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The Moderating Role of Gender Between Social Needs, Social Influence and Convenience and Smartphone Dependence

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Abstract

This study aimed to analyze the factors affecting students' dependence on smartphones and the moderating role of gender. The three factors included convenience, social needs, and social influence. All these are personal needs and impact the dependence on smartphones. A sample of 100 students from Karachi, Pakistan was taken through a convenience-based non-probability sampling technique. It was a case study and only one university was taken as a sample representative. The data was collected through survey method and their identities were kept anonymous. It was found that social needs and social influence impact students' usage of smartphones. Convenience had no direct impact on smartphone dependence. When the moderating role of Gender was checked, it was found that convenience affects dependence on smartphones positively for females and negatively for males. Thus, females tend to rely on smartphones because of their convenience. This study is relevant for marketers to use female demographics more to target their product offerings as they tend to buy online through smartphones more often than males. Future studies can increase the sample size and can also use celebrity endorsements as an independent variable to gauge the extended analysis of the model.

Keywords: Smartphones, Convenience, Social Needs, Social influence, Gender

Introduction

Rapid technological advancements have resulted in the invention of many gadgets including smartphones. These days' smartphones are not only phones, but they are also the advanced form of phones with incredible features with computing ability and connectivity that consist of functions such as portable media player, digital camera, video, and global positioning system (GPS) navigation units. The popular mobile operating system (OS) installed in these smartphones includes Google's Android or Apple's IOS. Smartphones due to their unique features have become a requisite for the consumer and because of smartphones, demand for various products has been triggered in the market (Suki, 2013). Due to the popularity and functions of smartphones, there is an increase in demand for new smartphones. In developed countries, smartphones have become an inseparable part of daily life and most consumers carry them all the time (Mei et al., 2023; Smura et al., 2009).

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Jacob and Isaac (2008), found that university students are one of the biggest contributors to the increasing sales of smartphones. The use of smartphones has generated consumer demand as it has created mobility to a continuing social trend, especially for geographically extended, quicker, and more personalized ways of social interactions (Wei & Lo, 2006). The smartphone comprises advanced features and technology with which students take advantage to complete their educational tasks. Smartphones offer a wide range of features and advanced programmable capabilities such as applications, software, data storage, cameras, etc. that help people both, in their work and personal lives (Mei et al., 2023).

There is an exponential shift in the demand for smartphones among university students. Many critical factors can contribute to the rise in smartphone sales, largely revolving around the functionality that these gadgets offer. Among all the key factors, the smartphone's multifunctionality enables the students to have all they need in one place with just one touch away. This multifunctional aspect provides high accessibility to all the other critical devices that they need during their academic life in their hands, be it communication, business research, entertainment, etc. So, in essence, it means, that instead of carrying a laptop, camera, or stacks of books, they now have everything available at their fingertips. This aspect allows them to be more productive, multitasking, and proactive. Furthermore, it provides access to numerous applications that help students manage their schedules, collaborate, and take notes more efficiently and productively. These task management, calendar management, and time management tools like Google Docs, MS OneNote, Monday, Trello, Google Calendar, and many more enable them to be organized. Then other tools like Quizlet, Grammarly, Chegg, etc. assist them in learning and writing assignments. (Xiao et al., 2024).

Smartphones help us to connect with our loved ones socially worldwide, whenever we miss our friends or family, we can easily connect with them via smartphones. The cell phone is a global communication device. This research aims to study the dependence of students on smartphones. It will identify whether the social needs, convenience, and social influence of smartphones cause this dependence. These 3 variables i.e., Social Needs, Social Influence, and Convenience have a great impact on smartphone usage. Smartphone dependence is the dependent variable as it is under the influence of social needs, where the world is becoming more globalized these days. The rationale of dependency on a smartphone is increasing day by day because the usage of smartphones is at its peak (Mei et al., 2023).

Students' dependency on smartphones is dependent on social needs because the majority of people use their smartphones for social purposes, using social websites like: Facebook, Instagram, WhatsApp, Snapchat, etc. Smartphones help us to have accessibility socially across the globe and keep connected with friends and family across the world. Students have groups of friends which clearly shows that the ones who have a smartphone must have social influence also and will tend to be more

involved in it. The young people in the smartphone industry have been called the sweet spot (Haverila, 2013). Consumers no longer see smartphones merely as devices for calling and texting; they now regard them as multifunctional tools for gaming, socializing, and downloading applications, leading to significant changes in behavior patterns, lifestyle, and status (Shin, 2012). Mobile phones have become an essential part of daily life, with most people carrying them constantly (Smura et al., 2009). Students, influenced by social factors, often purchase the latest smartphone models to keep up with new technology. Smartphones are usually used for our convenience to make our lives easy. There are many features available in smartphones from which we can easily solve our problems and do any task. Mobile phone users tend to have a high level of knowledge, greater social participation, extensive interpersonal networks, and maintain contact with people both within and outside their social circles (Suki & Suki, 2007). Smartphones, in particular, have shown significant potential in bridging the information gap.

