Tikrit Journal of Administrative and Economic Sciences, Vol. 20, No. 68, Part (2): 524-536
Doi: www.doi.org/10.25130/tjaes.20.68.2.28

Tikrit Journal of Administrative and Economics Sciences
مجلة تكريت للعلوم الإدارية والاقتصادية
EISSN: 3006-9149
PISSN: 1813-1719

Impact of Modern Technology and Electronic Screen Usage on Children: A Factor Analysis Study in Erbil City

Zhian Mohsin jalal [A*], Jwana Rostam Qadir [B], Shakar Maghdid Azeez [A]
Awaz Omer Ahmed [A]

[A] College of Administration and Economics/ Salahaddin University/Erbil
[B] College of Science/ Raparin University

Keywords:
Factor Analysis, Bartlett's test, Communalities, Component.

A R T I C L E I N F O

Article history:
Received 28 Jul. 2024
Accepted 27 Aug. 2024
Available online 31 Dec. 2024

*Corresponding author:
Zhian Mohsin jalal
College of Administration and Economics/ Salahaddin University/Erbil

Abstract: This study looks into how children in Erbil City are affected by electronic screens and modern technology, with a particular emphasis on identifying important elements that affect their use. Eight primary components were identified by factor analysis, accounting for 59.906% of the variance in the data. The amount of time spent on screens, parental control measures, effects on education and health, and social factors were all significant variables. The sample's suitability for factor analysis was validated using the Bartlett's test of sphericity and the Kaiser-Meyer-Olkin (KMO) measure. The results show how technology affects kids in many ways and offer guidance for focused interventions and laws that encourage responsible technology use.

Tikrit Journal of Administrative and Economic Sciences, Vol. 20, No. 68, Part (2): 524-536
Doi: www.doi.org/10.25130/tjaes.20.68.2.28

أثر التكنولوجيا الحديثة واستخدام الشاشة الإلكترونية على الأطفال: دراسة التحليل العاملي في مدينة أربيل

زيان محسن جلال	جوانه روستم قادر	شاكار مغديد عزيز	ئاواز عمر أحمد
كلية الإدارة والاقتصاد	كلية العلوم	كلية الإدارة والاقتصاد	كلية الإدارة والاقتصاد
جامعة صلاح الدين/ اربيل	جامعة رابرين	جامعة صلاح الدين/اربيل	جامعة صلاح الدين/اربيل

المستخلص

تبحث هذه الدراسة في كيفية تأثر الأطفال في مدينة أربيل بالشاشات الإلكترونية والتكنولوجيا الحديثة، مع التركيز بشكل خاص على تحديد العناصر المهمة التي تؤثر على استخدامها. تم تحديد ثمانية مكونات أساسية عن طريق تحليل العوامل، وهو ما يمثل 59.906% من التباين في البيانات. وكان مقدار الوقت الذي يقضيه أمام الشاشات، وإجراءات الرقابة الأبوية، والتأثيرات على التعليم والصحة، والعوامل الاجتماعية، كلها متغيرات مهمة. تم التحقق من مدى ملاءمة العينة لتحليل العوامل باستخدام اختبار بارتليت للكروية ومقياس كايزر ماير أولكين .(KMO) توضح النتائج كيف تؤثر التكنولوجيا على الأطفال بطرق عديدة وتقدم إرشادات للتدخلات المركزة والقوانين التي تشجع الاستخدام المسؤول للتكنولوجيا.

الكلمات المفتاحية: التحليل العاملي، اختبار بارتليت، المجتمعات، المكونات.

Introduction

The internet and technology have grown to be ubiquitous in our daily lives. Most people view the Internet as a fantastic source of knowledge and an unbeatable chance for social interaction, self-education, improving one's economic situation, and overcoming shyness and crippling inhibitions. For them, their quality of life and general well-being are improved by the Internet. For others, on the other hand, it may result in a condition that seems to fit the DSM's definition of a mental disorder, which is defined as "a clinically significant behavioral or psychological syndrome associated with present distress or with a significantly increased risk of suffering death, pain, disability, or an important loss of freedom." (King, Delfabbro, Griffiths, & Gradisar, 2012)

