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# Electronic Devices Use Association with Psychological Distress and Sleep among Adolescents

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**ABSTRACT**

**Introduction**: Adolescents' electronic devices (e-devices) use is an emerging issue that may influence their emotions and sleep. The relations between e-devices use and psychological distress of stress, anxiety, depression, and sleep in this population are not well examined. This study aimed to describe e-devices use and psychological distress and sleep in a sample of adolescents and examine the relationships between e-devices use and psychological distress and sleep.

**Design:** This descriptive comparative study utilized cross-sectional collected data on e-devices use, psychological distress, and sleep from 485 randomly selected Jordanian adolescents. Descriptive and inferential statistics were used in this study.

**Results:** About 99% of the subjects reported using e-devices for a mean of 5 hours/day. Subjects reported an average of 8 hours of sleep /day, though two-thirds of them reported not getting enough sleep. About 17%, 37.9%, 20.2%, and 10% of the subjects had severe to extremely severe levels of stress, anxiety, depression, and moderate to severe insomnia, respectively. The stress and anxiety scores were significantly higher (worse) in high- compared to low- e-devices users. The difference in insomnia scores approached the significance level (p 0.06), with high e-devices users had poorer scores.

**Conclusion:** E-devices use is a widespread behavior among Jordanian adolescents. This study demonstrated the negative relationship between e-devices use and psychological distress, especially among female adolescents. It supports targeting adolescents' e-devices users to promote their mental health.

**Keywords:** adolescents, electronic devices, psychological distress, sleep, insomnia

## INTRODUCTION

During the last decade, electronic devices (e-devices) such as smartphones, video games, computers, and tablets have become essential to modern societies [1,2]. Although e-devise use in a reasonable way is beneficial in improving cognitive skills such as intellectual, attentional control, and problem-solving [3-5], but may have several negative consequences if misused [6]. In 2014, the World Health Organization (WHO) has described excessive e-devices use as a risk factor for developing internet addiction, a behavioral problem similar to the compulsive-impulsive spectrum disorder [7]. Furthermore, the WHO's 11th Revision of the International Classification of Diseases (ICD-11) has included gaming disorder as a new disorder [8]. Given the risk of excessive e-device use, experts have suggested controlling screen time for adolescents. For example, the Canadian 24-Hour Movement Guidelines recommend ≤2 hours/day [9] while the American Academy of Pediatrics limits screen time use to no more than 1 hour or less per day [10].

A systematic review of reviews synthesized the effects of excessive e-devices for young adolescents' health found that higher e-devices are related to various health harms such as adiposity, unhealthy diet, impacts on sleep, social interaction, and adverse psychological effects [11]. Also, excessive e-devices use has shown associations with many physical health-related problems such as blurred vision and pain in the wrists or neck pain [12,13]. Moreover, overuse of e-devices may lead to some psychological or behavioral problems. It may cause maladaptive behavioral difficulties [14]. A systematic review found that excessive e-devices were related a relation with anxiety (β coefficients, .12-.23) and depression (β coefficients, .15-.48), and stress (β coefficients, .10 to .30) [15]. This problematic e-devices usage has been reported to be associated with the duration of e-devices use [16].

E-devices addiction also may affect the quality of adolescents' sleep [17,18] and may lead to insomnia [19,20].

Poor sleep quality has arisen as a related public health problem among e-devices users [21]. The National Sleep Foundation and the American Academy of Sleep Medicine recommend sleeping 8 to 10 hours/day to promote optimal health and support healthy development [9,22]. E-devices use at bedtime may impact subsequent sleep through the melatonin-suppression effect and to the increase of pre-sleep psychophysiological arousal secondary to the meeting and content of the media screen time and bedtime [23]. In turn insomnia and poor sleep quality have shown association with an increased risk for the development of major depressive disorder (odds ratio 2.1) [24].