In recent years, smartphones have been rapidly adopted by young people (Smith & Chaparro, 2015). Even though smartphones increase communication frequency and expand opportunities for social relationships, there are a few downsides to the same. Excessive usage of smartphones leads to a high risk of mental health problems, such as attention deficit hyperactivity disorder (ADHD), unsafe driving habits, decrease in general happiness, depression, poor sleep quality, etc. (Hong et al., 2012; Mei et al., 2023). It has also been found that the need for gratification achieved through the excessive use of smartphones creates negative psychological effects. Various serious problems have also arisen which include sexting, identity theft, cyberbullying, and other forms of cybercrimes. Terms such as smartphone addiction, smartphone dependence, smartphone overuse, or compulsive smartphone usage have been used to describe the same phenomenon. Smartphone users feel more in control but this control comes with anxiety and depression (Mei et al., 2023). Youngsters lose track of time, become socially isolated, and become addicted. These signs also lead to panic and an increase in heart rate (Nishad & Rana, 2016). This research has used the gratifications theory to explain why students use smartphones for their gratification and personal use. This theory emphasizes the needs, and self-interesting motives of the students (Ruggiero, 2000).

Too much dependence on smartphones may lead to detrimental emotional and social consequences. Smartphone addiction is termed as an obsessive-compulsive disorder (OCD) by psychiatrists. Smartphone dependence creates anti-social behaviors, isolation from family and friends, and various psychological disorders, therefore research is needed to be done on smartphone usage (Nishad & Rana, 2016). While technology adoption and usage behavior have been shown in previous literature to vary by type, there are notable differences based on gender as well. It has been analyzed through research that male subjects have a more positive attitude toward computers and better computer literacy than female subjects (Gani et al., 2024).

These gender divides remained in place even as the rate of ownership of personal computers went up. There was a digital split, which can be attributed to the continued societal gender stereotyping that associates technology with the male gender (Arpaci & Kocadag Unver, 2020). The gap is closing, however, because many mainstream users are now using smartphones and devices. It has been demonstrated that female users have reached parity with their male counterparts in terms of both the training of owning a smartphone and the cadence of going online through portable devices (Li et al., 2022). Meanwhile, women and men use and engage with these technologies, and certain differences have appeared as well. Likewise, women perform more social and communicative activities through smartphones than males, and they perform more functional tasks such as searching for information (Bulut & Sengul, 2024). Moreover, women report that they are more dependent on the 'always connected' nature of the mobile internet and have more severe separation anxiety when parted from their mobile phone (Gani et al., 2024).

These contemporary usage patterns probably contain some information about gendered conventions of language use, as well as gender stereotyping. Research also indicates that there is more cultural compliance in communicating and building relationships with women. As a result, women mainly use Smartphones in more social activities (Gong et al., 2020). This ability to easily connect, as the accessibility of social media causes us to multitask and continually be connected, could also enhance technology dependence (Li et al., 2022). On the other hand, the ideas of stereotypically masculine functional and entertainment-based use of burgeoning technologies may be fuelled by values such as independence and diversion seeking (Bulut & Sengul, 2024). It is observed that not all people follow such patterns, and men, as well as women, use technology in a rather gendered manner. Innovation cycles are also very short and constantly transform device functions and behaviors over time (Arpaci & Kocadag Unver, 2020).

We have seen remarkable improvements in the services offered by Pakistani smartphone makers and mobile phone service providers over the last ten or so years. Both new research directions and new opportunities for users have resulted from this. The reasons why university students use smartphones and related services have been the subject of some research, but there are still several undiscovered aspects that are relevant to comprehending the variables influencing smartphone usage among Pakistani youth (Aslam, et al., 2018). Therefore, this study has determined whether social influence, social need, and convenience have an impact on students' dependence on smartphones and if it is different for male and female students. In this study, the perception is to show how much students are dependent on their smartphones. Nowadays students depend too much on their smartphones, they use their smartphones for social activities, communication with their friends and family performing their educational tasks on smartphones, and getting information from the internet via smartphones. In this study, there is one dependent variable, three

independent variables, and one moderator. Student dependency on smartphones is directly related to social needs, social influence, and convenience, as people use their phones for their social needs, social influence, and for their convenience because they feel comfortable with their smartphones.

