pros and cons of changing and staying the same; Supporting self-efficacy: Self talk, change success stories and exploring strengths; Planning for change and the role of importance, confidence, and desire for change (Hoffmann, Glasziou, Boutron, Milne, Perera & Moher 2014).

Follow-Up: The intervention phase session was concluded with midline assessment. At that point, a 3-month follow-up phase was allowed. After this period endline assessment was conducted; to obtain additional post-treatment data which also helped in determining the effect of the interventions in symptoms reduction of PIU.

Instruments: A socio-demographic questionnaire attached to Problematic and Risky Internet Use Screening Scale (PRIUSS) was used in the first meeting with the respondents before the intervention. Other tools used were problematic Internet Use in adolescent (PIU-a); Internet Disorder Scale- Short Form (IDS9-SF) and Readiness Check Ruler. The PRIUSS, PIU-a and IDS9-SF have diverse number of items using a 5-point Likert scale; each with 3 subscales: i) Social Impairment ii) Emotional Impairment; iii) Risky/Impulsive Internet Use. The readiness check ruler has a scale of 1 to 10. The ruler was used from time to time to check on motivation changes (motivation= importance + confidence +readiness to change) in the course of treatment. The respondents evaluated their specific readiness by uttering a figure verbatim or marking on the ruler.

Data analysis: Data collected from the three phases were analyzed using Statistical Package for Social Science(SPSS)version 24.0 statistical software. For the processing of statistical output and construction of tables and graphs, Microsoft Excel was used. The obtained data were analyzed using descriptive statistics, independent t-test, and analysis of variance. Additionally, multivariate logistic regression analysis was applied to find a relationship between sociodemographic variables and being prone to pathological Internet use. All statistical tests were two sided with a p-value $<0.05$ considered statistically significant

**Results**

This study sought to assess the efficacy of MET in treatment of PIU among the at-risk adolescents in selected secondary schools in Dagoretti sub-County. The focus of this objective was particularly on practicality of MET as an intervention for the adolescents. The experimental group received MET intervention while control group did not receive any intervention.

*Table 1: Respondents' Pathological Internet Condition at Endline and Distribution of Socio-Demographic Characteristics*

| Variables | Total % | Respondents pathological Internet Conditions | | | Chi-Square Test | | |
|---|---|---|---|---|---|---|---|
| | | Minimal | Moderate | pathological | $X^2$ | df | Sig. |
| Respondents Gender | | | | | | | |
| Male | 154 (57.2) | 33 (12.3) | 49 (18.2) | 72 (26.8) | 4.148 | 1 | .126 |
| Female | 115 (42.8) | 31 (11.5) | 24 (8.9) | 60 (22.3) | | | |
| Respondents Age | | | | | | | |
| 14-16 | 115 (42.8) | 30 (11.2) | 26 (9.7) | 59 (21.9) | 2.777 | 2 | .596 |
| 17-19 | 149 (55.4) | 32 (11.9) | 46 (17.1) | 71 (26.4) | | | |
| 20-22 | 5 (1.9) | 1 (0.4) | 2 (0.7) | 2 (0.7) | | | |
| Respondents Level of Education | | | | | | | |
| Form 2 | 132 (48.9) | 36 (13.3) | 40 (14.8) | 56 (20.7) | 4.386 | 1 | .112 |
| Form 3 | 138 (51.1) | 28 (10.4) | 34 (12.6) | 76 (28.1) | | | |
| Respondents Religious Affiliation | | | | | | | |
| Catholics | 86 (31.9) | 19 (7.0) | 24 (8.9) | 43 (15.9) | 17.834 | 5 | .058 |
| Anglican | 39 (14.4) | 11 (4.1) | 14 (5.2) | 14 (5.2) | | | |
| Pentecostal | 77 (28.5) | 12 (4.4) | 15 (5.6) | 50 (18.5) | | | |
| Adventist | 18 (6.7) | 6 (2.2) | 6 (2.2) | 6 (2.2) | | | |
| Muslim | 8 (3.0) | 2 (0.7) | 1 (0.4) | 5 (1.9) | | | |
| Others | 42 (15.6) | 14 (5.2) | 14 (5.2) | 14 (5.2) | | | |
| Fathers' occupation | | | | | | | |
| Not employed | 78 (28.9) | 16 (5.9) | 18 (6.7) | 44 (16.3) | 26.165 | 4 | .001 |
| Casuals menial jobs | 40 (14.8) | 5 (1.9) | 5 (1.9) | 30 (11.1) | | | |
| Farmer/Agricultural | 9 (3.3) | 0 (0.0) | 5 (1.9) | 4 (1.5) | | | |
| Self-employed/ B/s | | | | | | | |
| Prof. (office) | 80 (29.6) | 27 (10.0) | 24 (8.9) | 29 (10.7) | | | |
| employed | 63 (23.3) | 16 (5.9) | 22 (8.1) | 25 (9.3) | | | |

*Table 1: Respondents' Pathological Internet Condition at Endline and Distribution of Social-*