The term "internet addiction" first debuted in the aptly named Internet Addiction. Six characteristics of addiction were taken into consideration when developing this test: salience, excessive usage, ignoring work, emotions of increased anticipation, decreased self-control, and ignoring social life. The psychometric qualities of the exam were then ascertained by correlating these parameters with three types of Internet usage: personal, professional, and general. At least one of the following symptoms was added to the previously suggested criteria for Internet addiction: lying to others and risking personal loss. Reliable and acknowledged addiction characteristics

seemed to be included in Young's Internet Addiction Test. (Wells, 2010) (Griffiths, Kuss, Billieux, & Pontes, 2016)

As of right now, the Diagnostic and Statistical Manual of Mental Disorders Fifth Edition (DSM-5) does not have Internet addiction (or a similar diagnosis) included in its spectrum of addictive disorders. However, it might be mentioned in an appendix as something that warrants additional empirical research. It's interesting to note that, despite the Internet's widespread use and prominence in contemporary life, there have only been two proposals for changes to the DSM that directly address the Internet or online behavior. The following disorders are mentioned in these revisions: (a) hypersexual disorder and (b) illness anxiety disorder (repeatedly seeking internet comfort regarding physiological indicators of illness). (King et al., 2012: 1185)

The Problem of Research: The use of technology and addiction is considered as one of the problems that is facing society in general and children in particular in today's world ،it directly affects them negatively and on the other hand it causes health disorders and lack of concentration.

Importance of research: Increasing the level of education of parents and developing their abilities through reading scientific research ،opening training courses and watching useful programs in the field of children's education ،so this research will greatly benefit parents and society in order to protect the future of the next generation.

The objective of study: the aim of this study is to serve the community ، parents and children in particular ،and to address the problems that children will face in the future. Identify the factors that have a negative impact on children and how to solve the problems that children face.

Hypothesis testing:

1. factorial analysis can be used to choose the validity of the hypothesis related to the pattern of factors affecting a group of variables, based on the matrix of the factors.
2. null hypothesis equal to the model is not adequacy sampling model alternative hypothesis equal to the model is adequacy sampling model.

Research Boundaries: In order to determine the boundaries of this study ، we collected data in the form of questionnaires in Erbil and its environs and mostly asked married people of both sexes with different occupations in the form of random choices.

Doi: www.doi.org/10.25130/tjaes.20.68.2.28

Factor analysis (FA): The factor structure is defined through a set of statistical methods that aim to reduce the number of variables or data related to a particular phenomenon, or through a set of hypothetical factors underlying a set of test items, measures, or variables in general, which is a form of construct validity that It is arrived at through factor analysis. (Rummel, 1988:3) (Baban & Saeed, 2023: 135)

It is a set of modern statistical techniques aimed at revealing the common factors that affect any number of different phenomena, and ends up reducing the multiple aspects that it analyzed into a small number of factors. That is, factor analysis condenses large numbers of variables according to their correlations into a number of factors. A few topics, and an introduction to the factors. Factor analysis is based on calculating the magnitudes and directions of correlations between variables, to derive a smaller number of linear harmonics that explain the largest proportion of the variance in the original variables. (tayoub, 1998: 145) (Lawley & Maxwell, 1962: 209)

Table (1): Descriptive Statistics for qualitative variables

Variables		f	%
Gender	Male	103	51.0
	Female	99	49.0
Occupation	Student	25	12.4
	Teacher	46	22.8
	Trader	36	17.8
	Housewife	44	21.8
	Doctor	15	7.4
	Employee	36	17.8
Age	<= 23	30	14.9
	24 – 26	26	12.9
	27 – 30	26	12.9
	31 – 32	26	12.9
	33 – 34	27	13.4
	35 – 38	21	10.4
	39 – 43	30	14.9
	44+	16	7.9
social situation	Married	156	77.2
	Divorced	31	15.3

Variables		f	%
	Single	15	7.4
Economic situation	Very good	40	19.8
	Good	84	41.6
	Center	69	34.2
	Bad	9	4.5
Scientific level	Primary	27	13.4
	Central	36	17.8
	High School	13	6.4
	Diploma	36	17.8
	Bachelor's degree	76	37.6
	Master's Degree	5	2.5
	Doctorate	9	4.5

The source: was prepared by the researcher based on the statistical program

Table 1 shows that most of the people in this survey are male (51%) as well as married (77.2%), and their profession is teacher (22.8%). On the other hand, they have a good economy (41.6%) and the highest level of education, which in this Table 1 shows that most of the people in this survey are male (51%), married (77.2%), and teachers (22.8%). On the other hand, they have a good economy (41.6%), and the highest educational level of the sample is a bachelor's degree (37.6%).