Conceptual Framework

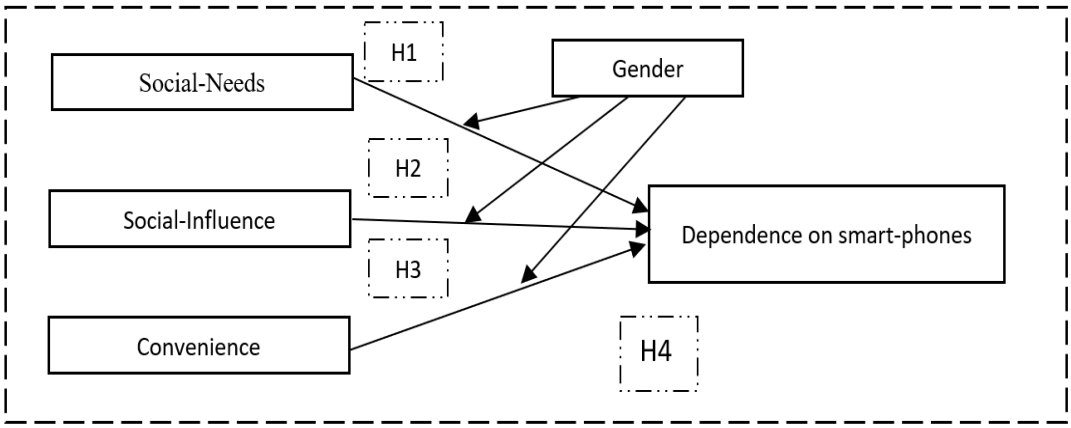


Figure 1: Conceptual Framework

Research Objectives

1. To identify the factors influencing the dependency of university students on smartphones

2. To examine the role of gender between the stimulating factors and dependency on smartphones.

Research Hypotheses

The following are the hypotheses of the present study:

H_1: Social needs increase smartphone dependence.

H_2: The Convenience of smartphones increases smartphone dependence.

H_3: Social influences increase smartphone dependence.

H_4: Gender moderates the relationship between social needs, convenience, social influences, and smartphone dependence.

Limitations

One factor that limited the finding is that the sample size was only 100. A larger and more varied sample size could yield more comprehensive and definitive findings. In the future, if the sample size is increased, then the result can be more valid, concrete, and generalized. Also, future studies can focus on longitudinal and experimental designs to explore causal relationships. Future studies can use other samples besides university students, to increase generalization and reliability. These findings can be replicated in other data sets with caution. This study has mostly concentrated on students. A useful addition to this field may be to include a subset of the sample size of business executives apart from students. Finally, other studies can rely on qualitative data instead of self-report measures to improve validity and gain more insights. Future studies can explore the relationship between Nomophobia or no fear of using mobile phones and personality characteristics between male and female gender. Certain cultural and contextual factors seem to be influencing gender-specific smartphone dependence in Pakistan, which can also be studied in the future.

Practical Implications

Students should be encouraged to use smartphones to enhance their learning skills. On the developer side of smartphones, it is recommended that they try to provide more relevant and enhanced functions in smartphones for students to improve their learning and socializing.

Mobile phone firms can learn from this research, and marketers can use it to design methods that demonstrate social influence and generate a sense of convenience. Marketing initiatives focusing on social and family values appear to be well-received by Pakistani consumers. Additionally, marketers push the idea that smartphones simplify life by facilitating improved communication through a variety of social networking apps, etc.

Review of the Literature

People who use smartphones in their daily life are depending on smartphones greatly, these people use their smartphones when they are relaxing at home, commuting, or traveling around (Genova, 2010). There will be greater use of smartphones in academic libraries in the future (Suki & Suki, 2007). In recent years there have been many researches on smartphone usage and they found that smartphones will perform most of the work for which we use computers and laptops nowadays. It was observed by Peterson and Low (2011) that undergraduates seek out different websites to check their e-mails and use social media such as Facebook, X, Snapchat, and Instagram for social networking. Smartphones create more convenience and they are easy to use, portable, and useful for every individual (Caruso, & Salaway, 2007). Smartphone usage and the

internet are increasing with time. In smartphones, IT services cannot be performed nowadays but we hope that in upcoming years, features like that will be in those advanced smartphones (Caruso, & Salaway, 2007). Smartphones are not only used by students for studies, projects, and assignments but smartphones are also used in different fields like journalism, science, business, etc. Smartphones improve performance and can achieve a task more quickly than a laptop or computer (Lippincott, 2010).