Past existing studies have focused on identifying the links between e-devices and psychological symptoms [15,17], e-devices and sleep problems [16,25,26], the addiction of e-devices [18,19], or developing, evaluation instruments for various e-device addiction [27-30]. The widespread use of e-devices during the Coronavirus disease pandemic, adolescents are likely to use e-devices for more hours per day. Despite the widespread use of e-devices and society, only a few published reports have examined the relations between the use of e-devices and adolescents' psychological health. Therefore, this study aimed to describe the effects of e-devices use, depression, anxiety, stress, and sleep in a sample of Jordanian adolescents and examine the associations between e-devices use and depression, anxiety, stress sleep, and sleep. We were also interested in the differences in e-devices use and variables of psychological distress and sleep between males and females in adolescents.

## METHODS

### Design

This study is a cross-sectional descriptive comparative study.

### Sample, Sampling, and Settings

The target population of this study was adolescents aged 15-17 years old. A multiple-stage cluster sampling technique was used to select the study sample among the five educational districts in Amman, Jordan's capital. One region in Amman was chosen randomly. Then, two schools (one for males and another for females) from a list of all government schools were randomly selected. After that, random selection was employed to choose two classes from each $9^{th}$-, $10^{th}$-, and $11^{th}$-grade level in each school. Only students in the selected classes were invited to participate. The final sample consisted of 235 male and 250 female students drawn out of 1,210 males and 1,380 female students in the two schools. The study participants' sample size was calculated using the G*Power 3.1.2. Analysis using a conventional value of statistical significance (α) of .05, a power level of 0.80, and a small effect size of 0.2, for two-tailed test and using the statistical test of t-test, the required sample size was about 410 students. We invited 100 additional participants to overcome the expected non-response rate of 25% and issues associated with having the consent of both students and their parents.

### Procedure

The Ethics Committee of the Institutional Review Board (IRB) at the university where the first two authors are working (reference# 5/2/2018/2019) and the Ministry of Education-Jordan approved this study. Before data collection, the purpose of the study was briefly described to the students and their parents then written consents were obtained from both students and their parents. All participants were assured that they have the right to participate, refuse, and withdraw at any time without any consequence and that their confidentiality will be maintained. Participants were given questionnaires and instructed to return questionnaires using the provided sealed envelope to the researcher or the teachers. Data were collected in the academic year of 2018/2019.

### Measures

In addition to the questionnaires on variables of e-devices use, psychological distress, and insomnia, a demographic sheet developed for this study was used to collect the respondents' socio-demographic and clinical characteristics. The data collected includes age, gender, number of family members, educational level of parents, and monthly income.

***E-devices use.*** Subjects' e-devices use was assessed using two questions. The first question asked whether they use e-devices such as smartphones, video game consoles, computers, and tablets or not (responses were either yes or no). The second question asked about the average duration of the e-devices use per day.

***Psychological distress.*** Psychological distress was measured using the Arabic version of the Depression Anxiety Stress Scale-21 (DASS-21) short form. The DASS-21 is a self-report questionnaire consisting of 21 items with each pertinent seven items measure one dimension of mental health symptoms of depression, anxiety, or stress [31]. The responses of the items ranged from 0 (does not apply to me at all) to 3 (referred to me very much). The total score of each dimension is calculated by summing the scores of the seven items then multiplying them by two, with the subscales score can range between 0 and 42 and with higher scores indicating severe mental health symptoms. Summing the scores of the three dimensions yields a total score for the whole scale, which can be ranged between 0 to 126. The validity and reliability of the DASS-21 questionnaire in measuring the dimensions of depression, anxiety, and stress have been provided in several studies [32-34]. In the original study, DASS-21 indicated good internal consistency in which the Cronbach alpha was .74, .75, .73, and .80 for depression, anxiety, stress, and the total scale, respectively [31]. In the current study, Cronbach's reliability alphas were 0.71, 0.63, 0.67, and 0.83 for the stress, anxiety, depression subscales, and the total scale scores, respectively.