*Demographic Characteristics (continued)*

| Variables | Total % | Respondents pathological Internet Conditions | | | Chi-Square Test | | |
|---|---|---|---|---|---|---|---|
| | | Minimal | Moderate | Pathological | $X^2$ | df | Sig |
| Mothers'occupation | | | | | | | |
| Not employed | 79 (29.3) | 10 (3.7) | 13 (4.8) | 56 (20.7) | 32.594 | 4 | .000 |
| Casuals menial jobs | 44 (16.3) | 8 (0.4) | 11 (4.1) | 25 (9.3) | | | |
| Farmer/Agricultural | 7 (2.6) | 1 (0.4) | 3 (1.1) | 3 (1.1) | | | |
| Self-employed/B/s | 101 (37.4) | 33 (12.2) | 30 (11.1) | 38 (14.1) | | | |
| Professionals (office) job | 39 (14.4) | 12 (4.4) | 17 (6.3) | 10 (3.7) | | | |
| Whom respondent is living with | | | | | | | |
| Biological Parents | 147 (54.4) | 40 (14.8) | 45 (16.7) | 62 (23.0) | 15.300 | 5 | .122 |
| Adopted Parents | 2 (0.7) | 1 (0.4) | 1 (0.4) | 0 (0.0) | | | |
| Single Parents | 84 (31.1) | 14 (5.2) | 16 (5.9) | 54 (20.0) | | | |
| Guardian/Foster | 11 (4.1) | 2 (0.7) | 3 (1.1) | 6 (2.2) | | | |
| Parents | 2 (0.7) | 1 (0.4) | 1 (0.4) | 0 (0.0) | | | |
| Grandparents | 24 (8.9) | 6 (2.2) | 8 (3.0) | 10 (3.7) | | | |
| Others relatives | | | | | | | |

Table 1 presents pathological Internet condition of the respondents at endline and distribution of socio-demographic characteristics. The distribution of respondents' pathological Internet condition at endline was grouped into three classifications comprising minimal, moderate and pathological. As indicated in Table 1, all the variables were insignificant ($p > 0.05$). However, occupation of respondents' father ($p = .001$) and occupation of respondents' mother ($p = .000$) showed significant distribution difference across the intervention groups. The overall percentage of the male respondents was higher (57.2%) in comparison to that of the female (42.8%). The proportion of the male respondents with minimal symptoms of PIU was 12.3%, those with moderate symptoms were 18.2% and those with pathological symptoms were26.8%. The PIU symptoms of the female respondents were 11.5% for the minimal level, 8.9% for the moderate level and 22.3% for the pathological level. The distribution difference vis-à-vis the gender of the respondents was not statistically significant ($p=.126$). The implication was that the respondents were distributed consistently with negligible difference.

Out of all the respondents aged 14-22 years, 11.2% exhibited minimal level of PIU, 9.7% had moderate symptoms while 21.9% exhibited pathological level of PIU. For those aged 17-19 years, 11.9% showed minimal symptoms, while 17.1% showed moderate condition of PIU. The respondents aged 20-22 demonstrated 0.4% minimal condition and 0.7% for moderate and pathological conditions. The difference in condition of respondents according to age was not statistically significant ($p = .596$). This means that the condition of the respondent was consistently distributed within the three classifications.

The frequency by educational level of respondents indicated that among the students in form two, 13.3% exhibited minimal condition of PIU, 14.8% had moderate condition and 20.7% had pathological condition of PIU. On the other hand, the frequency among the form three students

showed that 10.4% had minimal condition, 12.6% had moderate condition while 28.1% had pathological condition. The distribution by education level of the respondents seemed to be slightly different across the three condition levels but the difference was statistically insignificant (*p= .112*).

The religious affiliations in this study were also considered. The distributions of the condition by denominations were Catholics at 7.0% for the minimal condition, 8.9% of the moderate condition and 15.9% of the pathological condition. Among the respondents whose denomination was Anglican, 4.1% were categorized under the minimal condition, 5.2% for moderate condition and pathological condition respectively. The condition of the respondents whose denomination was Pentecostal showed that 4.4% were in minimal condition, 5.6% in moderate condition and 18.5% in pathological condition. Among the Adventists, the distribution of the condition was at 6.7% for minimal condition, 2.2% for moderate condition and pathological condition respectively. For those whose religion was Islam, 0.7% had minimal condition, 0.4% had moderate condition and 1.9% had pathological condition. All the respondents who identified with other religious affiliations were in minimal condition (5.2%), moderate condition (5.2%) and pathological condition (5.2%). The distribution across the three conditions was to some extent statistically significant (*p= .058*). This suggests that the distribution was slightly different among the different denominations or religions.

With regard to the distribution of occupation of the father, those respondents whose fathers were not employed (5.9%) were grouped within minimal condition, 6.7% within moderate condition and 16.3% within pathological condition. Among the casuals or menial jobs, 1.9% were grouped in minimal and moderate conditions respectively while 11.1% were grouped within pathological condition. Similarly, among those whose fathers were farmers or engaged in agricultural activities, 0.0% were grouped in minimal condition, 1.9% in moderate condition and 1.5% in pathological condition. Among those whose fathers were self -employed or in business, 10.0% were grouped within minimal condition, 8.9% within moderate condition and 10.7% within pathological condition. Among respondents whose fathers were in professionals (office) jobs, 5.9% had minimal condition, 8.1% had moderate condition while 9.3% had pathological condition. Overall, the respondents whose fathers were not employed had significantly higher (16.3%) proportion of PIU meaning that the difference in distribution according to the occupation of respondents' fathers were statistically significant (*p= 001*). This implied that the respondents' conditions in PIU were consistently distributed with notable difference.

