

RESEARCH ARTICLE (ORIGINAL) 

Structural validity of the Internet-related Experiences Questionnaire (CERI) in adolescents

Validez estructural del Cuestionario de Experiencias Relacionadas con Internet (CERI) en adolescentes

Validade estrutural do Internet-Related Experiences Questionnaire (CERI) em adolescentes

Carlos Reyes-Sánchez ¹

 <https://orcid.org/0000-0001-7758-5906>

Verónica Guzmán-Ramírez ¹

 <https://orcid.org/0000-0003-2088-2138>

Julia Lizeth Villarreal Mata ²

 <https://orcid.org/0000-0002-8829-0537>

Brenda Guadalupe Yañez Castillo ¹

 <https://orcid.org/0000-0002-3203-8156>

Manuel Antonio López Cisneros ³

 <https://orcid.org/0000-0002-9384-5752>

¹ Autonomous University of Tamaulipas, Nursing School, Nuevo Laredo, Nuevo Laredo, Tamaulipas, Mexico.

² Autonomous University of Nuevo León, Nursing School, Monterrey, Nuevo León, Mexico

³ Autonomous University of Carmen, School of Health Sciences, Ciudad del Carmen, Campeche, Mexico

Corresponding author

Carlos Reyes-Sánchez

E-mail: crsanchez@docentes.uat.edu.mx

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Abstract

Background: Internet use can have positive or negative social effects and, as such, it is crucial to have instruments that can identify the addictive behaviors associated with it.

Objective: To validate a questionnaire on experiences related to Internet use among Mexican lower-secondary school students.

Methodology: A cross-sectional descriptive study was conducted on a sample of 258 Mexican students aged 11 to 15 years, selected by stratified random sampling. The instrument used included a personal data questionnaire and the Internet-related Experiences Questionnaire. Descriptive statistics, exploratory factor analysis followed by the multiple principal component extraction method, and confirmatory factor analysis were used to examine the data.

Results: The two-factor model with a second-order factor showed an acceptable fit ($\chi^2(34) = 63.718$; $p < 0.001$; CMIN/DF = 1.874; CFI = 0.905; TLI = 0.875; RMSEA = 0.061; AIC = 105.718/110.000/379.240). The two resulting factors were designated as “interpersonal conflicts” and “intrapersonal conflicts.”

Conclusion: The results indicate that the Internet-related Experiences Questionnaire is a valid screening instrument that can be used in any context.

Keywords: internet use; internet addiction disorder; adolescent behavior

Resumen

Marco contextual: El uso de Internet puede generar efectos sociales positivos o negativos, por esto, es importante contar con herramientas que permitan identificar conductas adictivas relacionadas con su uso.

Objetivo: Validar el cuestionario de experiencias relacionadas con el uso de internet en estudiantes de secundaria.

Metodología: Estudio descriptivo transversal con una muestra de 258 estudiantes de 11 a 15 años seleccionados a través de muestreo aleatorio estratificado. Se utilizó una Cédula de Datos Personales y el Cuestionario de Experiencias Relacionadas con Internet (CERI). Para el análisis se utilizó estadística descriptiva, análisis factorial exploratorio por el método de extracción de componentes múltiples principales y el análisis factorial confirmatorio.

Resultados: El modelo de dos factores con un factor de segundo orden presentaba un ajuste aceptable ($\chi^2(34) = 63,718$; $p < 0,001$; CMIN/DF = 1,874; CFI = 0,905; TLI = 0,875; RMSEA = 0,061; AIC = 105,718/110,000/379,240). Los dos factores resultantes fueron denominados conflictos interpersonales y conflictos intrapersonales.

Conclusión: El CERI es un instrumento válido de detección oportuna aplicable en cualquier contexto.

Palabras clave: uso de internet; trastorno de adicción a internet; conducta del adolescente

Resumo

Enquadramento: A utilização da Internet tem o potencial de gerar efeitos sociais positivos ou negativos, pelo que é importante dispor de instrumentos que permitam identificar comportamentos aditivos associados a ela.

Objetivo: Determinar a validade de um questionário sobre experiências relacionadas com a utilização da Internet em alunos mexicanos do segundo ciclo do ensino básico.