***Sleep.*** Subjects' sleep was measured using questions on participants' sleep duration (on average hours of sleep /night), perception of the adequacy of their sleep (adequate or not), taking a nap during the day (yes or no), and duration of the nap (on average hours/day, if applicable). Also, we measured insomnia as part of the subject's sleep assessment using the Insomnia Severity Index (ISI). The ISI is a widely used 7-item self-report questionnaire measuring the nature, severity, and effect of insomnia. The ISI asks respondents to answer the items related to sleep problems on a 5-point Likert scale ranging from 0 "not at all" to 4 "very severe." The total scores were calculated by summing the responses of the items with total scores ranging from 0 to 28, with higher scores indicating severe Insomnia. The respondents were categorized based on the cutoff scores of 0–7, 8–14, 15–21, and 22–28 into no insomnia, mild insomnia, moderate insomnia, and severe insomnia, respectively [20]. The ISI showed excellent

**Table 1.** Demographic characteristics of the sample (N=485)

| Characteristic | Mean ±SD or n (%)† |
|---|---|
| Age, Years | 16.09 ±0.77 |
| Gender | |
| Female | 250 (51.5) |
| Male | 235 (48.5) |
| Number of Family Members | 4.76±1.259 |
| Family Income | |
| ≤ $400 | 40 (8.2) |
| $401-800 | 203 (41.9) |
| $801-1200 | 140 (28.9) |
| >$1201 | 102 (21) |
| Fathers Level of Education | |
| ≤ Primary level | 66 (13.6) |
| High school level | 180 (37.1) |
| Diploma le vel | 99 (20.4) |
| ≥ University level | 140 (28.8) |
| Mothers Level of Education | |
| ≤ Primary level | 57 (11.7) |
| High school level | 229 (47.2) |
| Diploma level | 111 (22.9) |
| ≥ University level | 88 (18.1) |
| BMI | |
| Underweight (<19) | 23 (4.7) |
| Normal (19-25) | 396 (76.1) |
| Overweight (>25-30) | 70 (14.4) |
| Obese (>30) | 23 (4.7) |

†SD = standard deviation

psychometric properties and was validated in the adolescent population [35,36]. The Arabic version of the ISI has shown excellent psychometric properties as well [37,38]. In the current study, the ISI had a Cronbach's alpha of 0.72.

### Data Analysis

Data analysis was conducted using SPSS version 25 with 0.05 as the significance level. Data analyses including descriptive statistics such as frequency, percentage, mean, standard deviation, as appropriate to the level of measurement, were used to describe the sociodemographic and clinical characteristics of the participants. Subjects were classified based on their scores on psychological distress (stress, anxiety, and depression) into normal, mild, moderate, and severe to extremely severe based on the cut-off scores of 0-14, 15-18, 19-25, and >25 for stress subscale, 0-7, 8-9, 10-14, and >14 for anxiety subscale, and 0-9, 10-13, 14-20, and > 20 for the depression subscale, respectively. To examine the relations between using e-devices with psychological distress and insomnia, subjects were divided into two groups based on the mean hours of using e-devices per day. Those who had below the mean were classified as low e-devices users and those who had scores higher than the mean were classified as high e-devices users. The Independent Sample t-tests were used to compare psychological distress and sleep scores between low and high e-device users as well as to compare males and females regarding their e-devices use, sleep, and psychological distress.

## RESULTS

### The Subjects' Characteristics and Scores on Main Study Variables

The subject's mean age was about 16 years, with a range of 15-18 years (**Table 1**). Slightly more than half of the subjects were male. The average number of family members was 4.76 members. About half of the subjects reported family income of $401-$800 per month, and mothers had a high school level of education. One-third of the subjects' fathers had a high school level of education.

