

## INTRODUCTION

The increased prevalence of smartphones has led to greater technology use among adolescents.<sup>1</sup> Recently, problematic and risky internet use screening scale (PRIUSS) was developed for adolescents and young adults. There is limited research on use of PRIUSS in adolescents and its relationship with depression symptoms. The CES-D scale was used to analyze mood symptoms in these patients, and to observe if there is a relationship among internet use and symptoms of depression in adolescents.<sup>3</sup>

## PURPOSE OF STUDY

The goal of this study is to identify adolescents at risk for problematic internet use (PIU) using PRIUSS, and to examine its relationship, if any, with depression symptoms using CES-D.

## METHODS

A cross-sectional study was conducted at the University of Kentucky Adolescent Medicine clinic to investigate the relationship between internet use and depression in adolescents from December 2019 to March 2020. Approval of this study was granted by the University of Kentucky Institutional Review Board, protocol number 54741.

Adolescents between ages 12 and 21 were evaluated using the CES-D questionnaire, the PRIUSS questionnaire, and an Adolescent Internet Use survey. The exclusion criteria for the study were adolescents with a history of global developmental delay, moderate-severe autism, and medical or neurological conditions which impaired ability to complete screening tools. Co-investigators were present in the clinic for the purpose of participant recruitment and data collection. Participants completed the study tools at the conclusion of the visit with their clinic provider. Statistical analysis of the data that was collected was performed using Microsoft Excel.

## RESULTS

There were 69 participants who met the inclusion criteria for the research study and completed the Adolescent Internet Use, PRIUSS, and CES-D surveys. Of the 69 study participants, 37.7% (n=26) were identified as at risk for PIU (PRIUSS  $\geq 25$ ). These participants at risk for PIU had an average CES-D score of  $23.3 \pm 10.3$ . The participants not at risk for PIU (PRIUSS  $< 25$ ) had an average CES-D score of  $16 \pm 10.1$ . Of the 26 participants identified as at risk for PIU, 61.2% (n=16) were identified with symptoms of depression (CES-D  $\geq 20$ ), whereas only 34.9% (n=15) of the 43 participants not at risk for PIU were also identified as having symptoms of depression.

Of those who answered "no" to having ever been diagnosed with depression, the PRIUSS and CES-D scores were  $16.4 \pm 14.5$  and  $13.1 \pm 8.2$ , respectively. Of those who answered "yes" to ever having been diagnosed with depression, the PRIUSS and CES-D scores were  $28.7 \pm 13.8$  and  $24.3 \pm 9.8$ , respectively.