It has been claimed by Gulati & Sethi (n.d.) that mobile phone usage, particularly among the youth and the young generation, is determined by several social and environmental factors. The social factor is influential since children in their adolescent age copy their behaviors from friends and peers. Research has shown that youth with friends who spend much time on their smartphones spend a lot of time on the device themselves. However, Ibrahim et al. (2023) also shared that teenagers want to fit in and be associated with a group; hence, they follow the common smartphone usage trends and practices among their immediate friends. Besides peers, family influence plays a role in how young people use Smartphones. It is also found by Li (2023) that adolescents mimic the smartphone use behaviors of their parents, with the level of parental supervision and control correlating with lower levels of smartphone dependency. The socio-economic status of the family also determines the acquisition of smartphones and subscriptions to mobile data plans. Furthermore, Wang et al. (2023) also demonstrated that they maintain that the media constructs intensive smartphone uses as part of the normal teenage experience. Trends on television, movies, advertising, and social networks that portray texting, gaming, or access to social networking platforms using a smartphone may help to influence the youth to spend more time on their smartphones.

In the context of social motivation and smartphone use, Sun et al. (2023) pointed out that women have reported higher concerns about social contact and communication than men. According to the findings, while using smartphones, women spend more time on social networking than men, including Facebook, Twitter, and other social networking applications. These innate social needs indicate differences in the dynamics of smartphone usage. Meanwhile, women's social use of smartphones is mostly for communicating with friends and deepening close relationships by utilizing conversations and self-revelations.

On the other hand, Lv et al. (2023) also shared that for men, the social use of the same gadgets is mostly used to develop new relationships and build networks. When tested on the extent of damages caused by smartphone addiction, female participants were found to be affected more. Hence, they complained more about conflicts with their partners and families because of their overindulgence in social networking and messaging, according to the Smartphone. The study by Xiao, et al. (2024) expected that due to the higher social demands and needs of the female gender and their need for communication, they use the means of phone calls and messaging to communicate at the expense of time and attention to the immediate family. Furthermore, Prodanova and Chopdar (2024) also suggested

that women possess a greater social motive, which props up their usage of smartphones majorly for social networking purposes. This can be beneficial in making women strengthen their relationships, but it also has undesirable effects such as overdependency, diversion from other relationships, and phishing.

According to Karaoglan Yilmaz et al. (2024), the overreliance and embrace of the Smartphone have been rising in the recent past. So, it's no surprise that there are these strong links between phone addiction and psychological and social problems. Similarly, Li (2023) also claimed the correlation between depression and problematic smartphones. The author further noted that it is associated with smartphones being used in a complicated way at a higher level of loneliness. Likewise, Gulati & Sethi (n.d.) and Xiao, Yao, & Liu (2024) suggested that though using smartphones for social purposes may replace face-to-face communication, it may erode relationship quality and perceived social support. Excessive mobile use can have effects on academic and job performance. Mobile phone usage at the workplace has also been associated with poor task performance, cyberslang behavior, and productivity reduction.

Dependence on Smartphones

Due to the revolution in the mobile industry, people have started switching from ordinary mobile phones to smartphones (Han Rebekah Wong, 2012). People have started to perceive smartphones as their basic constant need and develop a strong perception that regular usage is necessary for their regular lives (Tian et al., 2009). Consumers who continuously engage in smartphones are those who have maximum knowledge about smartphone features and also have a personal experience about how they work and how they fulfill their needs (Keaveney & Parthasarathy, 2001). People use smartphones to access different kinds of information and are inseparable from smartphones in their daily lives (Suki, 2013). Future purchase behavior will be affected by the past experiences of a consumer of a smartphone as they are mostly dependent on smartphones because of their unique features (Kuhlmeier & Knight, 2005). Future purchase behavior is positively related to dependence on smartphones. It will not be a big issue that the experience of a consumer is good or bad, users will quickly learn and easily determine what to purchase with their smartphones (Keaveney & Parthasarathy, 2001).

Social Needs

Social needs are those that the person requires for social relations, which represents the need to communicate with family, friends, or affiliations like members of a club, workplace, or university mates (Tikkanen, 2009). Love, care, and belonging can be integrated into social needs. One of the reasons for an increasing number of people who use smartphones has social needs is because these smartphones have become handier and provide opportunities for consumers to increase their usage for communication and maintain relationships in their society or family (Lippincott, 2010). With time, smartphones are coming with new features that give a chance to