In addition, the results showed that respondents whose mothers were not employed (3.7%) were categorized within minimal condition, 4.8% were within moderate condition and 20.7% within pathological condition. Of those whose mothers were on casual or menial jobs, 0.4% were put under minimal condition, 4.1% were under moderate condition and 9.3% were under pathological condition. Likewise, among those whose mothers were farmers or engaged in agricultural activities, 0.4% were grouped in minimal condition, and 1.1% were in moderate condition and pathological condition each. For those whose mothers were self-employed or in business, 12.2% were categorized within minimal condition, and 11.1% were within moderate condition and 14.1% were within pathological condition. Similarly, among respondents whose mothers were professionals (in office employment), 4.4% were in minimal condition, 6.3% were in moderate condition and 3.7% were in pathological condition. Overall, the respondents whose mothers were not employed had significantly higher (20.7%) proportion of PIU. The difference

in PIU condition seemed to be statistically significant (*p= .001*). This implied that the frequency of the occupation of the mother of the respondents in regard to PIU was different across the three conditions.

On the basis of the respondents' family settings, those who were living together with both biological parents were at 14.8% in minimal condition, 16.7% in moderate condition and 23.0% in pathological condition. Among the respondents living with adopted parents, 0.4% were in minimal condition and moderate condition respectively, while 0.0% were in pathological condition. For the adolescents whose parents were single, 5.2% had minimal condition, 5.9% had moderate condition and 20.0% had pathological condition. Among the respondents who lived with guardians or adopted parents, 0.7% were grouped under minimal condition, 1.1% were under moderate condition and 2.2% were under pathological condition. Of those adolescents who lived with their grandparents, 0.4% were in minimal condition and moderate condition respectively while there were none in the pathological condition. Among the respondents living with other relatives, those with minimal condition were 2.2%, those with moderate condition were 3.0% and those with pathological condition were 3.7%. The distribution of the respondents' family setting was slightly different across the three PIU condition and the difference was not statistically significant (*p= .122*).

The results indicated that the three conditions were comparable in regard to key characteristics except for the occupation of the parents of the respondents. Both the occupation of the respondent's fathers (*p=001*) and that of the mothers (*p=.000*) revealed a significant difference among the minimal, moderate and pathological conditions This means that the occupation of the respondents' parents was a controlling factor and could be acting as a confounder.

*Table 2: Principal Component Analysis of Mean Reduction Estimates of Pathological Internet Use Scores for Experimental and Control* Groups

| Experimental Time | N | Mean & Std.Dev | MKO & Bartlett's test | df | Sig. | Control Time | N | Mean & Std. Deviation | MKO & Bartlett | df | Sig. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Baseline<br>Midline<br>Endline | 135 | 2.9630 (.18956)<br>2.0074 (.19302)<br>1.5259 (.50119) | 32.556 | 3 | .000 | Baseline<br>Midline<br>Endline | 135 | 2.9481 (.22255)<br>2.9852 (.12126)<br>2.9778 (.14795) | .335 | 3 | .953 |

Kaiser Meyer- Olkin measure of significant reduction

Table 2 presents the Principal Component Analysis (PCA) of mean reduction estimates of PIU scores for experimental and control groups. PCA is a variable reduction technique that extracts maximum common variance from all variables and puts them into a common score, hence reducing larger set of variables into smaller set of artificial variables called principal components, which account for most of the variance in the original variables. The table therefore evaluates the reduction of mean PIU from baseline to endline. In this regard KMO and Barlett's tests were done as measures of sampling adequacy. The MKO measure of the sampling adequacy indicated that a significant reduction in adolescents' PIU mean was observed. In the

experimental group (MET intervention), the mean PIU at baseline was 2.9630 ± (.18956 SD), which significantly reduced to 2.0074 ± (.19302 SD) at midline with a further reduction to 1.5259 (.50119) at endline. Besides, KMO measure of sampling adequacy showed that the reduction adequacy was significant (p=0.000), whereas insignificant reduction was noticed in the control group (*p*=0.953) as shown in Table 2. This implied that the MET intervention led to the statistical significance reduction in the PIU use in the experimental group. There was a significant difference in reduction of PIU among the adolescents treated with MET (*p= .000*) between baseline and endline treatment. This is an indication that MET was statistically efficacious in reducing PIU among the study population.