Evaluate Factorability of Matrices: Another premise of factor analysis is correlation, whereby the correlation matrix created later the information is used to compute the strength of linear correlations. In actuality, correlation values higher than 0.30 show that there is enough unity to support factors such as weak variance may be the cause of situations where there is some degree of weak intercorrelations. Additionally, homogeneous data show less fluctuation. (Blbas & Kadir, 2019: 256)

Kaiser (KMO): The Kaiser Meyer Olkin (KMO) Test determines whether your data is suitable for factor analysis. It is employed to assess the sampling appropriateness of the entire model as well as each variable. The statistic quantifies the amount of potential common variance, or variance, between variables. The lower the proportion, the more suited your data is to Factor Analysis. (Hill, 2011: 3)

Bartlett's Test of Sphericity: Tests the null hypothesis that your correlation matrix is an identity matrix, which would suggest that your variables have

Doi: www.doi.org/10.25130/tjaes.20.68.2.28

no relationship and are hence inappropriate for structure discovery. A factor analysis using your data may be beneficial if the significance level has small values less than 0.05. (Pett, Lackey, & Sullivan, 2003:73) (Tobias & Carlson, 1969:375)

Table (2): KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.525
Bartlett's Test of Sphericity	**Approx. Chi-Square**	341.374
	Df	171
	Sig.	0.000

The source: was prepared by the researcher based on the statistical program

We find that the value of the KMO is equal to (0.525), which is greater than (0.5), which indicates an increase in the reliability of the factors that we obtain from the factor analysis. We also judge the adequacy of the sample size, which is equal to 202 observations. We also find that the p-value for the tests by Bartlett is equal to 0.000, which is less than the alpha=0.05. This means that there is a correlation between some variables in the correlation matrix, as shown in Appendix table (A). The principal components method (PC) was applied, and the results were as follows:

Table (3): Total Variance Explained

Component	**Initial Eigenvalues**			**Rotation Sums of Squared Loadings**		
	Total	**% of Variance**	**Cumulative %**	**Total**	**% of Variance**	**Cumulative %**
1	1.994	10.493	10.493	1.667	8.773	8.773
2	1.748	9.199	19.692	1.614	8.493	17.266
3	1.671	8.794	28.486	1.537	8.089	25.355
4	1.382	7.274	35.760	1.481	7.795	33.150
5	1.308	6.884	42.644	1.377	7.247	40.397
6	1.181	6.213	48.857	1.313	6.912	47.309
7	1.091	5.742	54.599	1.197	6.302	53.610
8	1.008	5.307	59.906	1.196	6.295	59.906

The source: was prepared by the researcher based on the statistical program

The table above shows that there are eight main significant factors that affect the impact of modern technology and electronic screens on children in the Erbil city. These factors have a value greater than one, and these eight factors account for (59.906%) of the total variance. The factors summarized explain the variance but are important for identifying the factors affecting

Doi: www.doi.org/10.25130/tjaes.20.68.2.28

the impact of cold technology and electronic screens on children in Erbil. These eight factors are each explained in turn: (8.773, 8.493, 8.089, 7.795, 7.247, 6.912, 6.302, 6.295).