**Table 2.** The sample's data on e-devices use, psychological distress, and sleep (N=485)

| Characteristic | Mean ±SD or n (%)† |
|---|---|
| Use e-devices, Yes | 478 (98.6) |
| Average hours of screen-time/day | 5.26±4.0 |
| Average hours of sleep/day | 8.06±1.88 |
| Perceived get an adequate amount of sleep, Yes | 165 (34) |
| Taking a nap time, Yes | 240 (49.5) |
| Duration of the nap, minutes | 35.55±41.79 |
| Duration of the nap, min-max in Minutes | 10-120 |
| Insomnia Severity Index scores | 8.75±4.57 |
| Insomnia Severity Index Categories | |
| No insomnia (0–7) | 222 (45.8) |
| Subthreshold/mild (8–14) | 212 (43.7) |
| Moderate to severe (>14) | 51 (10.5) |
| Psychological distress (DASS-21) | |
| Total scores | 42.49±20.3 |
| Stress subscale scores | 15.73±8.74 |
| Anxiety subscale scores | 12.95±7.5 |
| Depression subscale scores | 13.81±8.2 |
| Stress categories (DASS-21) | |
| Normal (0-14) | 255 (52.6) |
| Mild (15-18) | 63 (13) |
| Moderate (19-25) | 84 (17.3) |
| Severe to extremely severe (>25) | 83 (17.1) |
| Anxiety categories (DASS-21) | |
| Normal (0-7) | 114 (23.5) |
| Mild (8-9) | 38 (7.8) |
| Moderate (10-14) | 149 (30.7) |
| Severe to extremely severe (>14) | 184 (37.9) |
| Depression categories (DASS-21) | |
| Normal (0-9) | 160 (33) |
| Mild (10-13) | 79 (16.3) |
| Moderate (14-20) | 148 (30.5) |
| Severe to extremely severe (> 20) | 98 (20.2) |

DASS 21= Depression Anxiety Stress Scale - 21; †SD = standard deviation

Almost all subjects use e-devices (**Table 2**). Subjects reported using these devices for an average of 5.25 hours per day. On psychological distress, the total scores (total DASS-21), the subjects had an average of about 42.49±20.3, mainly indicating mild distress (**Table 2**). On the psychological subscales, the subjects had mean scores that fell in the category of mild stress, moderate anxiety, and mild depression. As shown in **Table 2**, about 17%, 37.9%, and 20.2% of the subjects had severe to extremely severe levels of stress, anxiety, and depression, respectively.

Although the subjects reported an average of 8 hours of sleep per day, two-thirds of them reported not getting enough sleep. Besides, half of the subjects answered they took a nap that ranged between 10 minutes to two hours with an average of 35 minutes. Regarding the insomnia scores, the mean scores of the sample were 8.75, which fell in the subthreshold/ mild insomnia category, with only about 10% reported moderate to severe Insomnia.

### Differences between Low and High E-devices Users on Main Study Variables

Independent Samples t-tests were used to compare low and high e-devices users in terms of total psychological distress

**Table 3.** Comparison between low users and high e-devices users (N=485)

| Characteristic | Low e-device users (n=346) † | High e-devices users (n=139) † | *t- test (df1, 483)* | *P-value* (2-tailed) |
|---|---|---|---|---|
| Insomnia severity Index scores | 8.50±4.44 | 9.37±4.85 | -1.886 | 0.06 |
| Average hours of sleep/day | 7.88±1.78 | 8.51±2.06 | -1.427 | 0.154 |
| Duration of the nap, Minutes | 37.09±42.16 | 31.73±40.77 | 1.28 | 0.201 |
| Total DASS-21 scores | 40.34±19.86 | 47.87±20.48 | -3.087 | 0.002 |
| Stress subscale scores (DASS-21) | 14.77±8.45 | 18.11±9.05 | -3.348 | .001 |
| Anxiety subscale scores (DASS-21) | 12.47±7.37 | 14.14±7.72 | -3.651 | <0.001 |
| Depression subscale scores (DASS-21) | 13.08±8.09 | 15.61±8.26 | -0.922 | 0.357 |

