

Screen Natives Becoming Digital Orphans: The Online Challenges of Generation Alpha

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Abstract—Background: In the digital era, the unprecedented online presence of Generation Alpha creates novel challenges related to problematic internet use. Investigating this phenomenon is essential for understanding the cognitive and social development of this cohort and for formulating effective prevention strategies. **Objective:** The aim of this study is to measure Problematic Internet Use (PIU) and its influencing and moderating factors. It also investigates the relationships between the dimensions of PIU (control, obsession, and neglect) and demographic variables among representatives of Generation Alpha. **Method:** This study employed a quantitative, cross-sectional survey design. PIU was measured using a validated, 6-item questionnaire (Problematic Internet Use questionnaire, PIU-6) on a 5-point Likert scale. A total of $N = 837$ participants were recruited from educational institutions in Fejér County, Hungary. **Results:** Based on the results, average daily internet use time is the strongest behavioral predictor of problematic internet use; however, the strength of this relationship is significantly moderated by gender and family context. The association between online screen time and PIU is significantly stronger for girls than for boys. Furthermore, the relationship between internet use time and PIU was significant for children from families with higher levels of parental education. **Conclusion:** Considering family context and gender differences is essential when evaluating the effects of online screen time, as these factors can function as either protective or risk-enhancing elements in the development of problematic internet use among Generation Alpha.

Keywords— Generation Alpha, Problematic Internet Use, Digital Well-being

I. INTRODUCTION

Generation Alpha, comprised of children born after 2010, is the first cohort to be born entirely into the digital world. For them, using technological devices is not a learned skill but an inherent one, which uniquely shapes their cognitive development, social relationships, and lifestyle[1]. However, their digital nativity not only brings advantages but also creates new types of challenges, particularly regarding internet use.

Problematic Internet Use (PIU) is a phenomenon that refers to the negative consequences of time spent in the online space[2]. The literature conceptualizes this phenomenon through three primary dimensions:

- **Control:** A diminished capacity to manage or stop internet use, often manifesting as compulsive behavior.
- **Obsession:** Preoccupation with online activities, accompanied by anxiety and withdrawal symptoms in their absence.

- **Neglect:** The neglect of essential life areas, including sleep, academic responsibilities, and social interactions, in favor of online engagement.

Active participation in the digital space also entails numerous online risk factors[3], such as excessive screen time, access to inappropriate content, cyberbullying, or social isolation. Members of Generation Alpha may be particularly vulnerable to these factors, as they are still in a critical developmental stage.

The aim of the present study is to explore the patterns of problematic internet use emerging among Generation Alpha, with a special focus on the moderating role of demographic variables. In this study, we tested two hypotheses:

H1: Average daily internet use is positively correlated with the total PIU score, particularly in the dimension of neglect.

H2: The educational attainment of parents moderates the relationship between average daily internet use and the total PIU score.

The findings of this research can contribute to the development of digital education and prevention strategies, especially within educational and family contexts.

II. LITERATURE REVIEW

A. Problematic Internet Use and Cybersecurity Risks

Members of Generation Alpha, who were born into the digital world, begin engaging with the internet at a very young age, often without parental supervision. This early and intensive online presence not only increases the risk of developing Problematic Internet Use (PIU) but also heightens their vulnerability to various cybersecurity threats.

Problematic Internet Use (PIU) encompasses a pattern of behavioral and psychological symptoms where an individual is unable to control their online activities, which become compulsive, leading to the neglect of other important life domains such as sleep, academics, or social relationships[4][5][6][7]. The three primary dimensions of PIU—control, obsession, and neglect—can contribute to an increased vulnerability to cybersecurity risks in various ways.

Impaired control, for instance, can diminish self-regulatory skills, thereby increasing a child's susceptibility to impulsive actions such as clicking on unknown links or disclosing personal information. Obsessive internet use frequently leads users to seek intense emotional stimuli, heightening the probability of exposure to hazardous or age-inappropriate materials. Finally, the dimension of neglect implies that online engagement comes at the cost of other crucial activities, thus reducing participation in offline social

interactions that could otherwise function as a protective factor for navigating the digital environment. The scope of these cybersecurity risks includes, but is not limited to, the following[8][9]:

- breaches of personal data privacy,
- cyberbullying and online harassment,
- exposure to inappropriate content,
- the formation of digital dependencies,
- vulnerability to manipulation and disinformation.