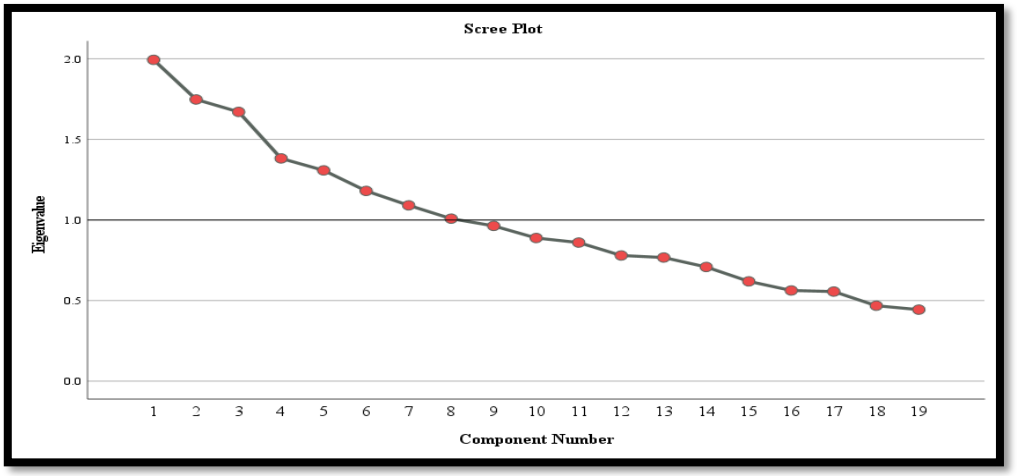

Figure (1): Scree Plot

The source: was prepared by the researcher based on the statistical program

Figure 1 shows that we have (8) significant factors that are valued more than (1) and (11) non-significant factors that are valued less than (1).

Table (4): Rotated Component Matrix

	Component							
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
y1		0.604						
y2				0.834				
y3			0.718					
y4	0.370	-0.500						0.380
y5	-0.428						0.443	0.316
y6				0.674				
y7		0.405	0.307		0.402			
y8						-0.695		
y9					0.752			
y10			-0.627					
y11						0.729		
y12			-0.509	-0.303				
y13					-0.718			
y14	0.625							
y15	0.482	0.365						
y16	0.608					0.310		
y17								0.833
y18		0.694						
y19							0.798	

The source: was prepared by the researcher based on the statistical program

Doi: www.doi.org/10.25130/tjaes.20.68.2.28

The table above shows our significant variables after rotation among the factors extracted for analysis, starting with the first factor explaining the largest percentage of total variance and ending with the last factor explaining the least percentage of total variance between components, as shown in Table (5).

Table (5): Table of components, significant variables, and percentage of variance explained for each component

Factors	Significant variables	The percentage of variance explained by each factor
1	Y4, Y5, Y14, Y15, Y16	8.773
2	Y1, Y4, Y7, Y15, Y18	8.493
3	Y3, Y7, Y10, Y12	8.089
4	Y2, Y6, Y12	7.795
5	Y7, Y9, Y13	7.247
6	Y8, Y11, Y16	6.912
7	Y5, Y19	6.302
8	Y4, Y5, Y17	6.295

The source: was prepared by the researcher based on the statistical program

We notice in the first factor, which has great and distinct importance in affecting the problem of the study and in determining the variables affecting the impact of modern technology and electronic screens on children in the city, that it explains (8.773) of the total variance, and this factor is significantly saturated with the net variables, which are respectively (Y4, Y5, Y14, Y15, Y16). And so on for all components.

Evaluating communalities: The square multiple correlation of a variable with all the common factors- thought of as the proportion of the variance of the variable because explained by the common factors. often used, ambiguously. to refer to crude approximations to communality. (Norris & Lecavalier, 2010:8)

Table (6): Communalities of variables

Variables	Extraction
Y1= Does your child use electronic devices (iPad, tablet, smartphone, etc.)	0.446
Y2= When does your child spend most of his time using electronic devices	0.736

Doi: www.doi.org/10.25130/tjaes.20.68.2.28

Variables	Extraction
Y3= As your child's guardian, are you aware of which applications you are using	0.674
Y4= How many hours a day does he spend watching electronic screens	0.647
Y5= Have you tried with your children to reduce and stop using electronic screens	0.633
Y6= Have you ever seen any programs or advertisements in the media about the bad effects of technology on children	0.612
Y7= How much do you agree with this and have you tried to set aside time for your child to use electronic screens each day	0.507
Y8= Large numbers of family members can affect your child's frequent use of electronic devices.	0.638
Y9= Your child uses the Internet and electronic screens to learn and access information.	0.628
Y10= Excessive use of the Internet and electronic screens has caused your child's academic performance at school.	0.503
Y11= To what extent do you agree that a lesson about the culture of using electronic devices and technology should be taught in schools	0.657
Y12= To what extent do you agree that your child's behavior has changed because of the use of electronic devices	0.517
Y13= Do you think the use of electronic devices has affected social relationships and interactions with other children	0.605
Y14= Friends, relatives and other children have influenced your child's use of electronic devices.	0.450
Y15= Electronic devices have a bad effect on your child's health.	0.490
Y16= Using the Internet and electronic screens can affect your child's sleep and eating habits.	0.558
Y17= Parents working abroad and being separated from their children affect their children's use of electronic devices.	0.733
Y18= You use giving electronic devices as rewards and taking them away as punishment for your child.	0.606
Y19= You are in favor of the government monitoring many deadly games and sites.	0.742

The source: was prepared by the researcher based on the statistical program

Doi: www.doi.org/10.25130/tjaes.20.68.2.28

These extraction values can help in identifying which items are most representative of the underlying latent factors and are crucial for understanding the main dimensions captured in your dataset.