†Data are presented as mean ±standard deviation

**Table 4.** Comparison of Psychological Distress scores and Sleep between male and female adolescents (N=485)

| Characteristic | Male (n=235)† | Females (n=250)† | *t- test (df 1, 483)* | *P-value* (2-tailed) |
|---|---|---|---|---|
| Average hours of screen-time/day | 4.93±3.65 | 5.54±4.28 | -1.627 | 0.104 |
| Insomnia severity Index scores | 8.63±4.33 | 8.85±4.79 | -0.523 | 0.600 |
| Average hours of sleep/day | 7.94±1.93 | 8.18±1.82 | -1.427 | 0.154 |
| Duration of the nap, Minutes | 33.06±41.67 | 37.9±41.8 | -1.274 | 0.203 |
| Total DASS-21 scores | 39.51±18.4 | 45.29±21.6 | -3.162 | 0.002 |
| Stress subscale scores (DASS-21) | 14.37±8.06 | 17.0±9.17 | -3.348 | 0.001 |
| Anxiety subscale scores (DASS-21) | 11.68±6.86 | 14.14±7.89 | -3.651 | <0.001 |
| Depression subscale scores (DASS-21) | 13.45±7.89 | 14.14±8.5 | -0.922 | 0.357 |

† Date are presented as mean ±standard deviation

scores (total DASS-21), and the subscales scores of stress, anxiety, and depression and the insomnia scores, average hours of sleep/day, duration of the nap. The results showed that only the total psychological distress scores and subscales scores of stress and anxiety differed between the two kinds of users, with those in high e-devices users had poorer scores compared to low e-devices users (**Table 3**). Although it was not significant, it is interesting to note that the high e-devices users reported sleeping more hours per day than low e-devices users. On the contrary, with regards to insomnia scores, high e-devices users reported worse scores than low e-devices users (approaching the significance level, $p$=0.06).

### Differences between Male and Female Adolescents on Main Study Variables

Using the independent samples t-tests to compare male and female adolescents in terms of average hours of screen-time/day, insomnia scores, average hours of sleep/day, duration of the nap, total psychological distress scores (total DASS-21), and the subscales scores of stress, anxiety, and depression indicated that there were only significant differences between male and female adolescents in the total DASS-21 and the subscales scores of stress and anxiety. Specifically, females had higher (worse) scores on the stress and anxiety subscales scores and the total scores on psychological distress (total DASS-21).

## DISCUSSION

The current study examined the relationship between e-devices use, stress, anxiety, depression, and insomnia among adolescents in Jordan. It showed that excessive e-devices use was associated with stress and anxiety, especially among female adolescents. No significant correlation between excessive e-devices use and insomnia was noted in this study.

The majority of subjects in the study used the e-devices for a high duration of time, more than the specific recommendations daily of two hours [9]. The duration of the adolescents' use of e-devices reported in this study is consistent with school-based population studies that confirmed high levels of e-devices use among adolescents [39,40]. Similar to our finding, adolescents exposed to excessive e-devices time displayed adverse psychological outcomes [11,30,41]. Subjects in our study also had higher scores on psychological distress than those reported in the literature [42,43]. For example, subjects in our study had higher psychological distress than Indian [43] and Malaysian adolescents [44].

Excessive use of e-devices has shown to be associated with poorer psychological distress only on the stress and anxiety subscales. These findings were constant with previous research [45,46]. Similar to our result a significant relation was found between e-devices use and stress [17,47,48]. Each study used a different measure of stress, including the DASS, Perceived Stress Scale (PSS), adapted from Kanner, Coyne, Schaefer, & Lazarus. The majority of multivariate relations were significant, mostly with betas ranging from .10 to .30. Similarly, the anxiety subscale was significantly related to e-devices use [15,16,44]; these studies used the Beck Anxiety Inventory, social anxiety-related scales. Bivariate correlations and multivariate beta coefficients were around .20.