These factors can be particularly dangerous for Generation Alpha, who do not yet possess the necessary critical thinking and digital literacy to recognize and manage these threats[8]. Therefore, Problematic Internet Use and cybersecurity risks are closely intertwined, and they have a complex impact on children's psychological well-being and development.

B. Generation Alpha Characteristics and Risk Factors

Members of Generation Alpha are growing up in a technologically saturated environment that is fundamentally different from the experiences of previous generations. From a very young age, they have access to smart devices, digital content, and social platforms. Consequently, while their digital competencies develop early, their capacity for critical thinking and self-regulation is not yet fully formed[10][11][12]. The generation is characterized by a high sensitivity to multimedia content and rapid information processing; short attention spans, which reinforce the fragmented nature of content consumption; a strong visual orientation, resulting in a preference for image- and video-based content; and a form of digital socialization that often replaces or sidelines face-to-face interactions. While these characteristics are not inherently negative, they can lead to problematic behavioral patterns when combined with certain risk factors. The most common risk factors include:

- lack of parental control or excessive permissiveness regarding device use,
- a low level of digital literacy within the family context,
- unfiltered access to content, potentially leading to exposure to age-inappropriate material,
- social isolation, which prioritizes online interactions over face-to-face relationships,
- difficulties with emotional regulation, particularly in the case of withdrawal symptoms.

The patterns observed in this study indicate that members of Generation Alpha are particularly sensitive to the behavioral and psychological effects present in the online space. The risk of developing Problematic Internet Use depends not only on the amount of time spent online but also on the family, social, and educational context in which internet use occurs. The moderating role of demographic variables, such as parental educational attainment and gender, is critically important in understanding these risk patterns.

III. METHOD AND TOOLS

A. Measurement Instrument

Problematic Internet Use (PIU) was measured using the shortened Hungarian version of the Problematic Internet Use Questionnaire-Short Form (PIUQ-SF-6), a validated 6-item instrument developed by Demetrovics et al.[15]. The questionnaire assesses the phenomenon on a 5-point Likert scale across three dimensions. Two items measure the

obsession dimension (preoccupation with the internet), two items measure **neglect** (neglecting other life domains, such as academic/work performance and social relationships), and two items measure impaired **control** (loss of control over internet use, compulsive behavior). A higher total PIU score indicates an increased risk of problematic internet use. The reliability of the original scale is reported as Cronbach's $\alpha = 0.77$ [16].

To assess the internal consistency of the PIU scale and its theoretical subscales, Cronbach's alpha (α) coefficients were calculated for the Generation Alpha subsample ($N = 837$). The reliability of the total PIU scale was acceptable in this age group ($\alpha = .647$). However, the internal consistency of the impaired control ($\alpha = .238$) and neglect ($\alpha = .388$) subscales was low. Therefore, using their composite scores for further statistical analyses was deemed methodologically inappropriate for this sample; consequently, the individual items were analyzed instead. The reliability of the obsession subscale was acceptable ($\alpha = .627$).

B. Data Preparation and Analysis

Data were gathered via quantitative questionnaires administered in both paper and digital formats. Prior to analysis, the dataset was subjected to a rigorous data cleaning procedure to identify and address missing values, outliers, and data entry errors. The statistical analysis followed a multi-stage process and was executed using IBM SPSS Statistics 27, Microsoft Excel, and Python 3.11.

Initially, descriptive statistics were generated to summarize the characteristics of the sample. The internal consistency of the scales was evaluated using Cronbach's alpha, with a threshold for acceptability set at $\alpha > .60$ [13]. Relationships between variables were examined using Pearson correlation analysis. Independent samples t-tests and one-way analysis of variance (ANOVA) were utilized to test for significant differences between groups. Moderated regression analysis was employed to assess the moderating effects of key variables. The level of statistical significance was set at $p < .05$ for all analyses[14]. To explore the underlying data structure, cluster analysis was employed; the optimal number of clusters was determined using the elbow method, and the grouping was performed with the K-means algorithm.