Metodologia: Foi realizado um estudo descritivo transversal com uma amostra de 258 alunos mexicanos com idades compreendidas entre os 11 e os 15 anos, selecionados por amostragem aleatória estratificada. O instrumento utilizado incluía um questionário de dados pessoais e o CERI (*Cuestionario de Experiencias Relacionadas con Internet*). Os dados foram analisados recorrendo a estatísticas descritivas, análise fatorial exploratória seguida de extração de componentes principais múltiplos e análise fatorial confirmatória.

Resultados: O modelo de dois fatores com um fator de segunda ordem apresentou um ajustamento aceitável ($\chi^2(34) = 63,718$; $p < 0,001$; CMIN/DF = 1,874; CFI = 0,905; TLI = 0,875; RMSEA = 0,061; AIC = 105,718/110,000/379,240). Os dois fatores resultantes foram designados por “conflitos interpessoais” e “conflitos intrapessoais”.

Conclusão: Os resultados sugerem que o CERI (*Cuestionario de Experiencias Relacionadas con Internet*) é um instrumento de rastreio válido e aplicável em qualquer contexto.

Palavras-chave: uso da internet; transtorno de adição à internet; comportamento do adolescente



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Introduction

The Internet allows people to interact with each other regardless of location, increasing the number of social relationships that individuals can have at any given time. Also, online social interactions are free and easily accessible and can occur all the time (Nikbin et al., 2021). As adolescents learn to interpret their emotions, a greater emphasis on peer approval characterizes their social interactions. These interactions often occur through online social media and the use of mobile devices, which have contributed to changing the way adolescents communicate through downloadable multimedia applications (Shah et al., 2019).

Thus, technology allows adolescents to interact with their social support networks. However, when adolescents are unable to establish these interactions, they may develop emotional and psychological problems caused by the need to be constantly online. Some even stop eating or sleeping and show less interest in daily activities (Morales, 2022). Gioia et al. (2021) mention that “Internet addiction is characterized by uncontrolled preoccupations, urges, or behaviors related to computer use that might lead to impairment or distress, but also to psychosocial maladjustment, academic difficulties, and physical health problems”.

The United Nations Children’s Fund (UNICEF, n.d.) calls attention to the fact that adolescents’ use of the Internet can pose a risk to their development and mental health, as well as to their personal integrity, by exposing them to virtual violence or grooming attempts through social media and online gaming or messaging platforms. Other risks include exposure to inappropriate content, including sexual, violent, or xenophobic material, and exposure to cyberbullying, ridicule, and rumors or threats on social media.

Statista reports that in 2023 there were 5.4 billion Internet users in the world. In Mexico, in 2023, the National Institute of Statistics and Geography (INEGI), based on the National Survey on the Availability and Use of Information Technologies in Households (ENDUTIH), reported a prevalence of 81.2% of Internet users aged 6 years and older, with an average online time of 4.5 hours per day. In the 12-17 age group, the prevalence of Internet use was 92.4%, and in the 6-11 age group it was 72.1%. The use of smartphones to connect to the Internet is predominant (97.1%) among young people, who use these devices to communicate (93.3%), access social media (91.5%), entertain themselves (88.1%), search for information (87.7%), support education or training (82.1%) and access audiovisual content (77.8%), among others.

Several instruments have been developed and validated to assess Internet use and quality of use. Beranuy et al. (2009) developed the original version of the Internet-related Experiences Questionnaire (IREQ), which has been used with adolescents and young people in Spain, Paraguay, Colombia, and Chile (Beranuy et al., 2009; Carbonell et al., 2012; Inostroza et al., 2019; Larco, 2018; Redondo et al., 2016). However, there is no literature to

support its application in Mexico. Therefore, our study aims to validate the IREQ in adolescents in Nuevo Laredo, Tamaulipas, Mexico.

