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MOBILE PHONE PROBLEMATIC USE AMONG POSTGRADUATE STUDENTS IN PURULIA DISTRICT OF WEST BENGAL: A DESCRIPTIVE STUDY

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RESEARCH ARTICLE

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Abstract

The primary aim of the present study was to study smartphone addiction among postgraduate students in the Purulia district of West Bengal. The researchers utilized a descriptive survey design with a sample of 410 postgraduate students who were studying at 'Sidho-Kanho-Birsha University' in Purulia District. The data were gathered through the Mobile Phone Problematic Use Scale by Mohammadi et al. (2015). The analysis of the data was conducted through cluster analysis technique using SPSS version 26.0. The results showed that when students are divided into various numbers of clusters, the predictors for smartphone addiction were different in their importance. While in two clusters stream (Arts, Science) was the major predictor, in three clusters gender rose to be the most crucial factor. With an increase in the number of clusters to five, seven and ten, factors such as gender, academic stream, and residence (rural/urban) all became key predictors for Mobile Phone Problematic Use. This study adds knowledge regarding the impact of demographic factors on smartphone addiction trends among postgraduate students, which will be important in the design of intervention strategies.

Keywords: *Smartphone Addiction, Cluster Analysis, Predictors, Postgraduate Students, Gender, Residence, Stream*

1. Introduction

A smartphone is a cell device that incorporates a computer and additional functionalities not traditionally linked to telephones, like web surfing and the capability to execute software programs (Provazza, 2019). More simply, a smartphone is a handheld electronic device that provides a connection to a cellular network (Ghosh & Mandal, 2025). Oxford Dictionaries (2016) define a smartphone as "a mobile phone that performs many of the functions of a computer, typically having a touch screen interface, internet access, and an operating system capable of running downloaded applications."

When a person's fascination with a particular activity interferes with their day-to-day functioning, it is referred to as "addiction." Smartphone addiction exhibits traits that are comparable to chemical dependency (Kwon et al., 2013). While some researchers contend that "smartphone addiction" is just a human need to connect with other people and not a true addiction (Veissiere & Stendel, 2018), others define it as excessive smartphone use that is hard to control and negatively affects other aspects of life (Park & Lee, 2012).

One common way to quantify smartphone addiction is to track how often a person uses their device or how much time they spend online in a specific period of time (Hanna & Wigmore, 2024). It is a widespread issue among people throughout the world and shows up as excessive use when driving, studying, going to social events, and even sleeping (Harwood et al., 2014). According to Elhai et al. (2019), problematic smartphone usage (PSU) is the excessive use of smartphones in daily life along with dysfunction and symptoms like those of drug use disorder.

The smartphone represents one of the major technological innovations of the twenty-first century and has become a significant component of people's everyday needs. Smartphones are being used for virtually all tasks, from education to leisure. As smartphone usage has increased, so too has the potential for addiction resulting from excessive use.

Excessive smartphone use can lead to anxiety, depression, and stress among students, as well as physical problems such as eye strain and sleep disturbances. Additionally, constant smartphone use can weaken communication with family, friends, and society, as students increasingly find their social connections through digital means rather than face-to-face interactions. The convenience of smartphone applications for food ordering, shopping, and entertainment may contribute to increased sedentary behavior and decreased physical activity.

Given these concerns, this study aims to investigate smartphone addiction among postgraduate students in the Purulia district of West Bengal, with specific focus on differences based on gender, academic stream, and residence.

2. Review of Related Literature

2.1. Smartphone Addiction among College and University Students

Laurence et al. (2020) investigated predictors of problematic smartphone use among 257 Brazilian university students. They found that a hierarchical regression model predicted 32.2% of the score on the Brazilian version of the 'smartphone addiction scale' with social network use, messaging apps, and loneliness as significant factors. Ghosh and Mandal (2025) studied smartphone addiction among 300 college students in 'West Bengal,' comparing rural (South 24 Parganas district) and urban (Kolkata) areas. They found no significant differences in smartphone addiction between male and female students or among different academic streams (B.A., B.Sc., and B. Com). Gayen (2024) investigated 'smartphone addiction' among 140 postgraduate students in Purulia district, West Bengal. The study revealed no statistically significant differences between male/female, urban/rural, arts/commerce, and science/commerce students. However, a significant difference was found between arts and science postgraduate students. Ansary and Bauri (2024) studied smartphone addiction among 350 undergraduate students in Purulia district. Their findings showed no significant differences between 'male and female' students or between 'rural and urban' students regarding smartphone addiction. Gayen and Mahato (2023) examined the relationship between different dimensions of smartphone addiction among 140 postgraduate students of Sidho-Kanho-Birsha University, Purulia. Their results showed statistically significant positive correlations among different dimensions of smartphone addiction, including daily-life disturbances, positive anticipation, withdrawal, overuse, and tolerance.