- ❖ Values above 0.6 generally indicate a strong association with the underlying factor.
- ❖ Values between 0.4 and 0.6 indicate a moderate association.
- ❖ Values below 0.4 (none in this case) would indicate a weak association.

In table (6), there are no variables with communalities lower than (0.4). and twelve variables, which are respectively (Y2, Y3, Y4, Y5, Y6, Y8, Y9, Y11, Y13, Y17, Y18, Y19) have a strong correlation with factors, whereas seven variables, whose communalities are between (0.4-0.6), have a moderate association with factors.

Component Plot: This plot, which was created using the input data, is a three-dimensional scatterplot of the principal components. In the input data collection, every point corresponds to a single column. (Wold, Esbensen, & Geladi, 1987)

A component plot in factor analysis is a visual aid that shows how variables and the extracted components (factors) relate to one another. Factor analysis uses a variety of plot formats, of which the component plot is one of the most widely used. (Langsrud & Næs, 2003:6)

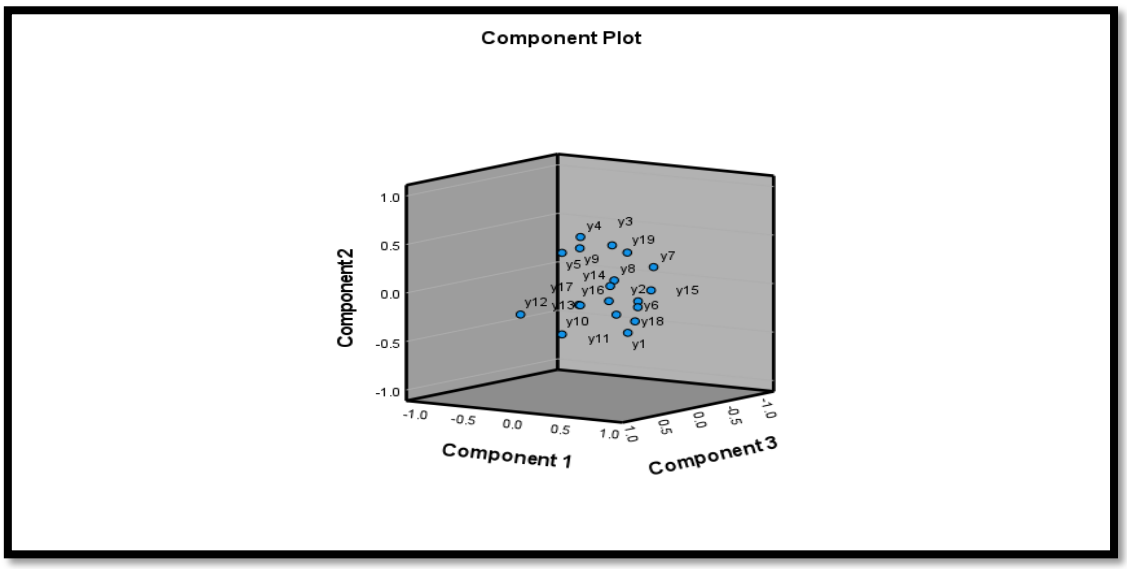

Figure (2): Component Plot

The source: was prepared by the researcher based on the statistical program

Plotting variables that are near to one another have comparable loadings on the components, indicating that they are connected and measure

similar characteristics of how children are affected by modern technology and electronic screens.

The fact that y5, y9, y4, y3, y8, y19, and y7 are clustered together suggests that their underlying causes are connected.

- Component 3 is where y2 and y19 are positioned, suggesting a close link with that factor.
- Component 2 has a notable loading in y17.
- Variables that are nearer the origin, such as y1, suggest a more evenly distributed loading across the three components or a reduced loading total.