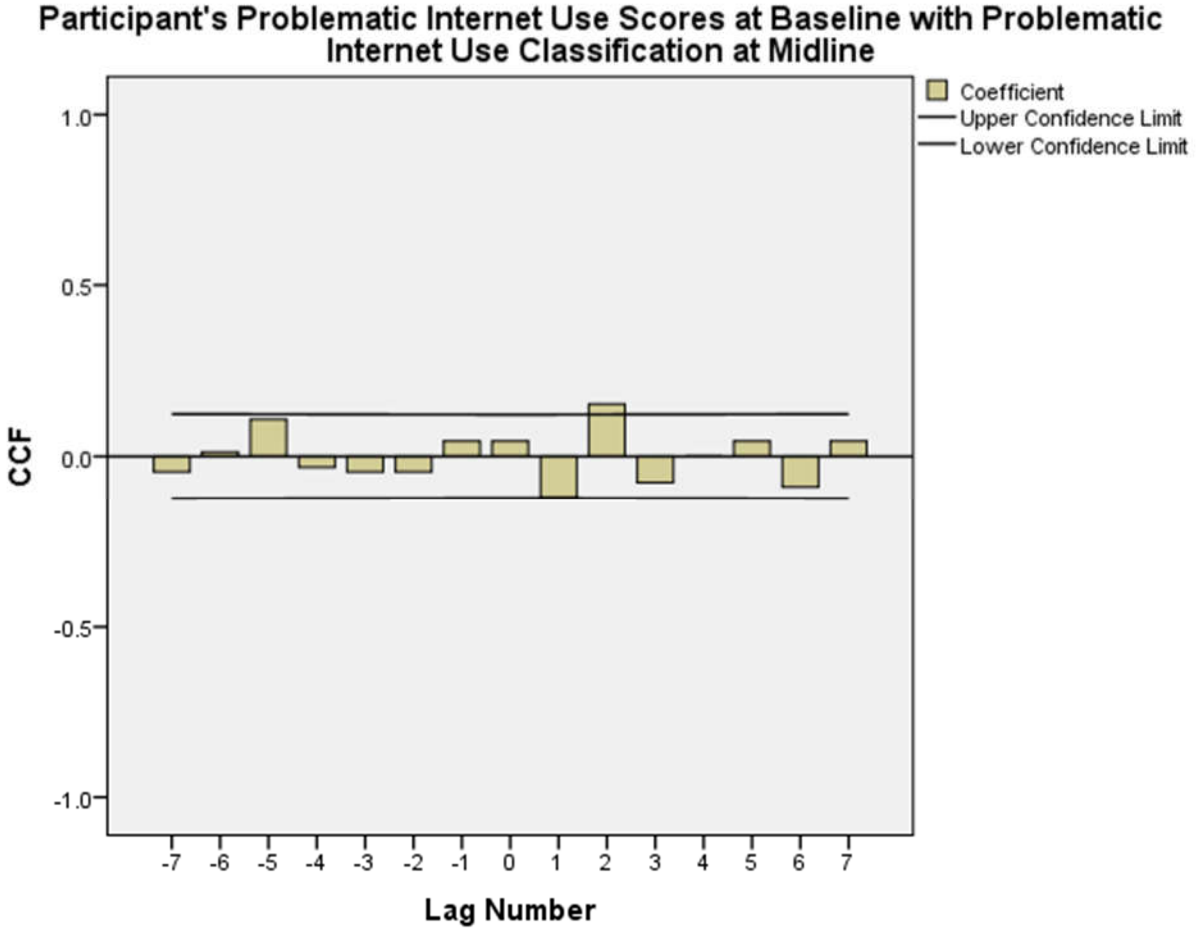
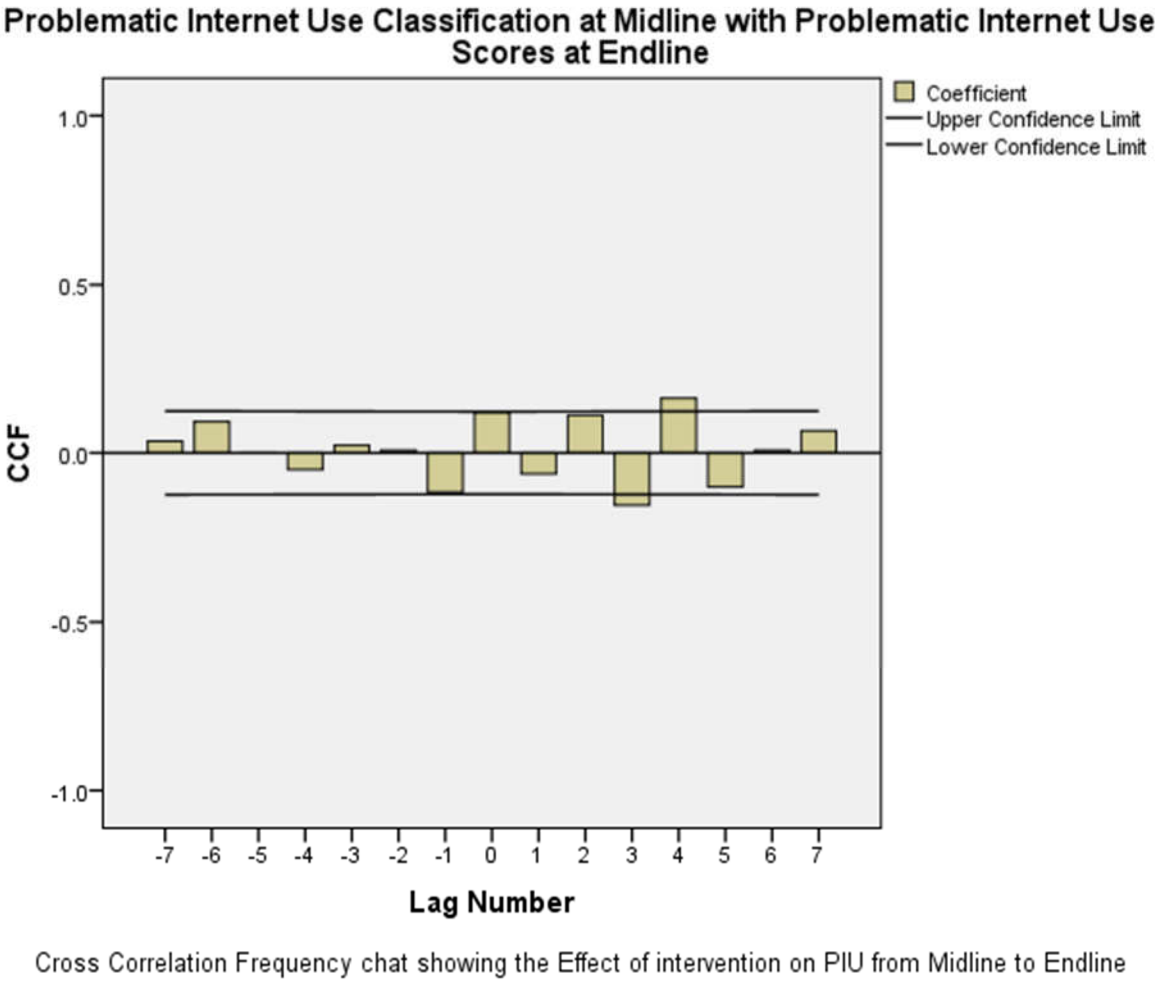