2.2. Literature Review of Smartphone Addiction on Academic Performance and Mental Health

Ghosh and Naskar (2023) studied the impact of smartphone addiction on study habits and mental health among 257 higher secondary school students in Purba Bardhaman, West Bengal. They found significant differences in smartphone addiction related to gender and locality. Additionally, mental health differences were significant in relation to gender but not locality, while study habits showed no significant differences for either variable. Importantly, smartphone addiction and mental health were found to be positively correlated. Pal (2025) investigated 'smartphone addiction' and its impact on academic performance among secondary students in Hooghly District, West Bengal. Using qualitative methods including semi-structured interviews and observations, the study found that excessive smartphone use, particularly for entertainment and social media, negatively affected academic performance. However, mindful use did not necessarily lead to adverse outcomes. Bhattacharjee et al. (2025) explored the link between smartphone addiction and mental health among graduate students in South Assam, India. Their analysis revealed a significant association between mental health and smartphone addiction, with regression analysis showing that better mental health correlated with lower addiction levels. Chaudhury and Tripathy (2018) investigated the impact of smartphone addiction on academic performance among 222 university students. Using machine learning techniques and classification models, they found a negative correlation between smartphone addiction and academic performance. Boumosleh and Jaalouk (2017) examined the relationship between smartphone addiction and academic performance among 688 undergraduate students at Notre Dame University. They found that low academic performance was associated with alcohol drinking, enrollment in business and economics programs, first-year status in college, and non-use of smartphones for academic purposes.

2.3. Demographic Factors and Smartphone Addiction

Putta and Shaik (2023) studied problematic smartphone use among emerging Indian adults aged 18-25 during the COVID-19 pandemic. They found that depression levels during the pandemic affected smartphone usage behavior in this demographic group. Jain et al. (2019) investigated smartphone addiction prevalence and patterns among medical students from rural central India. They found that 24.65% of students showed smartphone addiction, with high risk of addiction being 7.53% among males and 17.12% among females. Addiction was associated with smartphone use duration, frequency of use, and personally relevant smartphone functions. Singh and Kumari (2021) analyzed the association between smartphone addiction and perceived loneliness among 120 college students aged 20-25 years. They found a significant positive relationship between loneliness and smartphone addiction, with females scoring higher on loneliness compared to males. Umarji and Patel (2024) studied smartphone addiction among 200 college students in Panchmahal district, finding no significant differences based on gender or area of residence (urban/rural).

2.4. Smartphone Addiction Studies Using Cluster Analysis

Gayen (2024) conducted cluster analysis on smartphone addiction among postgraduate students. The study found that as the number of clusters increased, the range of influential predictors became more complex. With two and three clusters, locality and stream emerged as pivotal factors. In five clusters, gender emerged as an important predictor alongside stream and locality. With ten clusters, stream, smartphone addiction level, and locality became major predictors, while gender, overuse, and cyberspace-oriented relationships emerged as moderate predictors.

The t-tests, for example, have been widely employed in several studies. Notable accomplishments in this sector include [Sen et al. (2013); Karmakar et al. (2016); Chatterjee et al. (2016); Mondal et al. (2018); Gayen et al. (2021); Dandapat et al. (2021); Ansary, Saha, and Gorain (2021); Rajak and Gayen (2022); Mahanti, Mondal, and Saha (2016); Ansary, Ansary, and Adhikari (2022); Khan et al. (2023); Khatun, Ansary, and Adhikari (2022); Adhikari et al. (2023); Gayen, and Sen (2023); Mahato and Sen (2021,2023); Mondal and Saha (2013); Ansary (2023); Gayen and Sen (2023, 2023a); Das, Gayen, and Sen (2023b); Mahato and Das (2024a; 2024b)] Clustering techniques are [Ansary et al. (2023); Dol and Jawandhiya (2023); Facca and Allen (2011);