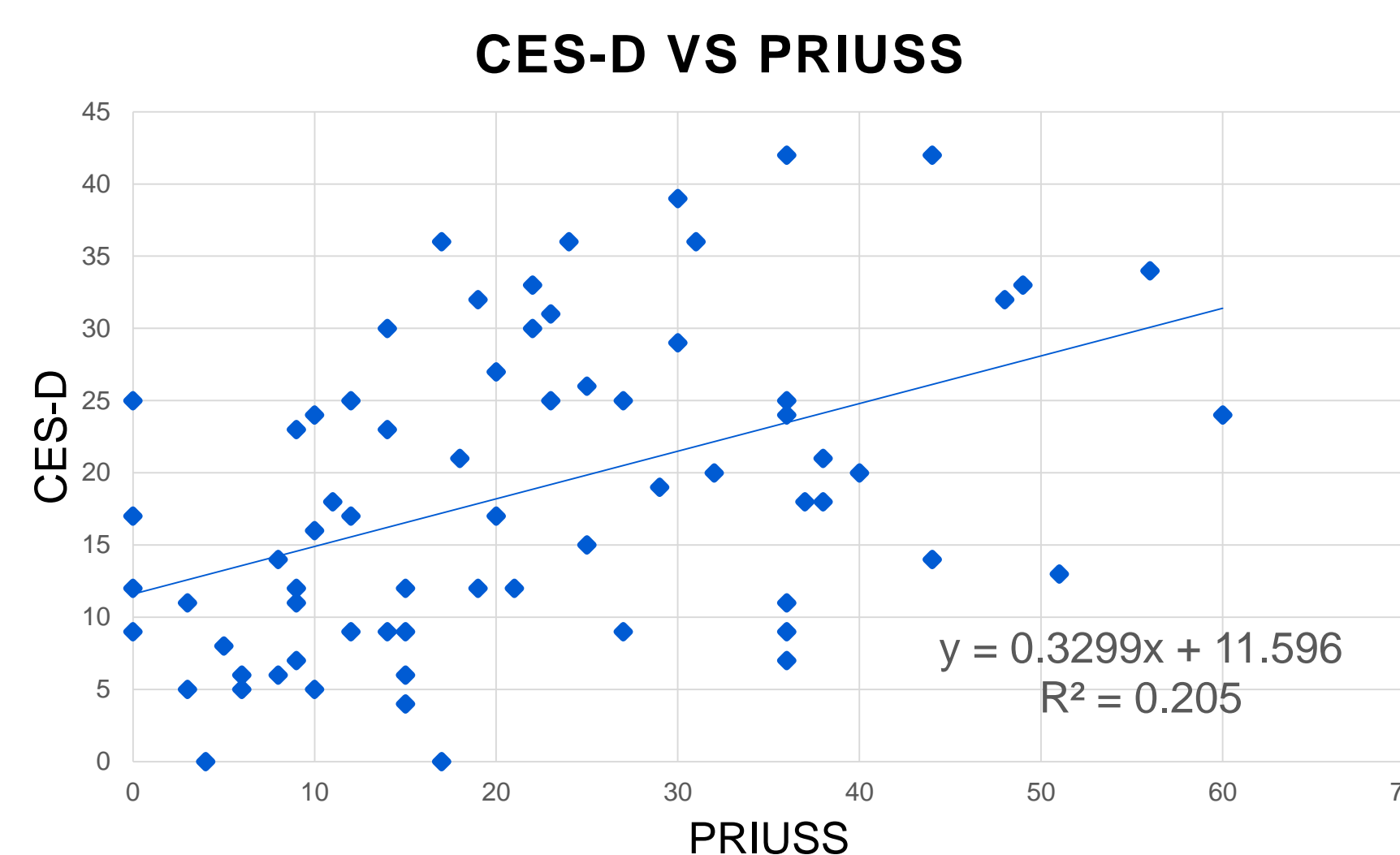


Figure 1: Scatterplot of all participants' PRIUSS score with their corresponding CES-D score.

	PRIUSS $\geq 25$	PRIUSS $< 25$	TOTAL
CES-D $\geq 20$	16	15	31
CES-D $< 20$	10	28	38
TOTAL	26	43	69

Table 1: Participants that scored above suggested cut-off values for PRIUSS and CES-D