Conclusion: Several important findings have emerged from the factor analysis carried out on how children in Erbil City are affected by electronic screens and modern technology. Almost 60% of the variance in the data was explained by eight major components, demonstrating their significant impact on the problem. These variables offer a thorough grasp of the essential components influencing kids' use of technology.

Eight important components were found through the research, and each one accounted for a different percentage of the variance. For example, factors including the number of hours spent watching screens, attempts to cut down on screen time, and the impact of friends and family are included in the first component, which accounts for 8.773% of the variance. These elements draw attention to important topics like the amount of screen time, parental control initiatives, the effects of technology on education and health, and societal influences on kids' technology use.

The use of component analysis was justified by the Kaiser-Meyer-Olkin (KMO) measure and Bartlett's test of sphericity, which both attested to the sample's sufficiency and the existence of substantial correlations between variables. The significant Bartlett's test result ($p < 0.05$) and the KMO value of 0.525 suggest that the data and sample size were suitable for the factor analysis.

These results highlight the complex interactions between technology and children's behavior, education, and social development. The identification of critical elements can direct programs and regulations intended to lessen the harmful impacts of excessive screen time and encourage youngsters to utilize technology in a healthier way.

As a result, the factor analysis has effectively reduced the intricate interaction of variables to eight essential aspects, offering a more lucid

Doi: www.doi.org/10.25130/tjaes.20.68.2.28

understanding of the ways in which contemporary technology and electronic displays impact children in Erbil city. These observations can help develop focused methods to deal with the drawbacks and maximize the positive effects of technology on children's life.

Appendix: Correlation Matrix

	y1	y2	y3	y4	y5	y6	y7	y8	y9	y10	y11	y12	y13	y14	y15	y16	y17	y18	y19
y1	1.00	0.02	-0.05	-0.21	-0.13	0.05	0.10	0.04	-0.09	0.13	0.06	-0.07	0.00	0.01	0.09	0.09	0.04	0.1	0.02
y2	0.02	1.00	-0.09	-0.01	-0.15	0.33	0.02	0.07	-0.04	-0.01	0.03	-0.14	-0.14	0.02	0.04	0.12	0.02	.01	0.11
y3	-0.05	-0.09	1.00	0.24	0.07	0.08	0.09	-0.06	0.03	-0.17	0.03	-0.16	0.07	0.09	0.15	0.01	0.01	.08	0.01
y4	-0.21	-0.01	0.24	1.00	0.04	0.02	0.02	-0.01	0.12	-0.04	-0.07	-0.06	-0.01	0.10	-0.08	0.17	0.08	-.18	0.13
y5	-0.13	-0.15	0.07	0.04	1.00	-0.08	0.01	0.08	0.04	-0.13	-0.04	0.05	0.04	-0.11	-0.18	-0.20	0.07	-.04	0.07
y6	0.05	0.33	0.08	0.02	-0.08	1.00	0.13	-0.07	-0.09	-0.01	0.17	-0.08	0.00	0.03	0.08	0.10	0.05	.05	-.07
y7	0.10	0.02	0.09	0.02	0.01	0.13	1.00	0.09	0.13	-0.03	-0.01	-0.20	-0.13	0.04	0.18	0.01	-0.13	.15	0.14
y8	0.04	0.07	-0.06	-0.01	0.08	-0.07	0.09	1.00	-0.04	-0.02	-0.19	-0.14	0.04	-0.08	0.02	-0.22	0.04	.15	0.02
y9	-0.09	-0.04	0.03	0.12	0.04	-0.09	0.13	-0.04	1.00	-0.09	-0.03	0.09	-0.23	-0.04	0.00	0.07	-0.04	.11	0.06
y10	0.13	-0.01	-0.17	-0.04	-0.13	-0.01	-0.03	-0.02	-0.09	1.00	0.08	0.23	0.07	0.02	-0.03	0.12	0.04	-.11	-.06
y11	0.06	0.03	0.03	-0.07	-0.04	0.17	-0.01	-0.19	-0.03	0.08	1.00	-0.04	0.02	0.12	0.13	0.18	0.00	.12	0.05
y12	-0.07	-0.14	-0.16	-0.06	0.05	-0.08	-0.20	-0.14	0.09	0.23	-0.04	1.00	0.02	-0.05	-0.09	0.05	0.04	-.08	-0.18
y13	0.00	-0.14	0.07	-0.01	0.04	0.00	-0.13	0.04	-0.23	0.07	0.02	0.02	1.00	0.13	0.03	0.02	-0.02	.06	-.02
y14	0.01	0.02	0.09	0.10	-0.11	0.03	0.04	-0.08	-0.04	0.02	0.12	-0.05	0.13	1.00	0.20	0.21	0.04	-.10	0.11
y15	0.09	0.04	0.15	-0.08	-0.18	0.08	0.18	0.02	0.00	-0.03	0.13	-0.09	0.03	0.20	1.00	0.15	-0.07	.08	0.18
y16	0.09	0.12	0.01	0.17	-0.20	0.10	0.01	-0.22	0.07	0.12	0.18	0.05	0.02	0.21	0.15	1.00	-0.04	-.01	0.13
y17	0.04	0.02	0.01	0.08	0.07	0.05	-0.13	0.04	-0.04	0.04	0.00	0.04	-0.02	0.04	-0.07	-0.04	1.00	.14	-.15
y18	0.17	0.01	-0.08	-0.18	-0.04	0.05	0.15	0.15	-0.11	-0.11	0.12	-0.08	0.06	-0.10	0.08	-0.01	0.14	1.0	-.07
y19	-0.02	0.11	0.01	0.13	0.07	-0.07	0.14	0.02	0.06	-0.06	0.05	-0.18	-0.02	0.11	0.18	0.13	-0.15	-.07	1.00