Mondal and Mahato (2025); Sen, Mahato, Mahato, Das (2025); Das and Mahato (2024a; 2024b); Das, Mahato, Sen (2023); Sen, S., Adhikari., Ansary & Roy (2023); Adhikari & Sen (2023a); Adhikari & Sen (2023b); Gayen (2024); Gorain et al. (2023); Mohanta et al. (2023, 2023a); Nafuri et al. (2022); Oyewole and Thopil (2023); Saha., Sen & Adhikari (2021); Sen et al. (2023);] Correlation related [Sen et al. (2023); Das and Mahato; Das and Mahato (2024); Mahato and Das (2024); Das, Mahato and Gayen (2024); Gayen, Sen and Adhikari (2023)] Z- Transformation including [Das, Mahato and Gayen (2024); Mahato, Das and Gayen (2024); Das and Mahato (2024); Mahato and Das (2024)] others have also studied the Mahalanobis distance [Mahato, Das & Sen, 2023; Ahmed et al., 2020, 2021, 2022; Sen et al., 2023], as well as Structural Equation Modelling and Confirmatory Factor Analysis [Sen, Mahato, Mandal & Saha, 2025].

3. Objectives of the Study

1. To study the smartphone addiction by forming different clusters with respect of gender, stream, and residence of the Postgraduate level students.
2. To study the predictor importance for different size of clusters.

4. Methodology

4.1. Research Design: The study employed a descriptive survey research design.

4.2. Population and Sample

The population comprised all postgraduate students who are studying at Sidho-Kanho-Birsha University in the Purulia district of West Bengal. A sample of 410 postgraduate students was selected from this population using stratified random sampling technique.

4.3. Research Tool

The "Mobile Phone Problematic Use Scale" developed by Mohammadi et al. (2015) was used for data collection. 'This standardized scale measures various dimensions of smartphone addiction, including daily-life disturbances, positive anticipation, withdrawal, overuse, and tolerance.'

4.4. Data Analysis

The data was analyzed using two-step cluster analysis technique through SPSS version 26.0. Cluster analysis allows for the identification of homogeneous groups within the data based on selected variables, providing insights into patterns of smartphone addiction among different demographic groups.

5. Results and Discussion

5.1. Two-Cluster Analysis

Table 1: Formation of Two-Clusters:

Clusters

Input (Predictor) Importance
1.0 0.8 0.6 0.4 0.2 0.0

Cluster	2	1
Label		
Description		
Size	52.0% (213)	48.0% (197)
Inputs	STREAM Arts (100.0%)	STREAM Science (57.4%)
	GENDER Female (100.0%)	GENDER Female (59.9%)
	RESIDENCE Rural (100.0%)	RESIDENCE Rural (60.9%)
	PMPU 81.54	PMPU 84.73

According to Table 1, two clusters are formed. First cluster comprised of 48% of total sample and second cluster is comprised of 52% of total sample. For these two clusters, first one is dominated by rural students, but second cluster is completely formed by rural students.

Both the clusters are female student dominated. According to stream of study first cluster is dominated by science student but second cluster is fully comprised of arts students.

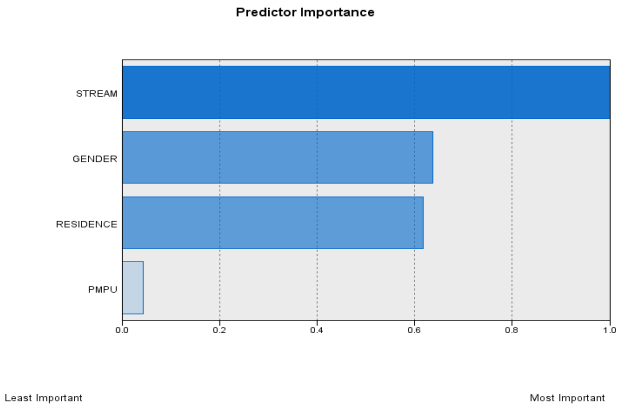

Figure 1: Predictors of Two Clusters

Represents that the Academic stream emerged as the very high predictor of cluster formation, while gender and residence were high predictors. MPPU is the very low predictor detected by two clusters formed as mentioned in Table 1.