*Figure 1: Cross Correlation Frequency Chart Showing the Effect of Intervention on PIU from Baseline to Midline*

Figure 2 presents the sequential chart of cross correlation frequency showing the effect of intervention on PIU from Baseline to Endline phases of the study. The x- axis indicated the cross correlation Frequency whereas y- axis indicated the lag number.




Cross Correlation Frequency chat showing the Effect of intervention on PIU from Midline to Endline

*Figure 2: Cross Correlation Frequency Chart Showing the Effect of intervention on PIU from Midline to Endline*

Figure 2 presents the sequential chart of cross correlation frequency showing the effect of intervention on PIU from Midline to Endline phases of the study. The x- axis indicated the cross correlation Frequency whereas y- axis indicated the lag number.

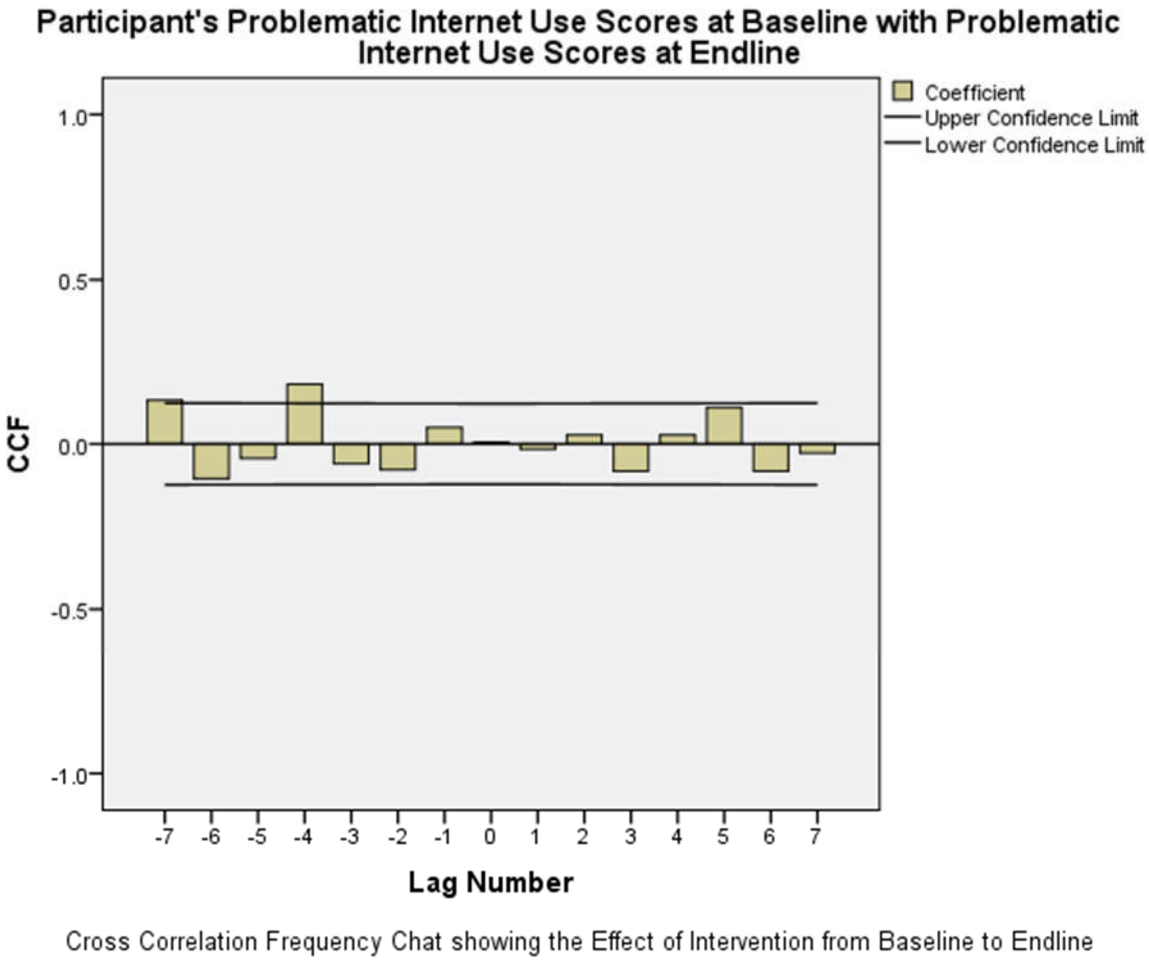



*Figure 3: Cross Correlation Frequency Chart Showing the Effect of intervention on PIU from Baseline to Endline of the Research Groups*

Figure 4 presents the sequential chart of cross correlation frequency showing the effect of intervention on PIU from Baseline to Endline phases of the study. The x- axis indicated the cross correlation Frequency whereas y- axis indicated the lag number.