Background

Beranuy et al. (2009) developed the IREQ to assess Internet-related experiences in young people. The instrument consists of two factors. The first factor assesses “intrapersonal conflicts” and the second assesses “interpersonal conflicts,” both related to Internet use. “Intrapersonal conflicts” are characterized by the constant concern with being online, the occurrence of negative feelings when unable to be online, such as dejection and irritability, and the avoidance of everyday situations and problems. “Interpersonal conflicts” are associated with time spent online and the personal and social problems stemming from Internet use and the reduction in time spent on daily activities (Cudo et al., 2016; Larco, 2018). The instrument was initially validated with age groups between 12 and 25 years and showed internal consistency values of 0.77 for the total scale, 0.74 for the “intrapersonal conflicts” factor, and 0.75 for the “interpersonal conflicts” factor. Carbonell et al. (2012) administered the IREQ to a Spanish population aged 12 to 25 years old and reported an internal consistency of 0.77 for the total scale. In 2015, Britos and Brítez (2015) applied the IREQ to university students in Paraguay and reported an internal consistency of 0.98 for the total scale and 0.96 for the “interpersonal conflicts” factor. Redondo et al. (2016) also conducted a study with Colombian university students using the IREQ and obtained an internal consistency of 0.79 for the total scale. In Chile, Inostroza et al. (2019) applied the questionnaire to university students and obtained an internal consistency of 0.72 for the total scale and 0.61 and 0.51 for the “intrapersonal conflicts” and “interpersonal conflicts” factors, respectively.

Research question

Can IREQ be used to identify problems related to Internet use in Mexican lower-secondary school students?

Methodology

A cross-sectional descriptive design was chosen as the data were collected at one point in time, allowing for the analysis of the psychometric properties of the IREQ in Mexican adolescents in Nuevo Laredo, Tamaulipas (Grove & Gray, 2019).

The study population consisted of 588 (276 males and 312 females) Mexican lower-secondary school students between the ages of 11 and 15 from a public institution in Nuevo Laredo, Tamaulipas. The stratified random sampling method was used in proportion to the population size of the stratum, and within the stratum, simple random sampling was used. The adolescents’ sex was



used as a stratum. The sample size was determined with a confidence level of 95%, a margin of error of 5%, and a non-response rate of 10%, resulting in a final sample of 258 adolescents (121 males and 137 females).

The questionnaires were given to the students in paper form and began with a personal data questionnaire consisting of 10 items. This questionnaire collected information on participants' age, sex, academic year, and who they lived with, as well as questions related to Internet use, such as time spent online, devices used to connect to the Internet, and parental supervision of time spent online. The IREQ was used. This instrument was adapted from the Internet Addiction Diagnostic Questionnaire developed by Kimberly Young in 1998 and validated by Beranuy in Spain in 2009. It consists of 10 questions divided into two factors: "intrapersonal conflicts" (with six items) and "interpersonal conflicts" (with four items). The IREQ is presented in a Likert format with four response options: 1 = almost never, 2 = sometimes, 3 = almost always, and 4 = always. Scores range from 10 to 40, with higher scores indicating greater problems related to Internet use. The IREQ obtained an internal consistency of 0.77 in our study.

After approval by the Ethics and Research Committee (FENL-CEI-P006) and with the permission of the educational institution, the student records were accessed. Informed consent forms were then sent to the students' parents/guardians, explaining the study and the risks and benefits to the participants. Next, the investigators visited the classrooms to inform the students about the purpose of the study and the risks and benefits of their participation. The investigators also informed the students that participation in the study was voluntary, anonymous, and confidential and that those who did not wish to

participate were free to refuse to answer and withdraw from the study without being sanctioned by the academic institution. Upon completing the questionnaire, the students were thanked for their participation and informed that the data obtained would be presented in a general way to maintain anonymity. Our study complied with the provisions of the Mexican General Health Law regarding health research (Secretaría de Salud, 2014).

Data were processed using IBM® SPSS® Statistics (2019) software, version 26.0 for Windows, and IBM® SPSS® Amos (2016) software, version 24.0 for Windows. Descriptive statistics such as frequencies, percentages, and measures of central tendency and variability were obtained. In addition, Spearman's correlation coefficient was applied, followed by exploratory factor analysis with multiple principal component extraction and subsequent oblique Promax rotation. Finally, a confirmatory factor analysis was conducted.

Results

Regarding our study sample, the results showed that 53.1% of the participants were female, 72.3% used smartphones, 39.2% used the Internet for gaming and 36.3% for socializing, and 58.9% reported no adult supervision during their time online. In addition, the amount of time spent online ranged from 2 to 11 hours.

Table 1 shows the descriptive statistics of each item and the original dimensions of the IREQ, indicating that the distribution was symmetric. In addition, the kurtosis of most items was closer to zero, indicating a normal distribution. A strong correlation was observed between the IREQ factors/subscales, and with the total scale (Table 2).