5.2. Three-Cluster Analysis

Table 2: Formation of Three Clusters

Clusters

Input (Predictor) Importance
1.0 0.8 0.6 0.4 0.2 0.0

Cluster	3	1	2
Label			
Description			
Size	52.0% (213)	28.8% (118)	19.3% (79)
Inputs	GENDER Female (100.0%)	GENDER Female (100.0%)	GENDER Male (100.0%)
	STREAM Arts (100.0%)	STREAM Science (69.5%)	STREAM Arts (60.8%)
	RESIDENCE Rural (100.0%)	RESIDENCE Urban (55.1%)	RESIDENCE Rural (84.8%)
	PMPU 81.54	PMPU 84.02	PMPU 85.80

According to Table 2, three clusters are formed. First cluster comprised of 28.8% of total sample, second cluster is comprised of 19.3% of total sample and three cluster is comprised of total sample. For these three clusters, first and third clusters are completely formed by female students, but second cluster is completely dominated by male students. First cluster is dominated by science students but second and third clusters are dominated by arts students.

According to residence of study first cluster is dominated by urban students, second cluster is dominated by rural students, and third cluster is fully comprised of rural students.

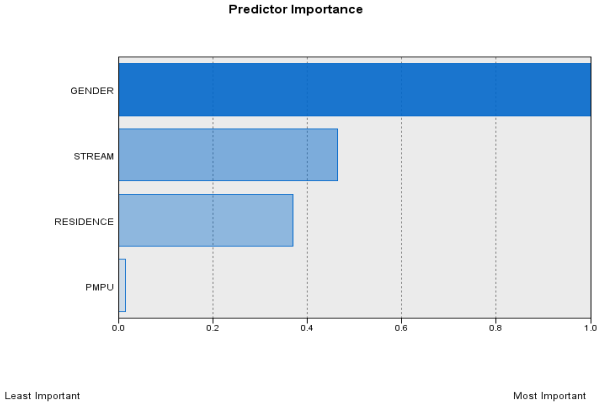

Figure 2: Predictors of Three Clusters

Represents that the Gender emerged as the very high predictor of cluster membership, while academic stream is moderate predictor and residence is low predictors. MPPU is the very low predictor detected by three clusters formed as mentioned in Table 2.

5.3. Five-Cluster Analysis

Table 3: Formation of Five Clusters

Clusters

Input (Predictor) Importance
1.0 0.8 0.6 0.4 0.2 0.0

Cluster	5	1	4	3	2
Label					
Description					
Size	52.0% (213)	15.9% (65)	12.9% (53)	11.0% (45)	8.3% (34)
Inputs	GENDER Female (100.0%)	GENDER Female (100.0%)	GENDER Female (100.0%)	GENDER Male (100.0%)	GENDER Male (100.0%)
	RESIDENCE Rural (100.0%)	RESIDENCE Urban (100.0%)	RESIDENCE Rural (100.0%)	RESIDENCE Rural (100.0%)	RESIDENCE Rural (64.7%)
	STREAM Arts (100.0%)	STREAM Arts (55.4%)	STREAM Science (100.0%)	STREAM Arts (100.0%)	STREAM Science (91.2%)
	PMPU 81.54	PMPU 83.98	PMPU 84.06	PMPU 86.00	PMPU 85.53

According to Table 3, five clusters are formed. First cluster comprised of 15.9% of total sample, second cluster comprised 8.3% of total sample and third cluster comprised of 11.0% of total sample, fourth cluster comprised 12.9% of total sample and five cluster comprised of 52.0% of total sample. In these five clusters, first one is completely formed by urban students, second cluster is dominated by rural students, and third cluster is fully comprised of rural students, and fourth cluster is completely formed by rural students, and fifth cluster is completely formed of rural students.

According to gender of the study first, fourth and fifth cluster are completely formed by female students but second and third clusters are completely formed by male students. First cluster is dominated by arts students, second cluster is dominated by science students, and third cluster is fully comprised of arts students, fourth cluster is completely formed by science students, and fifth cluster is completely formed by arts students.