Reference

1. Blbas, Hazhar, & Kadir, Dler Hussein. (2019). An application of factor analysis to identify the most effective reasons that university students hate to read books. International Journal of Innovation, Creativity and Change, 6(2), 251-265.
2. Griffiths, Mark D, Kuss, Daria J, Billieux, Joël, & Pontes, Halley M. (2016). The evolution of Internet addiction: A global perspective. Addictive behaviors, 53, 193-195.
3. Hill, Brent Dale. (2011). The sequential Kaiser-Meyer-Olkin procedure as an alternative for determining the number of factors in common-factor analysis: A Monte Carlo simulation: Oklahoma State University.

4. King, Daniel L, Delfabbro, Paul H, Griffiths, Mark D, & Gradisar, Michael. (2012). Cognitive-behavioral approaches to outpatient treatment of Internet addiction in children and adolescents. Journal of clinical psychology, 68(11), 1185-1195.
5. Langsrud, Øyvind, & Næs, Tormod. (2003). Optimised score plot by principal components of predictions. Chemometrics and intelligent laboratory systems, 68(1-2), 61-74.
6. Lawley, David N, & Maxwell, Adam E. (1962). Factor analysis as a statistical method. Journal of the Royal Statistical Society. Series D (The Statistician), 12(3), 209-229.
7. Norris, Megan, & Lecavalier, Luc. (2010). Evaluating the use of exploratory factor analysis in developmental disability psychological research. Journal of autism and developmental disorders, 40, 8-20.
8. Pett, Marjorie A, Lackey, Nancy R, & Sullivan, John J. (2003). Making sense of factor analysis: The use of factor analysis for instrument development in health care research: sage.
9. Rummel, Rudolph J. (1988). Applied factor analysis: Northwestern University Press.
10. Tobias, Sigmund, & Carlson, James E. (1969). Brief report: Bartlett's test of sphericity and chance findings in factor analysis. Multivariate behavioral research, 4(3), 375-377.
11. Wells, Ingrid E. (2010). Psychology of emotions, motivations and actions: Psychological well-being. New York: Nova Science Publisher, Inc, 6(9), 111334.
12. Wold, Svante, Esbensen, Kim, & Geladi, Paul. (1987). Principal component analysis. Chemometrics and intelligent laboratory systems, 2(1-3), 37-52.
13. Baban, Prof. Dr. Waleed Khaled Abdul Karim, & Saeed, Eng. M. Joan Ahmed Hamad. (2023). Structural equivalence of the cognitive representation scale using exploratory and affirmative factor analysis. Journal of Intelligence Research, 17(35), 129-155.
14. Tayoub, Mahmoud. (1998). How do we explain the results of cross-factor analysis?. Tishreen University Journal-Economic and Legal Sciences Series, 20(1).