Table 1

Descriptive Statistics for the Items of the Internet-Related Experiences Questionnaire

Items	Mean	Mdn	SD	Min	Max	Skewness	Kurtosis	IQR
1	1.9	2.0	0.867	1	4	0.853	0.209	1
2	1.6	2.0	0.751	1	4	1.017	0.784	1
3	1.7	2.0	0.851	1	4	0.984	0.342	1
4	1.7	2.0	0.910	1	4	1.022	0.222	1
5	1.8	2.0	0.928	1	4	0.902	-0.083	2
6	1.6	2.0	0.906	1	4	1.269	0.713	1
7	1.6	2.0	0.877	1	4	1.313	0.956	1
8	1.3	1.0	0.728	1	4	2.265	4.755	1
9	2.3	2.0	1.040	1	4	0.287	-1.079	1
10	1.8	2.0	0.982	1	4	0.977	-0.111	1
Intrapersonal	10.6		3.174	6	24	0.762	0.490	
Interpersonal	7.2		2.511	4	16	0.935	0.580	
Total	17.9		5.191	10	40	0.772	0.576	

Note. Mdn = Median; SD = Standard deviation; Min = Minimum value; Max = Maximum value; IQR = Interquartile range; $n = 258$.

Table 2

Matrix of Correlations Between the Intrapersonal and Interpersonal Subscales of the Internet-Related Experiences Questionnaire

	1	2	3
1 IREQ	1		
2 Intrapersonal Subscale	0.962**	1	
3 Interpersonal Subscale	0.919**	0.800**	1

Note. ** = $p < 0.001$; * = $p < 0.05$; $n = 258$.

The preliminary analyses were then performed with an exploratory factor analysis followed by a multiple principal component extraction, which resulted in two factors, ex-

plaining 60% of the variability of the items, and retained the 10 items of the IREQ (Table 3).

Table 3

Exploratory Factor Analysis of the Internet-Related Experiences Questionnaire

Items	Factor 1	Factor 2
1 How often do you make new friends on the internet?	0.398	0.173
2 How often do you give up things you are doing in order to be online for longer?	0.631	0.191
3 Do you think your academic or professional performance has been negatively affected by internet use?	0.303	0.748
4 When you are in trouble, does getting online help you to escape from them?	0.508	-0.452
5 How often do you anticipate your next time online?	0.528	-0.197
6 Do you think life without the internet is boring, empty, and sad?	0.648	-0.231
7 If someone disturbs you while you are online, do you get angry or irritated?	0.550	0.121
8 When you are not online, do you feel nervous or worried?	0.590	0.273
9 When you are online, do you feel time flies?	0.661	-0.219
10 Do you find relating to people through the internet easier or more convenient than face-to-face?	0.584	-0.027

Note. $n = 258$.

Table 4 shows the factor loadings after an oblique Promax rotation of the items. The model shows a good fit ($KMO = 0.78$; Bartlett's Test of Sphericity = 389.819; $gl = 45$; $p < 0.001$) and the items correspond to the two original factors/subscales. In terms of internal consistency, Factor 1 - "Intrapersonal Conflicts" and Factor 2 - "Interpersonal Conflicts" obtained Cronbach's alpha coefficients of 0.84 and 0.74, respectively.

Using robust estimators, the confirmatory factor analysis revealed a two-factor structure. The second order two-factor model also showed an acceptable fit ($\chi^2(34) = 63.718$; $p < 0.001$; $CMIN/DF = 1.874$; $CFI = 0.905$; $TLI = 0.875$; $RMSEA = 0.061$; $AIC = 105.718/ 110.000/ 379.240$). The two factors were labeled "interpersonal conflicts" and "intrapersonal conflicts" with four and six items, respectively. The regression loadings are shown in Table 5.

Table 4*Factor Analysis with Rotation of the Internet-Related Experiences Questionnaire*

Items	Promax rotation	
	Factor 1 $\alpha = 0.84$	Factor 2 $\alpha = 0.74$
9 When you are online, do you feel time flies?	0.685	
6 Do you think life without the internet is boring, empty, and sad?	0.679	
4 When you are in trouble, does getting online help you to escape from them?	0.664	
5 How often do you anticipate your next time online?	0.557	
10 Do you find relating to people through the internet easier or more convenient than face-to-face?	0.524	
7 If someone disturbs you while you are online, do you get angry or irritated?	0.423	
3 Do you think your academic or professional performance has been negatively affected by internet use?		0.748
8 When you are not online, do you feel nervous or worried?		0.608
2 How often do you give up things you are doing in order to be online for longer?		0.578
1 How often do you make new friends on the internet?		0.401

Note. $n = 258$; $\alpha =$ Cronbach's Alpha.