interact with other users more professionally and effectively without any limitation of distance (Carayannis et al., 2012). When there is a positive relationship between social needs and dependency on smartphones it is found that users of smartphones are highly engaged (Wei & Lo, 2006). Smartphones come with hundreds of applications like messaging (video, voice, or text), emailing, GPS, video games, cameras, and many others with high-resolution touch screens and fantastic features installed within them. People who need to socialize more and want to stay connected use more smartphones (Bødker et al., 2009). Those users who are less interested in socializing or have fewer social needs than others are expected to use smartphones less (Morgan, 2010). Suki (2013) studied many different students in which three-quarters of students declared that they activated different packages on smartphones which allowed them to use unlimited internet access to fulfill their social needs rather than limited access by the provider. Bridges et al., (2010) claimed that social networking sites and live chat options, allow consumers to fulfill their social needs by staying connected. It is also observed by Wei and Lo, (2006) that smartphones are one of the important facilitators for individual social bonds. Students have concerns regarding social disengagement and isolation from their friends and social groups, therefore, they fulfill their social needs by using smartphones (Suki, 2013). Since human beings need to be associated with their fellow human beings, advancement in smartphone technology has afforded other ways of satisfying this need (Ratan et al., 2021). It can be argued that smartphones offer convenient control over social networking, messaging, shared content, events, and information people use to interact (Li et al., 2022). The idea is that when several social wants are satisfied using the smartphone, more people become attached to the tool. This dependence is due to the daily notifications accompanied by dopamine highs that come with likes and comments on social networks, as well as calls and messages in smartphone messengers. People become habitual to receiving positive reinforcement and come to expect that they need to continue to stay connected via their devices (Yu & Sussman, 2020). Therefore, the first hypothesis is as follows;

H1: Social needs increase smartphone dependence.

Convenience

People are facing time shortages because of the busy schedules in their daily lives therefore they give great value to the convenience factor. They use smartphones as they are simple and convenient so they can use their smartphones any time and any place (Genova, 2010). Smartphones are now handier, easier to carry, tethered to individuals, and act like portable workstations (Holub et al., 2010). In recent years, smartphones have changed everything, individuals could do things that they never imagined could be possible without using a workplace or a home computer. From using social networking sites to searching for a restaurant online; from finding hospital reviews to searching for store price comparisons anytime anywhere have only

been possible by using smartphones. You don't have to wait to do transactions on a desktop or laptop at home or in the office when you are stuck in traffic, you can easily do transactions through your smartphones (Lu & Su, 2009). With the help of smartphones and the convenience of free download of applications, a consumer can easily determine product and company details within a couple of minutes. Shopping was always a time-consuming work but with the help of smartphones, we can save time in shopping and can do much more shopping in less time. One can do shopping from several different companies with convenience all in one place through the courtesy of smartphones (Persaud & Azhar, 2012). Awesome features in these smartphones show that shortly, innovation in mobile technology will offer more convenience, and benefits (Smura et al., 2009). Smartphones provide so much convenience to their users that they start to depend on smartphones to acquire useful information (Genova, 2010). Stephens and Davis (2009) stated that smartphones have diffused laptops and normal mobile phones into them for consumer convenience. The functions of both mobile phones and computers (laptops) have been integrated into one and because of this convenience, there is a swell in the usage rate of smartphones **(**Hahn, 2010). It is obvious that as smartphones give convenience to their consumers therefore dependency on smartphones will increase automatically.

At present, portable computing devices are as useful as smartphones because they offer most of the handy tools in one single handheld gadget (Sohn et al., 2021). The advancement of the convenient features that are offered through smartphones makes gadgets an essential part of people's lives. This covers all aspects of life and leads to the population's dependency as they get accustomed to having everything within reach (Ting & Chen, 2020). Without the smartphone, the user may feel disconnected, as if he or she is lost or cannot properly coordinate his or her day and other activities (Gonçalves et al., 2020). As far as the health aspect is concerned, they depend on the convenience of performing daily tasks and operations. This gradual conditioning integrates the use of the smartphone into habits and activities that immediately appear indispensable. The smartphone steps in as the control center of people's lives (Sohn et al., 2021). Therefore, the second hypothesis is as follows;

H2: The Convenience of smartphones increases smartphone dependence

Social Influence

When an individual affects another individual's feelings, beliefs, and behaviors, it can be defined as a social influence (Mason et al., 2007). When people are socially influenced, they start adopting thoughts, behaviors, and attitudes (Min et al., 2012). A smartphone user can easily be affected or socially influenced by other people through observation or anticipation of decisions (Suki & Suki, 2007). It can be claimed that users of smartphones are easily affected by social influence (Auter, 2007). Klobas and

Clyde, (2001) found that in many cases there is a positive impact of social influence on the dependence on smartphones. People's thoughts about a brand and social influence play an important role in the intention to buy a smartphone (Jamil & Wong, 2012). If smartphones have a positive word of mouth, then it will increase social influence, and people who are mostly dependent on others' experiences and believe in word-of-mouth opinions will likely increase their usage of smartphones. As individuals become social beings, their otherwise simple and easily regulative behaviors and habits become more complex and prone to the influence of peer pressure, relatives, influencers, celebrity endorsers, and such social standards as they perceive to be in society (Pera, 2020).