Our finding is consistent with the result that the high-level duration of e-devices used was significate related to the severity of anxiety but not significant in depression [54]. Only 20% of the participants have depression symptoms, which was not consistent in a previous national survey in 2018 showed that adolescents have moderate to severe levels of depression with a higher percentage (34%) [49]. Contrary to previous findings, the depression level was less than many previous studies finding [45,48,50], which find correlations in the severity of depression range of .20–.40. By using the Beck Depression Inventory, Depression Anxiety Stress Scale (DASS), 10-item Center for Epidemiologic Studies Depression scale. However, these differences could be related to using different instruments for measuring these concepts.

Unfortunately, spending more time on e-devices use may not be a helpful way to cope. Also, it is possible that using e-devices, especially for a long duration of time, may provoke negative emotions such as stress, anxiety, or depression and may lead to addiction. This cycle could further worsen psychological symptoms, initiating or exacerbating psychological well-being [51] and trigger further e-devices use.

The mean sleep duration of approximately eight hours every day showed adequate hours of sleep per day. There was moderate to severe insomnia in the present study, about 10% depending on the diagnostic test of ISI. Contrary to many other studies show a high rate of insomnia, ranging from 13.6% to 23.6%, depending on diagnostic criteria [16,52,53]. Females had a significantly higher prevalence of insomnia than male adolescents. Although many previous studies found that adolescents who reported excessive e-devices use had psychological distress and sleep problems [6,45,48,54], our finding revealed that adolescents had only psychological problems but not sleep problems. And sleep variables were calculated based on self-report, including bedtime, which would need to be explored in a future study. So, determining the most appropriate intervention requires further investigations.

Similar to our finding revealed that females were reported as having worse psychological distress than their male counterparts [55,56] and females were significantly more addicted to e-devices than their male age group [45,57]. The psychological problems pathways to be hyperactive, and females are more stress-reactive than males due to the variance effect of testosterone hormone hypothalamic-pituitary-adrenal axis [58]. Although, other studies reported that the prevalence of psychological distress among adolescent used e-devices was higher in males [42,59], or without differences [60,61]. Additionally, the authors suggested a differential sensitivity between male and female adolescents due to Estrogen hormone differences [65].

Significantly, sex differences are manifested not only in the prevalence of the condition but also characterize the comorbidities, precipitating factors of the disorder, especially among females. There is also a need to educate female adolescents' students about the physical and psychological risks of e-devices and their associated applications. A qualitative study will also be required to understand these associations within the Jordanian context in-depth.

This study highlights the connotation between excessive e-devices use and adolescents' psychological distress like anxiety, stress, and sleep problems. Our study is in line with a longitudinal study that reported that e-devices use was associated with sleep difficulties related to psychological distress [11,16,17,62,63].

Adolescents with insomnia are more likely to report comorbid psychological distress than adolescents without insomnia [52]. Two meta-analyses of the effect of e-device time on young adolescent's sleep have been conducted [25,64]. The potential mechanisms in troubled sleep may include psychological stimulation [23], poor sleep quality, and insomnia [65-68]; reduction of sleep duration among adolescents can cause gaming disorder [18,69], which may further lead to impact school performance [70].

These associations do not provide evidence on the causative direction between these variables and often concern confounding factors, including socioeconomic grouping and adverse related behaviors [11]. It is possible that adolescents with stress, anxiety, or depression, may spend more time on e-devices as a coping mechanism to escape from fears and worries in their life [61,71,72].

### Strength and Limitations

Our study has many strengths, including that the main study variables were measured using reliable and valid tools. Also, we used randomized sampling, which also strengthens the study and helps in generalizing the findings. However, using a cross-sectional design limits examining the causes and effects among study variables. Insomnia as an effect; cannot assess the causality relationships. More longitudinal and experimental studies are needed to allow attribution of causation. Required now are more rigorous prospective investigations of these relations. All variables were evaluated through a self-reported questionnaire, and so the responses might have been subject to reporting bias. It is highly recommended to add objective measures of the variables.