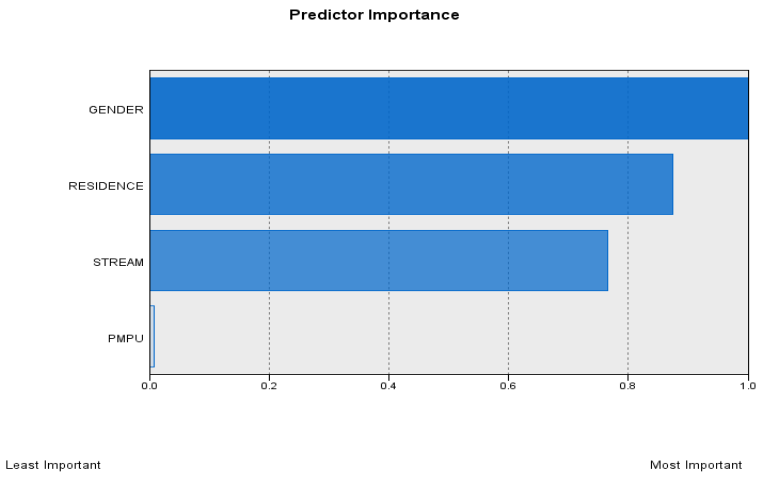

Figure 3: Predictor of Five Clusters

Represents the Gender and residence are emerged as very high predictors of cluster formation and academic stream as high predictor. MPPU is the very low predictor detected by five clusters formed as mentioned in Table 3.

5.4. Seven Cluster Analysis

Table 4: Formation of Seven Clusters

Clusters

Input (Predictor) Importance
1.0 0.8 0.6 0.4 0.2 0.0

Cluster	6	7	5	4	1	3	2
Label							
Description							
Size	31.5% (129)	20.5% (84)	12.9% (53)	11.0% (45)	8.8% (36)	8.3% (34)	7.1% (29)
Inputs	GENDER Female (100.0%)	GENDER Female (100.0%)	GENDER Female (100.0%)	GENDER Male (100.0%)	GENDER Female (100.0%)	GENDER Male (100.0%)	GENDER Female (100.0%)
	STREAM Arts (100.0%)	STREAM Arts (100.0%)	STREAM Science (100.0%)	STREAM Arts (100.0%)	STREAM Arts (100.0%)	STREAM Science (91.2%)	STREAM Science (100.0%)
	RESIDENCE Rural (100.0%)	RESIDENCE Rural (100.0%)	RESIDENCE Rural (100.0%)	RESIDENCE Rural (100.0%)	RESIDENCE Urban (100.0%)	RESIDENCE Rural (64.7%)	RESIDENCE Urban (100.0%)
	PMPU 72.14	PMPU 95.98	PMPU 84.06	PMPU 86.00	PMPU 83.69	PMPU 85.53	PMPU 84.34

According to Table 4, seven clusters are formed. First cluster comprised of 8.8% of total sample, second cluster is comprised of 7.1% of total sample and third cluster is comprised of 8.3% of total sample, fourth cluster is comprised of 11.0% of total sample, fifth cluster is comprised of 12.9% of total sample and sixth cluster is comprised of 31.5% of total sample and seventh cluster is comprised of 20.5% of total sample. For these seven clusters first, second, fifth, sixth and seventh clusters are fully comprised of female students, but third and fourth clusters are completely formed by male students. First cluster is completely formed by arts students, second cluster is completely formed by science students third cluster is predominated by science students, fourth cluster is fully comprised by arts students, fifth cluster is completely formed by science students, and sixth cluster is fully comprised by arts students and seventh cluster is fully comprised by arts students. According to residence of study first and second clusters are fully comprised by urban students, and third cluster is dominated by rural students but fourth, fifth, sixth and seventh clusters are completely formed by rural students.