People are 'connected' in a way, they have never experienced, given the rapidly increasing rate of smartphone usage. With their gadgets in hand, they peer into a window to the world and observe friends, relatives, strangers, and even celebrities sharing their lives, regardless of their location (Olson et al., 2022). The use of social networking sites offers CAMD well-timed, albeit slightly staged, depictions of how application incorporates smartphones into people's everyday existence. The more people get accustomed to and adore smartphones on social media platforms and in their physical environment, the more people feel the urge to emulate such behaviors (Pera, 2020). The hyphen between the need to belong and the fear of missing out makes individuals keep checking their phones. It thereafter becomes habitual and ritualistic. The mere fact of observing others frequently use smartphones for interaction helps us rely on them to interact with the surrounding environment (Chen, 2020). Therefore, the third hypothesis is as follows;

H3: Social influences increase smartphone dependence.

Gender and Smartphone Dependence

Many researchers are interested in studying gender roles in smartphone usage. Despite numerous studies, there is no agreement on which gender is at the highest risk. However, females tend to be more dependent on smartphones and use them more frequently. Women often use smartphones to connect with family and friends, send emails, and initiate communication in their social relationships. They maintain and develop social connections through texting, phone calls, and video calls (Billieux et al., 2008; Walsh et al., 2011; Hong et al., 2012). Understanding the factors that are causing a reliance on smartphones among students and influencing young people's propensity to buy smartphones is crucial, as evidenced by the recent increase in demand for smartphones in Pakistan and their early adoption among university students. In this context, Aslam, et al. (2018) have highlighted a comparison between male and female dependence on smartphones and purchasing behavior. The results revealed that social influence and convenience have a significant effect on female

participants whereas social needs and social influence have a significant effect on male participants. Therefore, the fourth hypothesis is as follows;

> *H4: Gender moderates the relationship between social needs, convenience, social influences, and smartphone dependence.*

Research Methodology

This study investigates the various factors that influence students' use of smartphones in their daily lives. By analyzing the results, we identified which factors are most and least considered by smartphone consumers and understand users' knowledge and perspectives on smartphone dependence. Data was collected using a questionnaire administered to students in Karachi. A non-probability-based convenience sampling technique was employed, with a sample size of 100 participants. The questionnaire, comprising closed-ended questions, focused on students' perceptions of factors driving their daily smartphone use. This method ensured participants felt comfortable, as they were not disclosing any new or personal information. The sample size was small which may present the problem of validity and generalizability; however, the scope of this study was a single unit, which was a university, hence, the purpose was not generalizability. Validity concerns are mitigated by using already established scales in the studies (Ting et al., 2011).

The questions used to measure the variables were adopted from Ting et al. (2011), variables included convenience; social needs; social influence, and dependency. A five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree) was used to measure university students' intentions toward smartphone use. This scale was employed with the assumption that the psychometric distances between the categories are equal. A quantitative research method was employed to determine whether the independent variables social needs, social influence, and convenience, significantly affect the dependent variable dependence. For statistical analysis, Smart PLS version 4 was utilized. The data were analyzed using structural equation modeling to assess the impact of each independent variable that predicts the dependent variable.

Data Analysis

Descriptive analysis was carried out, Table 1 shows the reliability, SD, mean, and correlation between the variables used in the study. The reliability of Social Need is 0.689, Social Influence 0.701, Convenience is 0.736, and Dependence on Smartphones is 0.753.

Table 1. Descriptive Analysis

Variables	Mean	SD	Correlations				Reliability
			1	2	3	4	
Social Need							**0.689**
SN1	4.17	0.84154	-	-	-	-	
SN2	4.02	0.79111	0.435	-	-	-	
SN3	3.67	0.95405	0.41	0.357	-	-	
SN4	3.91	0.84202	0.335	0.367	0.315	-	
Social Influence							**0.701**
SI1	3.31	1.07961	-	-	-	-	
SI2	3.06	1.30902	0.323	-	-	-	
SI3	3.66	1.13902	0.333	0.319	-	-	
SI4	3.33	1.1981	0.256	0.548	0.424	-	
C**onvenience**							**0.736**
C1	4.12	0.9242	-	-	-	-	
C2	3.76	1.15575	0.377	-	-	-	
C3	3.87	1.09779	0.324	0.413	-	-	
C4	3.77	0.98324	0.364	0.378	0.412	-	
C5	3.74	1.05044	0.189	0.422	0.382	0.303	
Dependence on Smartphones							**0.753**
D1	3.66	1.23272	-	-	-	-	
D2	3.35	1.38078	0.522	-	-	-	
D3	2.87	1.16909	0.34	0.567	-	-	
D4	3.01	1.24312	0.141	0.369	0.501	-	
D5	3.54	1.16706	0.29	0.289	0.467	0.31	

Measurement Model

Convergent validity has been calculated using the Variance Inflation factor (VIF), Cronbach alpha, Composite Reliability (RHO_A) and (RHO_C) and Average Variance Extracted for the four variables used in this study; namely; Dependence on Smartphones (DV); Social Influence (IV); Convenience (IV); and Social Needs (IV) (Table 2). 4 items retained in Convenience, 4 items retained in Dependence on smartphones, 3 items retained in Social Influence, and 3 items retained in Social needs. The threshold of loadings is >0.6, AVE> 0.5, Alpha > 0.7, and CR> 0.7 (Hair et al., 2019; Gefen et al., 2000). Almost all values are falling in the threshold. Hence, all variables show convergent validities.