### Implications

The findings of this study have many implications for practice, research, and education. For practice, Adolescents' e-devices use, psychological health, and sleep should be frequently and regularly monitored. School health nurses and other care providers such as psychologists, social workers, teachers can collaborate to use a multidisciplinary approach to meet adolescents' psychological health needs in collaboration with adolescents' parents.

Understanding the relationships among e-devices use, sleep, and psychological health is essential when assessing and managing adolescents with the high-risk need for early intervention and necessitate further researcher. Crisis interventions and education programs should target high-risk groups with psychological distress and the well-functioning general population. The findings of our study may raise the points of giving effective collaborative community-based programs to protect this age group.

Designing students' curricula should provide the students with basics principles about e-devices exposure. Psychoeducation training programs, individual or group counseling/therapy, and family/community projects are required for adolescents as early prevention and intervention programs to limit the time of e-devices use and consequently preventing co-related problems pertaining to psychological health, include courses on time management, problem solving skills and finding alternative activities to fill the adolescents' free time with things that are interesting, beneficial, and healthy.

In particular, there is a need for developing policies to inform the design and implementation of a guideline on the effect of e-devices on psychosocial and sleep difficulties for providing support for a similar situation. Also, the finding highlights the e-devices addiction among adolescents, and highlighted the importance of restricting and limiting the total time spent on e-devices and limiting downloading applications, reaching and accessing material online by establishing screen time rules as to international recommendations for screen time [44].

In research, more longitudinal and experimental studies are needed to allow attribution of causation and conduct interventional studies to help adolescents promote their mental health. Replicating this study using representative

samples from other governmental and private schools in Jordan will enhance the generalizability of the findings. Moreover, a quantitative survey at both the elementary and high school levels is recommended for future research. Although Our finding revealed that the duration of e-devices had a significantly stronger association with psychological symptoms than with sleep problems, a mediation relationship among these variables could explain this and warrants further investigations. Conducting further studies is needed into specific interventions to improve health among adolescents.

The study highlights the need for increasing awareness about the effects of e-devices use problems and their consequences including addiction, sleep, and mental health issues among adolescents by providing education programs on gaming addiction. Given the number of female adolescents who struggle, it is crucial to recognize sex differences in the association between psychological and sleep problems. There is a clear need for clinicians, teachers, parents, and adolescents for more basic, translational, and clinical research examining the effects of e-devices on health and health behavior consequences among adolescents [24]. Therefore, these pieces of information may be significant to meet the health needs of adolescents for building a public support system, preventing and treating mental health through the strengthening of health systems.

### Conclusion

In conclusion, e-devices may have several adverse significant harmful effects. The present study assessed relations between e-devices used with psychological distress among Jordanian adolescents. The results showed that both severities of psychological distress and sleep disruption were positively associated with e-devices use, especially among female subjects.

The data indicate that insomnia and other psychological distress severely influence adolescents' future health and functioning. There are sudden, pre-significant symptoms of psychological distress among adolescents, which happen when excessive e-devices start coming. Psychological distress can also lead to sleep problems and need to be identified and treated appropriately. Psychological and sleep problems have a complex and bidirectional interrelation. In addition, although severities of psychological distress and was more strongly associated with stress and anxiety. Attentions exist for online gaming disorder among Jordanian adolescent.

Thus, as recommended in current guidelines, we should consider both domains of psychological distress and sleep problems when we come across e-devices excessive use, considering the potentially more significant impact of e-devices on psychological distress. These data suggest that primary care settings such as schools might provide policies to limit the time spent on e-devices.

Crisis interventions and education programs should target high-risk groups with psychological distress and sleep problems and the well-functioning general population. The findings of our study may raise the points of giving effective collaborative community-based programs to protect this age group. Conducting further studies is needed into specific interventions to improve health with excessive e-devices used among that age group in Jordan and conducting interventional studies to help adolescents in inappropriate use of the e-devices.

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