C. Sample and Demographics

The survey included a total of $N = 837$ Generation Alpha students from Fejér County, Hungary, participating from the 5th grade of primary school and above. The gender distribution of the participants was balanced ($N = 425$, 50.8% male; $N = 412$, 49.2% female). Due to the 6-year secondary school system in Hungary, $N = 684$ (81.7%) of participants attended primary school, while $N = 153$ (18.3%) were enrolled in secondary school.

In terms of academic specialization, $N = 667$ students were in a general curriculum, $N = 101$ in a science-focused specialization (mostly math), and $N = 69$ in a humanities (mostly a foreign language). In terms of residence, the largest group consisted of students living in the county seat, where the survey was conducted (36.4%). $N = 283$ (33.8%) indicated they lived in a city, $N = 236$ (28.2%) in a village, while only 1.6% ($N = 13$) of participants were from the capital city.

Regarding family background, defined by the parents' highest level of education, the majority of parents held a

higher education diploma ($N = 510$, 60.9%). A further $N = 232$ had a secondary school degree, $N = 65$ had a vocational qualification, and $N = 30$ had a primary school education. The average daily internet use was 3.33 hours, with a large standard deviation indicating significant individual differences ($M = 3.33$, $SD = 2.08$).

IV. RESULTS

A. Descriptive Statistics and Correlation Analyses

The mean total score on the PIU Questionnaire was 12.33, with a large standard deviation ($M = 12.33$, $SD = 4.01$). A significant discrepancy was found between the items of the impaired **control subscale**: the mean for item PIHcontrol01 ($M = 2.62$, $SD = 1.05$) was considerably higher than the mean for item PIHcontrol02 ($M = 1.75$, $SD = 1.10$). The items of the impaired control subscale point to different levels of symptom severity. The intention to reduce use (PIHcontrol01) was a relatively common experience in the sample ($M = 2.62$, $SD = 1.05$). In contrast, the active concealment of use (PIHcontrol02), a more severe symptom of impaired control, occurred much less frequently ($M = 1.75$, $SD = 1.10$). This significant difference in the frequency of the two items explains the previously identified low internal consistency of the subscale ($\alpha = .238$).

The items of the **obsession subscale** had the lowest mean values, indicating that cognitive-emotional symptoms are the least characteristic for this age group. The mean for experiencing tension or restlessness while using the internet (PIHobsession01) was $M = 1.92$ ($SD = 1.09$), while feeling depressive or sad when unable to use the internet (PIHobsession02) was less common in the studied population ($M = 1.49$, $SD = 1.00$).

The **neglect subscale**, which measures the behavioral consequences of problematic use, showed symptoms of moderate frequency. Internet use at the expense of sleep (PIHneglect01, $M = 2.26$, $SD = 1.25$) and receiving signals from one's environment about excessive use (PIHneglect02, $M = 2.29$, $SD = 1.17$) had similar values. Overall, the most common experience was the internal intention to reduce use, followed by behavioral consequences (neglect), while the rarest were severe cognitive-emotional symptoms (concealment, withdrawal).

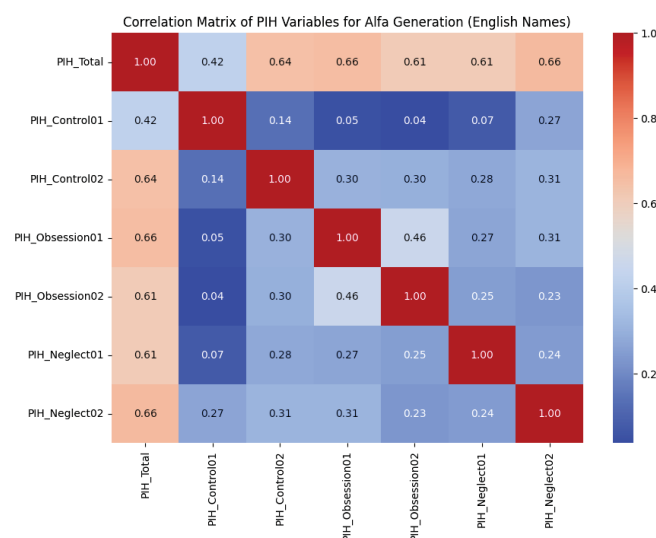


Fig. 1. Correlation matrix of the PIU items for Generation Alpha (Source: author's own compilation)