4.7 The Effect Size of Motivational Enhancement Therapy

Effect size in statistics is a quantitative measure of the magnitude of a phenomenon. The larger the effect size, the stronger the relationship between two variables. Effect sizes either measure the sizes of associations between variables or the sizes of differences between group means. In a study the effect size is determined when comparing any two groups to see how substantially different they are. Cohen's *d* effect size has the following interpretation: small, 0.10 – < 0.30; medium, 0.30 – < 0.50; large, ≥ 0.50. Cohen's *d* effect size calculation was done to test whether MET had had a small, medium or large effect on treating PIU.

*Table 3: Effect Sizes of Inter-Group Parameter Estimates*

| Parameter Estimates | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | 95% Confidence Interval | | |
| Dependent Variable | Parameter | B | Std. Error | t | Sig. | Lower Bound | Upper Bound | Partial Eta Squared |
| Respondents PIU Classification | Intercept | 2.948 | .018 | 165.709 | .000 | 2.913 | 2.983 | .990 |
| | Experimental | .015 | .025 | .589 | .556 | -.035 | .064 | .001 |
| | Control | 0[a] | . | . | . | . | . | . |
| PIU Classification at Midline | Intercept | 2.985 | .014 | 215.183 | .000 | 2.958 | 3.012 | .994 |
| | Experimental | -.978 | .020 | -49.838 | .000 | -1.016 | -.939 | .903 |
| | Control | 0[a] | . | . | . | . | . | . |
| PIU Scores at Endline | Intercept | 2.978 | .032 | 93.633 | .000 | 2.915 | 3.040 | .970 |
| | Experimental | -1.452 | .045 | -32.281 | .000 | -1.540 | -1.363 | .795 |
| | Control | 0[a] | . | . | . | . | . | . |

a. This parameter is set to zero because it is redundant.

Table 3 presents the partial Eta squared ($\eta^2_p$) analysis of effect sizes for group mean differences using Cohen's *d* standardized mean difference. In this study, the effect size parameters were used to estimate the impact of the MET as a therapeutic approach in treating PIU among the secondary school adolescents. Effect size was calculated to show the practical significance of outcome and to determine whether an intervention or experimental manipulation had an effect greater than zero or how big the effects of intervention were on the respondents. As shown on Table 3 the effect of intervention from baseline to midline indicates $t$ = -49.838, Cohen's $d$ = -.978 ($p$=0.000). This shows a very large effect size which implies that the difference was huge.

The study revealed that MET was efficacious in reducing PIU symptoms among the respondents. In regard to the respondents' problematic Internet use at baseline the effect size (d= 2.948; 95% CI: 2.983- 2.913) was large. In regard to PIU classification at midline, the effect size was (d= 2.985; 95% CI: 3.012-2.958). At the endline, the effect size was (d=2.978; CI: 3.040-2.915). These effect sizes shown in Table 3 suggested quite a large practical significance in terms of inter-group parameter estimates. This was an indication that the intervention used in this study had a strong effect on the treatments of PIU among adolescents in this study. The efficacy of the intervention based on the effect sizes from baseline to endline implied that MET treatment was capable of reducing the mean PIU even lower (baseline 2.948, midline 2.985, endline 2.978). This suggested that the treatment of PIU among the respondents was effective with the use of MET.