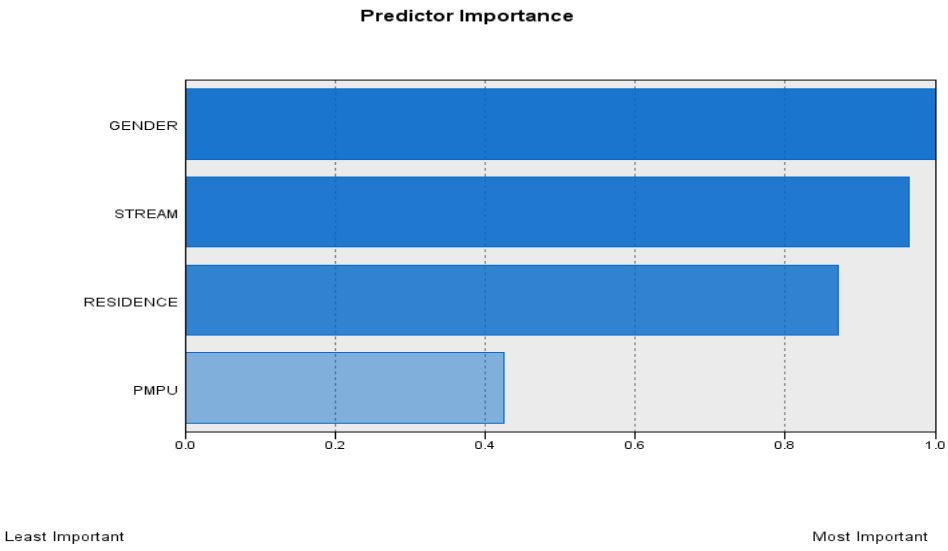

Figure 4: Predictors of Seven Clusters

Represents that Gender, academic stream, and residence were all very high predictors of cluster formation. MPPU is the moderate predictor detected by seven clusters formed as mentioned in Table 4.

5.5. Ten Cluster Analysis

Table 5: Formation of Ten Clusters

Clusters

Input (Predictor) Importance
1.0 0.8 0.6 0.4 0.2 0.0

Cluster	8	9	10	5	6	1	2	4	7	3
Label										
Description										
Size	21.5% (88)	19.3% (79)	11.2% (46)	11.0% (45)	9.3% (38)	8.8% (36)	7.1% (29)	5.4% (22)	3.7% (15)	2.9% (12)
Inputs	GENDER Female (100.0%)	GENDER Female (100.0%)	GENDER Female (100.0%)	GENDER Male (100.0%)	GENDER Female (100.0%)	GENDER Female (100.0%)	GENDER Female (100.0%)	GENDER Male (100.0%)	GENDER Female (100.0%)	GENDER Male (100.0%)
	RESIDENCE Rural (100.0%)	RESIDENCE Rural (100.0%)	RESIDENCE Rural (100.0%)	RESIDENCE Rural (100.0%)	RESIDENCE Rural (100.0%)	RESIDENCE Urban (100.0%)	RESIDENCE Urban (100.0%)	RESIDENCE Rural (100.0%)	RESIDENCE Rural (100.0%)	RESIDENCE Urban (100.0%)
	STREAM Arts (100.0%)	STREAM Arts (100.0%)	STREAM Arts (100.0%)	STREAM Arts (100.0%)	STREAM Science (100.0%)	STREAM Arts (100.0%)	STREAM Science (100.0%)	STREAM Science (100.0%)	STREAM Science (100.0%)	STREAM Science (75.0%)
	PMPU 78.74	PMPU 96.56	PMPU 61.11	PMPU 86.00	PMPU 77.32	PMPU 83.69	PMPU 84.34	PMPU 84.95	PMPU 101.13	PMPU 86.58

According to Table 5, ten clusters are formed. First cluster comprised of 8.8% of total sample, second cluster is comprised of 7.1% of total sample and third cluster is comprised of 2.9% of total sample, fourth cluster is comprised of 5.4% of total sample, fifth cluster is comprised of 11.0% of total sample and sixth cluster is comprised of 9.3% of total sample, seventh cluster is comprised of 3.7% of total sample, eighth cluster is comprised of 21.5% of total sample and nineth cluster is comprised of 19.3% of total sample and tenth cluster is comprised of 11.2% of total sample. For these clusters first, second, sixth, seventh, eight, nineth and tenth cluster are fully comprised of female students but third, fourth, and fifth clusters are completely formed by male students. According to residence of the study first, second and third clusters are fully comprised of urban students but fourth, fifth, sixth, seventh, eighth and nineth and tenth clusters are fully comprised of rural students.

First cluster is completely formed by arts students, second cluster is fully comprised of science students, third cluster is dominated by science students and forth cluster is completely formed by science students, fifth cluster is fully comprised of arts students and sixth cluster is completely formed by science students, seventh cluster is completely formed by science students and also eighth, nineth tenth cluster are fully comprised of arts students.

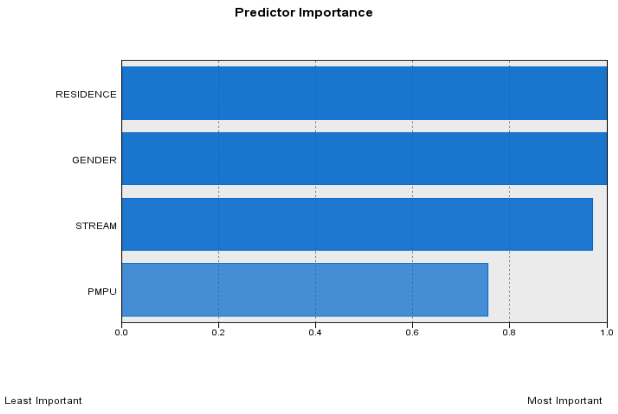

Figure 5: Predictor of Ten Clusters

Represents that residence, gender and academic stream are very high predictors of cluster formation. MPPU is the high predictor detected by ten clusters formed as mentioned in Table 5.