As shown in the correlation matrix of the PIU scale's internal structure in Fig. 1, each item showed a moderate to strong positive correlation with the PIH_Total score, with r_p values ranging from .42 to .66 ($p < .001$). Correlation analyses revealed several other significant relationships. The gender variable showed a weak positive correlation with both PIHcontrol01 (internal motivation to reduce internet time) ($r_p = .174$, $p < .001$) and the total PIU score ($r_p = .109$, $p < .002$). Regarding average internet time, a weak negative correlation was observed with academic specialization ($r_p = -.070$, $p = .043$), and a weak positive correlation was found with the parent's highest educational qualification ($r_p = .068$, $p = .049$). Further significant positive correlations (at $p < .001$) were found between average internet time and the following variables: concealment of internet time ($r_p = .213$), feelings of tension during internet use ($r_p = .278$), depression resulting from withdrawal ($r_p = .189$), neglect of sleep ($r_p = .492$), signals from one's environment ($r_p = .260$), and the total PIU score ($r_p = .428$). The strongest correlation was observed between average internet time and the neglect of sleep.

B. The Impact of Demographic Variables

A multiple linear regression was performed to determine the extent to which a set of demographic variables could predict composite scores of problematic internet use. The majority of demographic variables, including residence, academic specialization, and parental education, did not emerge as significant predictors. However, the overall regression model was statistically significant, $F(5, 831) = 40.87$, $p < .001$, and accounted for 19.3% of the variance in problematic internet use ($Adjusted R^2 = .193$).

Within the model, average daily internet use ($\beta = .427$, $p < .001$) and gender ($\beta = .111$, $p < .001$) were robust and significant predictors, even when controlling for other demographics. In the studied sample, problematic internet use is primarily influenced by the behavioral factor (time spent online) and gender.

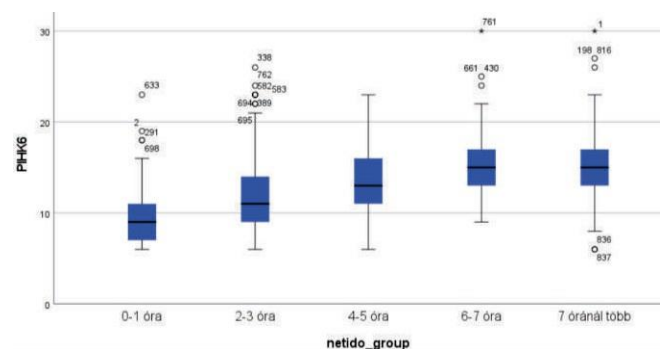


Fig. 2. Distribution of Problematic Internet Use Scores by Daily Internet Use Groups (Source: author's own compilation)

As depicted in Figure 2, the boxplot analysis revealed a dose-response relationship between daily internet use and problematic internet use scores. The results demonstrated not only progressive increases in median values across internet usage groups, but also expanding interquartile ranges, indicating greater variability in problematic internet use scores among individuals with higher usage levels.

Further analysis of individual PIU symptoms revealed that gender was a significant predictor for the desire to reduce internet time, with girls reporting higher values ($F(1, 835) = 26.22$, $p < .001$, $Adj. R^2 = .029$, $\beta = .174$,

$p < .001$). In contrast, the concealment of use, a more severe symptom, was predicted solely by average daily internet use ($F(1, 835) = 39.44$, $p < .001$, $\text{Adj. } R^2 = .045$, $\beta = .212$, $p < .001$).

Among the variables studied, feelings of tension and restlessness during internet use were associated exclusively with average daily internet use ($F(1, 835) = 69.92$, $p < .001$, $\text{Adj. } R^2 = .077$, $\beta = .279$, $p < .001$), with more time spent online predicting higher levels of tension. Similarly, feelings of sadness or depression in the absence of internet use were also associated with average daily internet use ($F(1, 835) = 29.70$, $p < .001$, $\text{Adj. } R^2 = .034$, $\beta = .186$, $p < .001$), indicating that more time online predicts more severe withdrawal symptoms..

Internet use at the expense of sleep, one of the most important signs of functional impairment, was almost exclusively associated with average daily internet use ($F(1, 835) = 266.89$, $p < .001$, $\text{Adj. } R^2 = .242$, $\beta = .493$, $p < .001$). This model had the highest R^2 value among those tested, suggesting that more time spent online is most directly and strongly reflected in the neglect of sleep. The frequency of receiving negative feedback from one's environment was also almost exclusively associated with average daily internet use ($F(1, 835) = 60.09$, $p < .001$, $\text{Adj. } R^2 = .067$, $\beta = .259$, $p < .001$), indicating that more time spent online significantly increases the likelihood that the family or the parents will signal a problem.