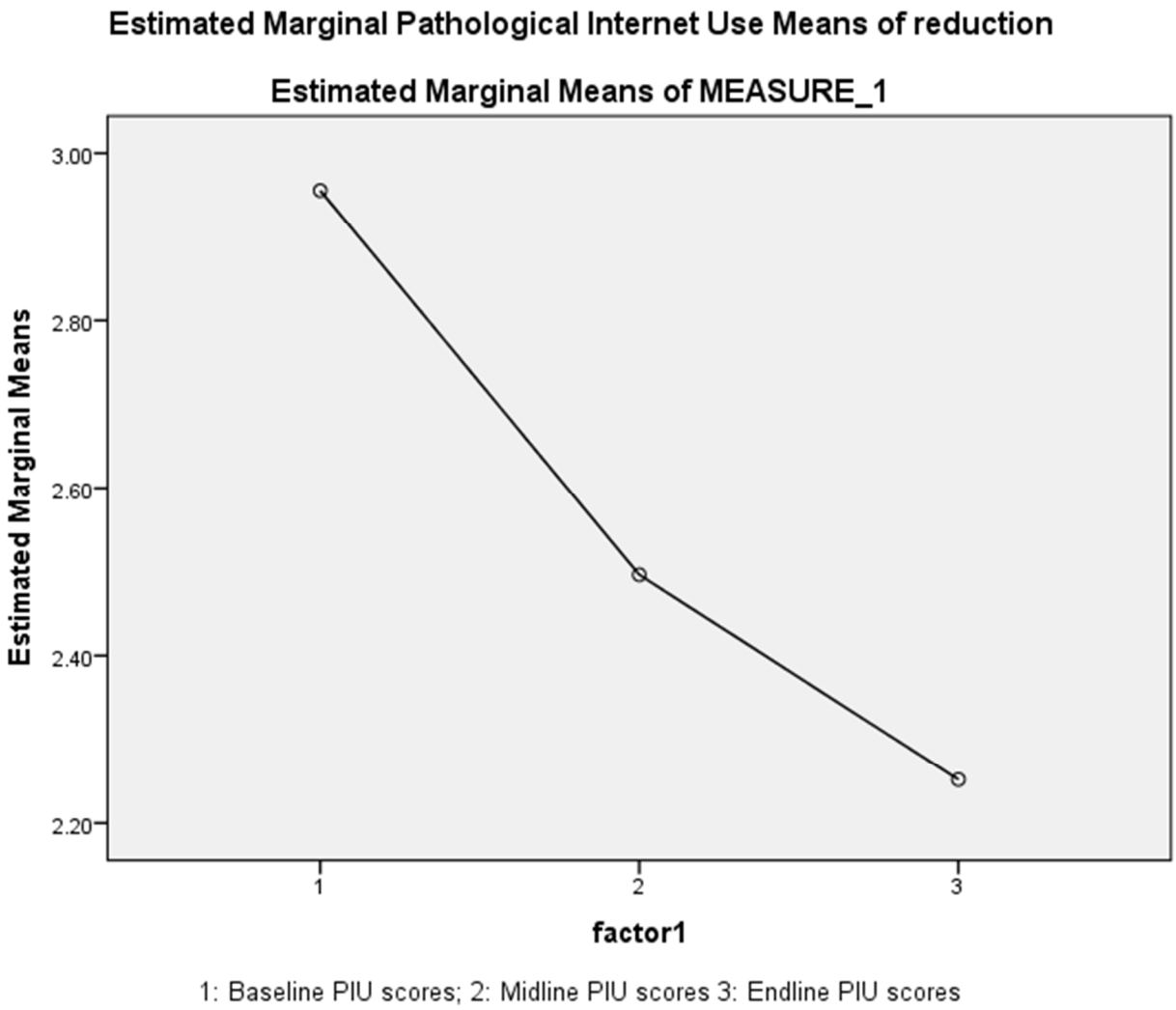



*Figure 4: Profile Plot Showing the Estimated Marginal Pathological Internet Use Means of Reduction*

Analysis was also conducted to illustrate the mean reduction of PIU symptoms from baseline through midline to endline in the experimental group. To demonstrate this, a profile plot was carried out to show the effect of MET intervention on the mean of reduction of PIU scores over the treatments timelines. Figure 4 shows a drastic decline in PIU scores across timelines. This was an indication that MET had a large effect given the significant decline in reduction of PIU symptoms. Precisely, this depicted that MET as a therapeutic intervention had an impact at post-treatments phases (midline and endline), further suggesting that MET was statistically effective in reducing PIU ($P<0.05$) among the adolescents under study.

*Table 4: Independent Sample T-Test Group Mean Statistics*

| Variables | Group Statistics | | | | |
|---|---|---|---|---|---|
| | Group | N | Mean | Std. Deviation | Std. Error Mean |
| Respondents Problematic Internet Use Classification | Experimental | 135 | 2.9630 | .18956 | .01631 |
| | Control | 135 | 2.9481 | .22255 | .01915 |
| Problematic Internet Use Classification at Midline | Experimental | 135 | 2.0074 | .19302 | .01661 |
| | Control | 135 | 2.9852 | .12126 | .01044 |
| Problematic Internet Use Classification at Endline | Experimental | 135 | 1.5259 | .50119 | .04314 |
| | Control | 135 | 2.9778 | .14795 | .01273 |

Table 4 presents the descriptive group means statistics of respondents' scores on PIU as background distribution statistics for Independent sample t-test. The PIU mean scores at baseline, midline and endline treatments for the experimental and control groups demonstrated steady decline in the mean PIU scores throughout the study period from the mean at baseline of 2.9630(.18956 SD) to the mean of 1.5259(.50119 SD) for the experimental group and mean of 2.9481(.22255) to mean of 2.9778(.14795) for the control group.

With regard to respondents' PIU score, the experimental group had a mean of 2.9630 $\pm$ (.18956 SD) as opposed to the mean of 2.9481 $\pm$ (.22255 SD) for control group at baseline. The mean at midline was 2.0074 $\pm$ (.19302 SD) for experimental group and 2.9852 $\pm$ (.12126 SD) for control group, while the mean scores for the experimental group was 1.5259 $\pm$ (.50119 SD) and (2.9778 $\pm$ (.14795) for the control group at endline.

Table 4 also indicated that there was a statistically significant difference between the mean scores of the experimental group and the control group. Similarly, the Group Statistics box suggested that the mean for the experimental group was greater than for control group (as shown in Table 4). This indicates that the experimental group still presented with noticeably much less PIU symptoms than the control group six months after the MET therapeutic treatment was administered. This shows that, the MET intervention was very efficacious in the treatment of PIU for the at-risk adolescents since it still showed its effects on the students long after the intervention.

*Table 5: Independent Sample T-Test Analyzing the Efficacy of MET in Treatment of Pathological Internet Users*

| Respondents' Scores on PIU | Equality of Variance | | T-Test for Equality of Means | | | | | 95% Confidence interval of the Difference | |
|---|---|---|---|---|---|---|---|---|---|
| | F | Sig. | t | df | Sig. | Mean Difference | Std. error Difference | Lower | Upper |
| Baseline | 1.394 | .239 | .589 | 268 | .556 | .01481 | .02516 | -.03472 | .06435 |
| Midline | .612 | .435 | -49.838 | 268 | .000 | -.97778 | .01962 | -1.01640 | -.93915 |
| Endline | 1353.743 | .000 | -32.281 | 268 | .000 | -1.45185 | .04498 | -1.54040 | -1.36330 |

Table 5 presents the inferential statistical test that determined whether there was a statistically significant difference between the equality of variance and equality of means. The independent samples t-test compared two groups on the mean value of a continuous (interval) normally distributed variable. The model assumed that a difference in the mean score of the dependent variable (PIU) was found because of the influence of the independent variables (MET and control group) that distinguished the two groups.