Table 2: Measurement Model

Variables	Items	VIF	Loadings	ALPHA	CR (RHO_A)	CR (RHO_C)	AVE
Convenience	***C1***	1.219	0.685	0.695	0.697	0.812	0.52
	C2	1.497	0.786				
	C3	1.36	0.683				
	C5	1.309	0.726				
Dependence On Smartphones	***D1***	1.293	0.667	0.741	0.753	0.838	0.566
	D2	1.367	0.701				
	D3	1.939	0.855				
	D4	1.496	0.773				
Social Influence	***SI2***	1.442	0.822	0.69	0.714	0.829	0.619
	SI3	1.23	0.676				
	SI4	1.58	0.852				
Social Needs	***SN1***	1.342	0.69	0.661	0.76	0.803	0.579
	SN2	1.28	0.71				
	SN3	1.256	0.869				

Tables 3 and 4 show the discriminant validities of the variables in the model (Hair et al., 2019) using the Fornell and Larcker (1981) and Heterotrait Monotrait Ratio (HTMT) (Henseler et al., 2015; Franke and Sarstedt (2019). All diagonal values should be greater than non-diagonal values as per Fornell and Larker (1981) while HTMT values should be less than <0.85which means all constructs are different from each other.

Table 3: Heterotrait-Monotrait Ratio (HTMT)

	Convenience	Dependence On Smartphones	Social Influence	Social Needs
Convenience	0.638	-	-	-
Dependence on Smartphones	0.506	0.846	-	-
Social Influence	0.754	0.482	0.292	-
Social Needs	0.278	0.277	0.063	0.186

Table 4: Fornell-Larcker Criterion

	Convenience	Dependence on Smartphones	Social Influence	Social Needs
Convenience	0.721	-	-	-
Dependence on Smartphones	0.477	0.752	-	-
Social Influence	0.357	0.63	0.787	-
Social Needs	0.502	0.381	0.207	0.761

Structural Model

For the structural model, 10,000 samples were used to assess the path coefficients in PLS SEM, using Smart PLS software version 4. The path coefficients, standard error, t values, p values, and confidence intervals were calculated. R square was 0.527 and R Square Adjusted was 0.49 for the model. Table 5 shows the direct and indirect path coefficients which reveal the hypothesis being accepted or rejected. First, the direct effect of Convenience, Social influence, and social needs on dependence on smartphones were tested. The results showed that H1 social needs on dependence were accepted on a 0.1 confidence interval with $\beta = 0.152$, $p < 0.1$, which is significant. H2 was rejected as $p > 0.1$, there is no direct effect of convenience on dependence on smartphones. H3 was accepted with $\beta = 0.522$, $p < 0.01$ while assessing H4, it was found that only convenience interacts with gender to impact the dependence on smartphones $\beta = 0.502$, $p < 0.1$ while the rest were not significant. Figure 2 shows the relationship between all the variables in the graphical form.

Table 5: Path Coefficients

Hypotheses	β	Mean	SD	T Statistics	P values	5% CFI	95%CFI
Social Needs->Dependence on Smartphones	0.152	0.159	0.093	1.63	0.052	-0.017	0.291
Convenience->Dependence on Smartphones	0.133	0.144	0.11	1.213	0.113	-0.053	0.306
Social Influence->Dependence on Smartphones	0.522	0.527	0.083	6.261	0	0.373	0.648
Gender->Dependence on Smartphones	0.240	0.249	0.214	1.119	0.132	-0.149	0.523
Gender*Social Needs->Dependence on Smartphones	-0.204	-0.228	0.268	0.764	0.223	-0.694	0.133
Gender*Social Influence->Dependence on Smartphones	-0.001	0.003	0.186	0.008	0.497	-0.323	0.258
Gender*Convenience->Dependence on Smartphones	0.502	0.504	0.308	1.633	0.051	0.028	0.921