C. The Moderating Role of Parental Education

To test the hypothesis that parents' educational qualification influences the relationship between average daily internet use and problematic internet use, a moderation analysis was conducted using Hayes' PROCESS macro (Model 1). The full regression model was significant ($R^2 = .206$, $F(7, 829) = 30.78$, $p < .001$), explaining 20.6% of the variance in problematic internet use. The interaction between average internet time and parents' university/college education showed a significant effect ($\beta = .95$, $p = .015$), while the other interaction terms were not significant.

In the analysis of simple main effects by parental education level, there was no significant effect for children of parents with a primary school education ($\beta = .34$, $p = .307$). However, significant positive effects were found for children of parents with a vocational degree ($\beta = .83$, $p < .001$), a secondary school degree ($\beta = .70$, $p < .001$), and a higher education degree ($\beta = 1.29$, $p < .001$). The results support that parental educational functions as a moderator in the relationship between screen time and problematic internet use. While for children of parents with a primary school education, more time spent online is not associated with a higher risk of problematic use, this relationship is significant and strong for children of parents with higher educational attainment.

Gender also emerged as a significant moderator. The association between daily internet use and PIU was significantly more pronounced for girls ($\beta = .99$, $p < .001$) compared to boys ($\beta = .68$, $p < .001$). While increased online time elevates the risk of PIU for both genders, this dose-response relationship is demonstrably steeper for girls. This suggests that, within Generation Alpha, girls may exhibit greater vulnerability to the adverse psychological outcomes of excessive screen time, revealing a gender-specific risk profile.

D. Identification of Problematic Internet Use User Profiles

A K-means cluster analysis yielded a four-cluster solution, delineating distinct user profiles based on internet usage intensity and the psychological dimensions of PIU (control, obsession, and neglect). ANOVA tests confirmed that all clustering variables were significant differentiators ($p < .001$ for all), with average daily internet use emerging as the most potent factor for group separation ($F(3, 833) = 834.83$, $p < .001$).

The „**Controlled Low-Users**” ($N = 317$, 37.9%) form the largest group, characterized by the lowest average internet use ($M = 1.7$) and the lowest scores on all symptoms of problematic internet use. They represent the „*problem-free*” profile.

The „**Intensive but Stable Users**” ($N = 203$, 24.3%) is a group that, despite spending a lot of time online ($M = 4.8$), exhibits low PIU symptoms. They can be described as „*functional heavy-users*”, indicating that intensive use is not necessarily problematic..

The „**Ambivalent Moderate-Users**” ($N = 193$, 23.1%) spend relatively low internet use ($M = 2.3$) but scored relatively high on the intention to reduce use ($M = 3.0$) and on receiving negative feedback from others ($M = 3.0$). This suggests a perceived problem or conflict with their use despite its moderate level.

The „**Problematic Intensive-Users**” ($N = 124$, 14.8%) spend the most time online ($M = 6.5$). This was the smallest but most at-risk segment. This cluster was defined by the highest overall PIU scores, especially regarding the neglect of tasks and sleep ($M = 4.0$), alongside high levels of impaired control and obsession, marking them as the most vulnerable group.

The results highlight that within Generation Alpha, problematic internet use is not a homogeneous phenomenon but rather manifests in several distinct patterns.

V. DISCUSSION

The primary objective of this study was to analyze the patterns of Problematic Internet Use (PIU) within a sample of Generation Alpha from Fejér County, Hungary, focusing specifically on the impact mechanisms of screen time, demographic variables, and parental factors. Our findings reveal that the most prevalent symptoms of PIU are linked to the behavioral dimension of neglect. Excessive internet use at the expense of sleep was the most commonly reported issue, though it often co-occurred with a stated internal desire to reduce use. The incidence of significant cognitive-emotional symptoms was notably lower in our sample. A comprehensive assessment indicates that problematic internet use within this age cohort is predominantly functional in character, primarily manifesting through the disruption of daily behavioral patterns and routines.