Table 6. Represent the overall Cluster summary in High Predictors to Low Predictors.

Number of Cluster	*Very High Predictors*	*High Predictors*	*Mediocre Predictors*	*Low Predictors*	*Very Low Predictors*
2	Stream	Gender Residence			MPPU
3	Gender	Stream Residence			MPPU
5	Gender Residence	Stream			MPPU
7	Gender Stream Residence		MPPU		
10	Residence Gender Stream	MPPU			

Table 6 displayed the clusters and their predictors, revealing variations in cluster size and predictors, when examining clusters with number 2,3,5,7,10. In formation of 2 clusters, stream is a very high predictors, gender and residence are high predictor and MPPU is a very low predictor. In the case of 3 clusters, gender is a very high predictor, stream and residence are high predictors and MPPU is a very low predictor. Gender and residence are very high predictors, stream is high predictor and MPPU is a very low predictor when 5 cluster are considered. In clusters 7, gender, stream, residence are very high predictors and MPPU is a mediocre predictor. Residence, gender, stream shown very high predictors and MPPU is a high predictor when 10 clusters are considered. So, to remark on objective 1, "to study the smartphone addiction by forming different clusters with respect to gender, stream and residence of postgraduate students" it is clear that to make clusters, all research variables, are fully responsible. Next, let us consider objective 2, which state "to study the predictor importance for different size of clusters", it was found when 2, 3, 5 number of clusters are formed, stream, gender and residence played a major role and MPPU played a minor role. But when clusters formed 7 and 10 number of clusters are formed gender, stream and residence played a major role and MPPU is mediocre role in clusters 7 and major role in clusters 10.

5.6. Discussion

The findings reveal that as the number of clusters increases, the complexity of influential predictors also increases. With two clusters, academic stream (arts vs. science) emerged as the primary predictor of smartphone addiction patterns. This suggests that students' field of study significantly influences how they use smartphones and potentially develop addictive behaviours.

When number of clusters is increased to three clusters, gender became the very high prominent predictor, while academic stream remained moderately and residence become low predictor important. This indicates that gender plays a crucial role in determining smartphone usage patterns and addiction tendencies. With five, seven and ten clusters, gender, academic stream, and residence all emerged as major predictors of smartphone addiction patterns. This suggests that these demographic factors interact in complex ways to influence how postgraduate students use smartphones and potentially develop problematic usage patterns.

These findings align with previous research by Gayen (2024), who found that as the number of clusters increased, the range of influential predictors also expanded in complexity. The current study supports the conclusion that demographic factors like gender, academic stream, and residence are important determinants of smartphone addiction patterns among postgraduate students.

The emergence of gender as a key predictor in the three-cluster solution contrasts with findings by Ghosh and Mandal (2025), Gayen (2024), and Umarji and Patel (2024), who found no significant gender differences in smartphone addiction.

The interaction between gender, academic stream, and residence in the five-cluster and seven-cluster solutions suggests that these factors work together to influence smartphone addiction patterns, supporting Behera and Seth's (2023) finding of a significant interaction effect between gender and academic streams on smartphone addiction.

6. Conclusion

This study investigated smartphone addiction among postgraduate students who are studying at Sidho-Kanho-Birsha University in the Purulia district of West Bengal, focusing on differences based on gender, academic stream, and residence. Using cluster analysis, the study identified patterns of smartphone addiction across different demographic groups.

The findings revealed that the predictor variables' importance varied depending on the number of clusters analysed. With two clusters, academic stream emerged as the primary predictor. As the number of clusters increased, gender became more important, and with five and seven clusters, gender, academic stream, and residence all emerged as significant predictors of smartphone addiction patterns.

These findings highlight the complex interaction between demographic factors and smartphone addiction among postgraduate students. The study provides valuable insights for developing targeted intervention strategies to address problematic smartphone use based on students' gender, academic stream, and residence.

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