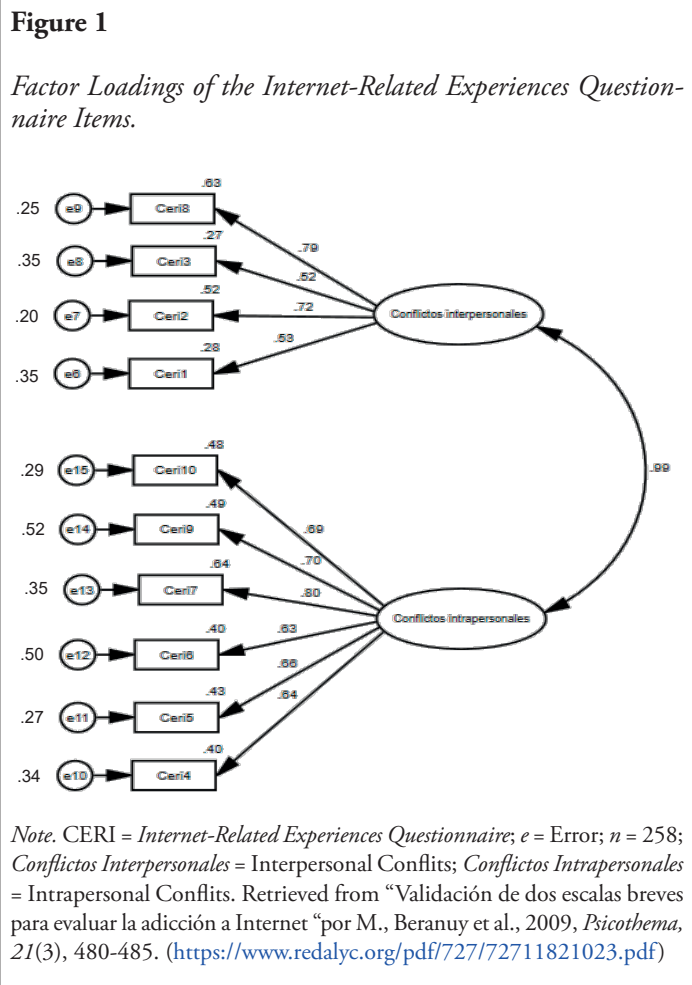
Table 5*Factor loadings of the Internet-related Experiences Questionnaire*

			β	S.E.	C.R.	p
IREQ1	←-	Interpersonal Conflicts	0.530			
IREQ2	←-	Interpersonal Conflicts	0.720	0.268	4.687	0.000
IREQ3	←-	Interpersonal Conflicts	0.516	0.253	3.807	0.000
IREQ8	←-	Interpersonal Conflicts	0.793	0.361	4.921	0.000
IREQ4	←-	Intrapersonal Conflicts	0.635			
IREQ5	←-	Intrapersonal Conflicts	0.655	0.179	5.230	0.000
IREQ6	←-	Intrapersonal Conflicts	0.630	0.237	5.067	0.000
IREQ7	←-	Intrapersonal Conflicts	0.798	0.271	6.087	0.000
IREQ9	←-	Intrapersonal Conflicts	0.703	0.271	5.529	0.000
IREQ10	←-	Intrapersonal Conflicts	0.693	0.198	5.469	0.000

Note. IREQ = Internet-related Experiences Questionnaire; β = Standardized Regression Coefficients; S.E.= Standard Error; C.R.= Critical Ratio; p = Significance; $n = 258$.

Figure 1 shows the factor loadings of the proposed two-factor model for the IREQ. The items loaded satisfactorily

on their respective factors, and the two factors strongly correlated with each other ($r = 0.990$).