The results clearly support Hypothesis 1, showing that online screen time is indeed most strongly associated with neglect. The correlation analysis revealed the strongest relationship ($r_p = .492$) between average daily internet use and the neglect of sleep. This finding is consistent with international literature, which consistently demonstrates a negative relationship between screen time, excessive online presence, and sleep problems (shorter sleep duration, poorer sleep quality, difficulty falling asleep) in adolescents. For

instance, in Hungary, boys who are intensive social media users were 85% more likely to report sleep disorders[17][18]. The neglect of sleep is a form of functional impairment, and its negative consequences include a decline in academic performance, the perpetuation of PIU, and the development of mental health problems[19].

The results also confirmed Hypothesis 2, showing that gender and parental education significantly moderate the relationship between internet time and PIU. The moderation analysis revealed complex patterns in the effect of parental education. For children of parents with higher education degree, online screen time significantly and strongly increased the risk of PIU, whereas this moderating effect was not detected for children of parents with a primary school education. This finding aligns with the research of Livingstone and Helsper[20], who pointed out that parental mediation strategies—including active co-use and setting interaction rules—are not always effective in reducing online risks. The increased vulnerability to PIU among children of higher-educated parents, despite their parents' mediation practices, suggests that conscious parental intervention alone does not guarantee effective protection.

In the examination of gender as a moderating variable, the relationship between screen time and PIU was found to be significantly stronger among girls. This contrasts with some earlier research that identified boys as the higher-risk group, particularly concerning online gaming, academic performance, and a lack of self-control[21][22]. While online screen time increases the risk of PIU for both genders, this association is notably stronger for girls, indicating their heightened vulnerability to the negative effects of excessive screen use (anxiety, depression, psychological distress) [23][24].

Overall, the findings indicate that problematic internet use is not exclusively a function of the quantity of screen time. A comprehensive understanding of the phenomenon requires the simultaneous examination of the context of use, gender differences, and the complex influencing role of family background.

A. Limitations and Future Directions

The primary limitation of this study is the occasional low reliability of the subscales of the problematic internet use instrument, which necessitates caution when generalizing the results. The lack of reliable and valid measurement tools for Generation Alpha represents a broader challenge in the field.

An additional constraint was the use of a self-report methodology, which introduces the potential for response biases. Self-reported data are vulnerable to distortions arising from social desirability and recall inaccuracies, especially concerning the estimation of time spent online. These methodological limitations delineate several key avenues for future research, including the implementation of longitudinal study designs and, crucially, the development of novel, reliable, and valid instruments specifically designed and validated for the unique characteristics and online behaviors of Generation Alpha.

VI. SUMMARY

The present research examined the phenomenon of Problematic Internet Use (PIU) within Generation Alpha, with a focus on its associations with internet time use, demographic factors (gender, parental education), and psychological

profiles. The study utilized a cross-sectional design, with a sample of 837 students in upper primary and secondary education in Fejér County, Hungary, completing a survey. Data were analyzed via correlation, regression, moderation, and cluster analyses.

Findings indicated that average daily internet use ($M = 3.33$ hours) was most strongly correlated with sleep neglect ($r_p = .492, p < .001$). A regression model accounted for 19.3% of the variance in PIU, with screen time ($\beta = .427$) and gender ($\beta = .111$) being the most potent predictors. Moderation analyses demonstrated that the association between online screen time and PIU was significantly more pronounced for girls and for children with higher-educated parents. A key finding from the cluster analysis, which identified four distinct user profiles, was that screen time is not a sufficient standalone indicator of problematic use. For instance, the „intensive but stable users” (24.3%) reported high online screen time without problematic symptoms, while the „ambivalent moderate-users” (23.1%) exhibited signs of impaired control at lower levels of use.

This study demonstrates that PIU in Generation Alpha is a complex, multifactorial construct that cannot be defined solely by the quantity of screen time. The results confirm the central role of behavioral neglect and show that risk profiles are considerably shaped by demographic context and usage patterns. The research underscores the necessity of longitudinal studies and the development of validated, age-appropriate assessment instruments.

DECLARATION OF GENERATIVE AI AND AI-ASSISTED TECHNOLOGIES IN THE WRITING PROCESS

During the preparation of this work the authors used Gemini 2.5 Pro in order to improve the language and readability of the paper. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

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