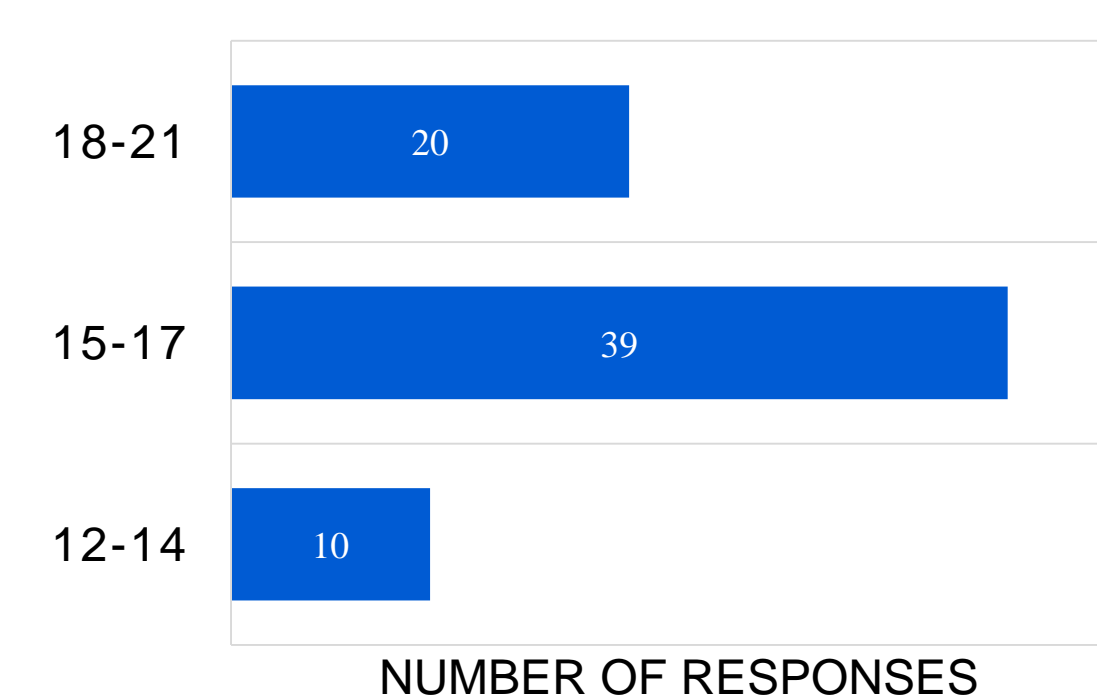


Figure 2: Age Distribution of Study Participants, N = 69

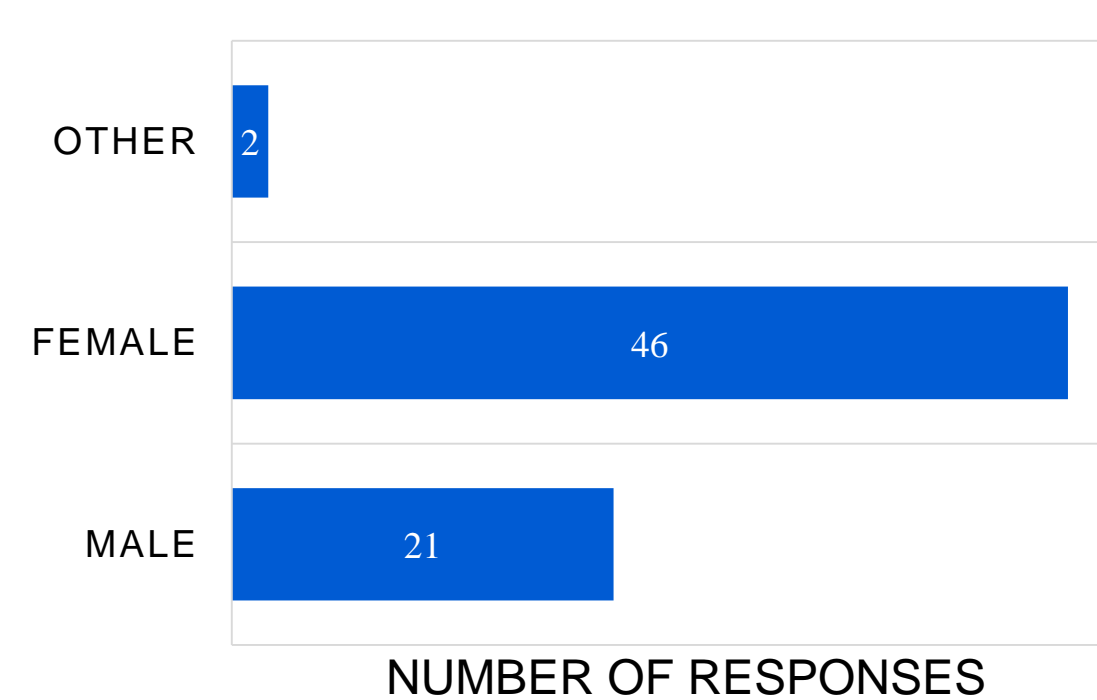


Figure 3: Gender Distribution of Study Participants, N = 69

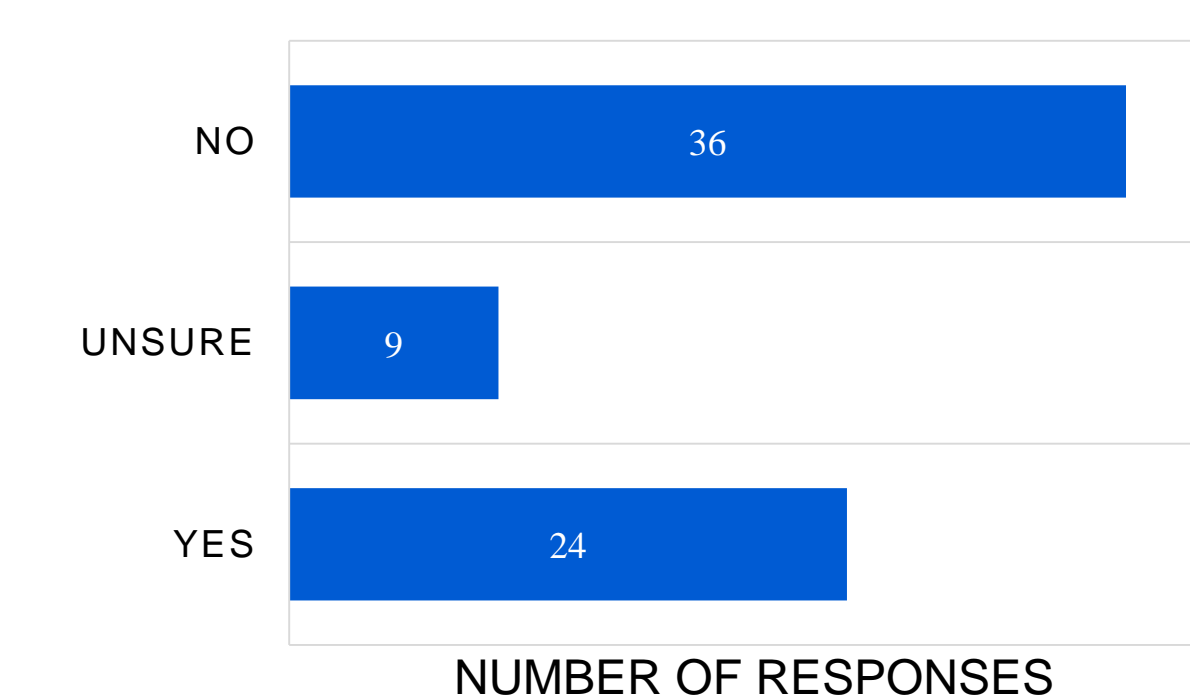


Figure 4: Participant's response to, "Have you ever been diagnosed with Depression?" N = 69

PRIUSS questions that participants reported agreeing with **most often**:

- Do you feel you use the internet excessively?
- Do you choose to socialize online instead of in-person?
- Do you feel irritated when you're not able to use the internet?
- Do you lose sleep due to nighttime internet use?

PRIUSS questions that participants reported agreeing with **least often**:

- Do you fail to create real-life relationships because of the internet?
- Do your offline relationships suffer due to your internet use?
- Do you skip out on social events to spend time online?

## SUMMARY OF RESULTS

There is a positive correlation between PRIUSS and CES-D scores, most strongly with the total PRIUSS score. The correlation coefficient for PRIUSS (total score) vs. CES-D score was 0.45, indicating a moderate correlation. There is also a statistically significant association between the results of screening with PRIUSS and CES-D using the cut-off values of 25 for PRIUSS and 20 for CES-D. (p-value=0.03).

## DISCUSSION AND CONCLUSIONS

Overall, a moderately significant correlation between internet use and depression in adolescents was observed in this study. Among those adolescents who screened for PIU, it was found that over 60% of them have experienced depression symptoms within the past 6 months. With