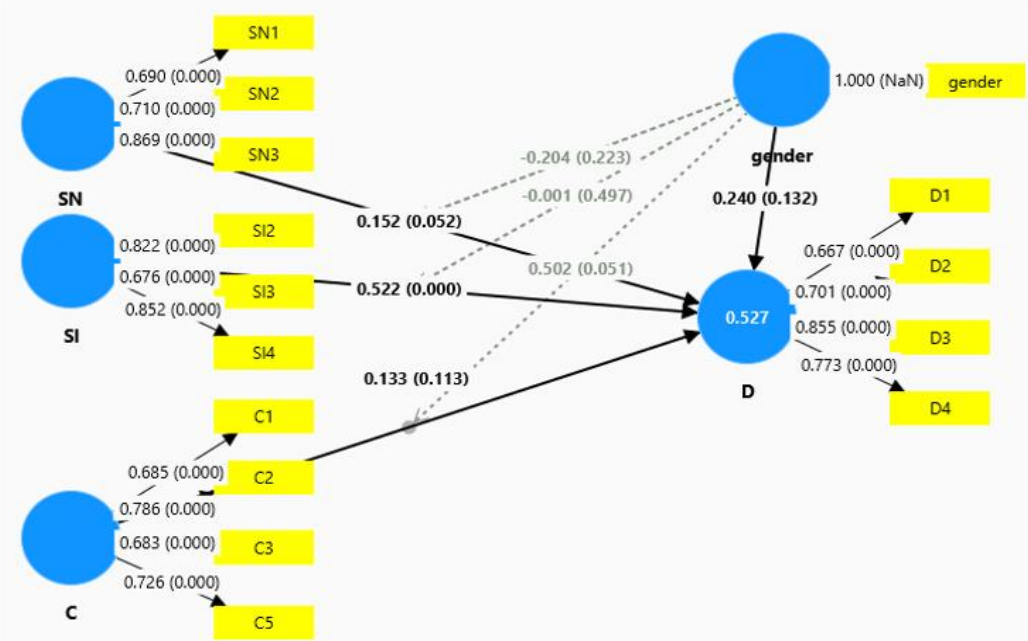


Figure 2. Structural Equation Model

Figure 3. shows the interaction effect of Gender between Convenience and Dependence on Smartphones. The moderation hypothesis, H4 was significant only for Convenience thus the interaction effect graph shows that the relationship between convenience and dependence is positive for females while it is negative for males. The level of moderator Gender has changed the direction of the relationship between Convenience and Dependence on smartphones. H2 showed that the Convenience > Dependence relationship is not significant, from not being significant, now it changes the relationship to positive for females and negative for males.

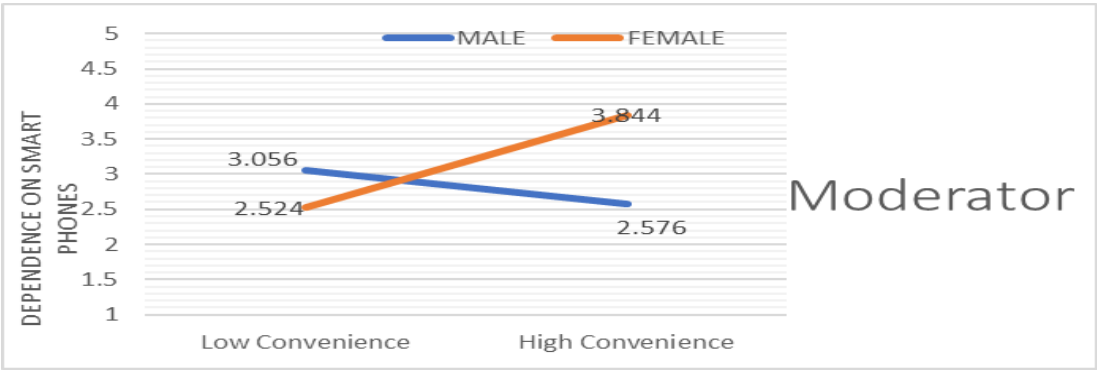


Figure 3. Moderation Effect of Gender between Convenience and Dependence on Smartphones

Discussion and Conclusion

After researching students' dependence on smartphones, it has been concluded that social influence and social needs have a positive impact on students' dependence on smartphones. Students are mostly dependent on smartphones in their daily lives. Convenience does not have a significant impact on using smartphones. However, if gender is interacting between Convenience and Dependence on Smartphones then females have a positive influence while males have a negative influence.

A similar study, conducted by Pearson and Hussain (2016) suggested that a correlation exists between psychological factors and smartphone addiction. Also, they found a positive correlation between neuroticism and narcissism with smartphone addiction. However, Arpaci and Kocadag Unver, (2020) found a positive relationship between neuroticism and smartphone addiction for females.

Smartphones with new advanced technology have made the students' lives easier. These smartphones are a combination of laptops and mobile phones. After analyzing the data, it has been concluded that two direct hypotheses are accepted while partially the moderating hypothesis has been accepted. Students are using smartphones to complete their assignments, tasks, and class work. These smartphones are also used for socializing, as they help them to stay connected with friends and family regardless of boundaries. Smartphones are handy to carry all the time.

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