Discussion

Our study aimed to validate the IREQ in the Mexican adolescent population. The predominantly female study sample shows that adolescents connect to the Internet predominantly through smartphones and are online between 2 and 11 hours per day, mostly for playing or socializing. Most participants also report that their parents do not monitor the content they view or the time they spend online. These data are similar to those reported by the Mexican ENDUTIH (Instituto Federal de Telecomunicaciones, 2023) regarding smartphone use and time spent online. In a literature review, Gioia et al. (2021) note that individuals use the Internet to distract themselves from negative emotions, escape from reality, or cope with feelings of loneliness, depression, and stress, which increases their risk of problematic Internet use. The analysis of the IREQ shows that the items fit a normal distribution and that they have a strong correlation between the factors/subscales as well as with the total scale. The principal components analysis led to the emergence of two factors, formed by retaining the 10 items of the original subscales, with internal consistencies of 0.84 for the “intrapersonal conflicts” factor and 0.74 for the “interpersonal conflicts” factor (Grove & Gray, 2019). The internal consistency reported by Beranuy et al. (2009) for the Spanish population (12-25 years old) was lower for the “intrapersonal conflicts” factor and similar for the

“interpersonal conflicts” factor. However, Britos and Britetz (2015), in Paraguayan university students, and Redondo et al. (2016), in Colombian university students, obtained Cronbach’s alpha coefficients ranging from 0.79 to 0.98. In Chile, also in university students, the IREQ showed a lower internal consistency than in our study. The factors obtained are the same as the original instrument, with four and six items that show a strong correlation between them. This result differs from that reported by Inostroza et al. (2019), who obtained factor loadings for a single factor and did not recommend the two-factor structure because items 8 and 9 have factor loadings opposite to the original scale. On the other hand, Larco (2018) obtained a two-factor scale but different from the original because she eliminated item 1 due to low factor loading and included item 8 in the “intrapersonal conflicts” subscale and item 9 in the “interpersonal conflicts” subscale. Beranuy et al. (2009) explain that the organization of items by factor/subscale is based on the effects that excessive Internet use causes, such as attention problems, worry, avoidance, denial, and social or family conflicts. The IREQ has been validated in adolescents and university students, but mostly in young adults who already have learned and established behaviors. Therefore, our study was conducted with lower-secondary school students, who are considered to be at higher risk for developing addictive behaviors. The changes in adolescents’ social

interactions have led to an increase in physical and mental health problems due to abusive or compulsive use of communication technologies. Despite removing communication barriers and serving as a means of expressing feelings or creativity, communication technologies may also increase the likelihood of overweight/obesity, impair academic performance (e.g., through lack of sleep), and increase anxiety and depression (Observatorio Nacional de Tecnología y Sociedad en colaboración con Digital Future Society, sf; Suárez-García & Álvarez-García, 2023).

Conclusion

Our study shows that the IREQ can be used as an instrument to assess Internet use. It applies to any age group and can be used as an early detection tool. Furthermore, due to its brief format, the IREQ can be used in any context.

Author contributions

Conceptualization: Reyes-Sánchez, C., Guzmán-Ramírez, V., Villarreal Mata, J. L., Yañez Castillo, B. G., López Cisneros, M. A.

Data curation: Reyes-Sánchez, C., Guzmán-Ramírez, V., Villarreal Mata, J. L., Yañez Castillo, B. G., López Cisneros, M. A.

Formal analysis: Reyes-Sánchez, C., Guzmán-Ramírez, V., Villarreal Mata, J. L., Yañez Castillo, B. G., López Cisneros, M. A.

Investigation: Reyes-Sánchez, C., Guzmán-Ramírez, V., Villarreal Mata, J. L., Yañez Castillo, B. G., López Cisneros, M. A.

Methodology: Reyes-Sánchez, C., Guzmán-Ramírez, V., Villarreal Mata, J. L., Yañez Castillo, B. G., López Cisneros, M. A.

Project administration: Reyes-Sánchez, C., Villarreal Mata, J. L.

Resources: Reyes-Sánchez, C., Yañez Castillo, B. G., López Cisneros, M. A.

Supervision: Villarreal Mata, J. L., Yañez Castillo, B. G., López Cisneros, M. A.

Validation: Reyes-Sánchez, C., Guzmán-Ramírez, V., Villarreal Mata, J. L., López Cisneros, M. A.

Visualization: Villarreal Mata, J. L., López Cisneros, M. A.

Writing - original draft: Reyes-Sánchez, C., Guzmán-Ramírez, V.

Writing - review and editing: Reyes-Sánchez, C., Guzmán-Ramírez, V., Villarreal Mata, J. L., Yañez Castillo, B. G., López Cisneros, M. A.

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