both internet use and depression in teenagers on the rise,<sup>2,3</sup> it is logical to continue the investigation of this relationship. Recognizing the link between these two factors could not only help healthcare professionals better understand the patients they treat, but also promote the advancement of new treatments aimed specifically towards the needs of these patients.

The data also displayed average PRIUSS and CES-D scores above the cutoff for those participants with a history of depression, while those without a history of depression had average scores below the cutoff. Upon further research of this topic, it could be useful to collect data that could help answer whether problematic internet use is causing depression in adolescents or could a history of depression result in problematic internet use.

Some limitations to the project still existed even with confounding variables being controlled for. The sample size was relatively small, underage participants completed the surveys with their parent/guardian present, and the surveys contained ambiguous terms that could be interpreted differently among participants. In addition, all the surveys were completed at the end of the patient's visit which could have affected the time spent completing the surveys.

## REFERENCES

- <sup>1</sup>Cash H, Rae CD, Steel AH, Winkler A. Internet Addiction: A Brief Summary of Research and Practice. *Current Psychiatry Reviews*. 2012;8(4):292-298.
- <sup>2</sup>Lohmann RC. What's Driving the Rise in Teen Depression? 2019, U.S. News & World Report
- <sup>3</sup>Teens, social media and technology 2018, PEW Research center