Moreover, Table 5 indicates that the variance between baseline and midline was equal ($p$=.435) which meant there was no significant difference in equality of variance in reduction of PIU between baseline and midline. At endline, however, a strong difference was observed which was an indication that equality of variance at endline was not equal (p=0.000). The T-test for equality of means in reduction of PIU symptoms at endline as presented in Table 5 revealed that MET was significantly effective in treatment of PIU among the secondary school adolescents (p=0.000). Precisely, this meant that there was no statistically significant difference between the respondents means of PIU symptoms in the experimental and control groups at baseline. This implied that the mean PIU scores did not differ (t (268) = 49.838, p=.556) between the adolescents in both groups prior to the MET intervention. Therefore, T-test for the equality of means showed that there were no statistical significant differences between the experimental and control groups at baseline.

Additionally, the data from Table 5 indicated that at midline the difference in mean score between the experimental and control groups was statistically significant ($p$= .000) in PIU mean score. The implication was that there was a statistically significant difference between the mean scores of the experimental group and the control group. Since the Group Statistics box (in Table 4) revealed that the mean for the experimental group was greater than for control group, the conclusion was that the experimental group exhibited considerably reduced PIU symptoms than in the control group after the MET therapeutic treatment was administered. This implied that, the MET intervention was very efficacious in the treatment of PIU for the at-risk adolescents in the secondary schools.

## Discussion

This study sought to assess the efficacy of MET in treatment of PIU among the at-risk adolescents in secondary schools. In the midst of the socio-demographic attributes, the study showed that occupation of respondent's father ($p$= .001) and occupation of respondents' mother ($p$= *.000*) indicated a significant difference between PIU and MET intervention. Specifically, it was found that (i) the respondents whose fathers were not employed had significantly higher (16.3%) proportion of PIU, (ii) similarly, the respondents whose mothers were not employed had significantly higher (20.7%) proportion of PIU. This implies that the occupation of respondents' parents had stronger effects than other socio-demographic characteristics. This finding is consistent with other studies that demonstrated that the occupation of the respondents' parents were found to be predictors of pathological Internet use among the respondents (Yu & Shek, 2013; Shek & Lin, 2014).

In addition, when the mean PIU scores were compared at pre-treatment and post-treatment phases of the intervention, the data showed a declining trend in the mean PIU scores throughout

the study period of 6 months from the mean at baseline of 2.9630 ± (.18956 SD), to 2.0074 ± (.19302 SD) at midline and then to 1.5259 ± (.50119 SD) at endline. In determining the effect of the interventions in symptoms reduction of PIU behaviors, KMO a measure of significant reduction was done. The measure revealed a steady decline over the pre-treatment and post-treatment phases of the intervention depicting significant reduction of the PIU scores; with a significant reduction adequacy (p=.000). Likewise, sample paired T-test was also conducted to investigate the significance in the paired mean difference scores between baseline and end-line. The statistical analysis implied that the MET intervention led to the statistical significant reduction ($p$= .0001) in the PIU in the experimental group. MET has been found to be statistically significant in diverse randomized and non-randomized control trial research. This observation is in line with other studies that showed that the promotion of MET can help reduce risky behaviors such as PIU among adolescent (Mun & Lee, 2015; Tsuruta & Nojima, 2015).

This study has clearly demonstrated that therapeutic interventions such as MET significantly reduced PIU symptoms and therefore was statistically efficacious in treatment of PIU behaviour among secondary school adolescents between 14-22 years of age. This affirms the emerging appreciation of MET as a therapeutic approach which is non- confrontational and a friendlier style to the adolescent subpopulation (Wagner & Ingersoll, 2013) enhancing its effectiveness. Meanwhile, Miller and Rollnick (2013) postulated that further research is inevitable in corroborating other usual psychotherapy strategies with motivational interviewing model to form a mutual treatment to be well-known as one of the best approaches for changing unhealthy behaviors in a short time period (VanBuskirk, & Wetherell, (2014).

## Conclusion

As Internet use is encouraged among young population in a wide range of activities of educational and everyday life, total abstinence from Internet is neither possible nor recommended. Therefore, emphasis has to be on responsible Internet use training, and engagement of appropriate preventive and curative interventions to cater for persons affected with PIU. This study revealed that MET is an efficacious intervention for reducing PIU. The study also showed that MET is more effective with young people especially adolescents who persistently use Internet than the older population. Precisely, adolescents affected by PIU who voluntarily seek help benefit the most from MET. Since MET has been recognized as an effective strategy for reducing PIU, it is recommended that future studies focus be on aspects that affect PIU long-term efficacy and can also assess its cost effectiveness. These aspects comprise respondents' age, gender, parents' employment status, education level, initial expectations, readiness to change, and if they try to find treatment. Besides, the MI key components of MET could be investigated in depth, to specifically identify the components which dominantly sustain the long-term changes.

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