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Exploring Upper Limb Discomfort due to Smartphone Usage and Internet Addiction across age groups: A Scientific Exploration

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ABSTRACT
Aim: The aim of the present study is to explore Upper Limb Discomfort associated with Smartphone Usage and Internet Addiction across various age groups.

Introduction: This study addresses the relationship between smartphone use, internet addiction, and related upper limb discomfort in various ages. As Smartphone become more and more ingrained in daily life, worries about their possible negative impact on both physical and mental health have emerged. These issues are worsened by internet addiction, which is frequently linked to excessive smartphone usage. The preliminary findings show a significant relationship, with differences identified across age groups, between excessive smartphone usage, internet addiction, and upper limb discomfort.

Methods of study: Employing a random sampling technique, this study's cross-sectional design has been implemented in Lucknow city. A total of 180 respondents have been selected for this investigation. Male and female participants were drawn randomly from each of the three age groups (i.e., 18-29; 30-59, and over 60).While responding to the Cornell Hand Discomfort Questionnaire (CHDQ), Internet Addiction Scale (IAS), and Smartphone Addiction Scale-Short Form (SAS-SF) questionnaires.

Results & Findings: The study examined upper limb discomfort linked to smartphone use and internet addiction in all age groups by analyzing a sample of 180 respondents. The study's findings showed that smartphone use, internet addiction, and upper limb discomfort were positively correlated in all age categories. In general, focused interventions are advised to manage musculoskeletal problems brought on by excessive use of Smartphone. Considering the strong positive connection developed between SAS and IAS scores, it appears that those who have higher smartphone rates of dependency are also more likely to be internet addicts. Similarly, a relatively favorable connection between the IAS and CHDQ scores suggests that. The SAS and CHDQ scores showed a significant moderate positive connection, suggesting that people who evaluate their smartphone addiction higher are also more likely

to suffer hand pain from using their phones. Higher internet addiction scores are also associated with more hand ache reports.

Conclusion: The study highlighted significant associations between upper limb discomfort problematic smartphone usage and internet addiction across different age groups in Lucknow city. Although there were significant changes in the scores of the Smartphone Addiction Scale (SAS) between age groups, there were also notable differences in the way some areas, especially Area F (wrist), interpreted pain. It suggests that those with higher rates of smartphone addiction are also more likely to have internet addictions, given the strong positive correlation that has been established between SAS and IAS scores. The significant moderate positive connection shown between SAS and CHDQ scores suggests that those with higher smartphone addiction scores are also more likely to suffer hand discomfort associated with smartphone use. Similarly, a relatively favorable connection between the IAS and CHDQ scores suggests that individuals with higher internet addiction scores also experience more hand discomfort.

Keywords: Internet addiction, Problematic Smartphone Usage, Upper limb Discomfort, Internet addiction & Upper limb Discomfort, Problematic Smartphone Usage & Upper limb Discomfort, Psychological wellness.

INTRODUCTION

Smart phones are multipurpose Internet-connected technology. Users can play games, communicate with colleagues, use messaging apps, access web services (such as blogs, homepages, and social networks), and search for information in addition to using phone calls.

Due to their ease of use and versatility, Smartphone are becoming more and more popular. As of early 2012, there were over 1.08 billion users globally (Mok et al., 2014).The most common device used by teenagers is a smartphone. According to research conducted among US university students, text messaging, or SMS, is the most popular form of communication. According to a recent survey, only two hours of a person's walking day are spent without a cell phone, accounting for 79% of the population between the ages of 18 and 44 (Neupane et al., 2017).

Mobile computers are widely utilized by people from all walks of life. It is now almost a necessary component of life, especially for students. For academic pursuits, most boys and girls assumed a posture of neck neutrality and neck flexion, while for work-related activities, most of them slouched forward. Boys and girls generally devote more time to jobs and school-related activities. It is also observed that a relatively small percentage of laptop users utilize phone and Laptop accessories for various kinds of tasks. It is necessary to provide students with appropriate orientation to the postures to be used in order to lessen their postural pain (Mishra, S., & Kiran, U. V.2013).

The duration of individuals using Smartphone's has increased, which resulted in an assortment of difficulties with overuse. Overuse of smart phones can result in problems paying attention in class or at work, as well as physical issues such neck stiffness, blurred vision, back or wrist pain, and disturbed sleep (Kim & Kang, 2013; Korea Internet & Security Agency, 2011; Kwon et al., 2013; Mok et al., 2014). According to Lin et al. (2014), addiction to Smartphone might be categorized as a specific type of technological addiction. Research on smartphone use (Korea Internet & Security Agency, 2013) reveals that 45.8% of users feel anxious when they are not holding their Smartphone, and 27.1% of users use them excessively. Smartphone of those who use it, 27.1% use it excessively, and 22.6% have tried and failed to reduce their consumption on multiple occasions. Moreover, 21.0% of smartphone users claimed that their excessive phone use had caused them to struggle at work or at school. Furthermore, the percentages were higher for those in their teens and twenties. Addiction is characterized by tolerance, withdrawal symptoms, dependency, and social issues (Holden, 2001; Kim, 2006; Kwon et al., 2013; O'Brien, 2011).In today's culture, a lot of people use their Smartphone excessively. Numerous studies (Shan et al., 2013; INal et al., 2015 & Xie et al., 2016) have found a connection between physical health symptoms and mental health problems like anxiety and depression when it comes to excessive smartphone use. (Elhai and others, 2017). In addition, excessive use has

been connected to poor academic achievement and lower productivity (Samaha and Hawi, 2016; Duke and Montag, 2017).

A few advantages of Smartphone's are that they may be used for a variety of things, such as increasing productivity, finding information, interacting with others, relaxing, and having fun (Deursen et al., 2015). Fortunately, a lot of people presently struggle with using their Smartphone excessively. Long hours of driving in a confined position and uncomfortable workspaces are the main causes of various body segments pain experienced by drivers of automobiles. Due to extended periods of sitting, full body vibration, and carrying luggage, taxi drivers are more susceptible to musculoskeletal diseases. Psychosocial work issues, such as feelings of unjust treatment, workplace stress, and an unbalanced effort-reward, may be linked to musculoskeletal problems among cab drivers (Srivastava, S., & Kiran, U. V. 2014).

A smartphone used properly can be dangerous for many individuals. Due to studies, for instance, using a smartphone excessively might have detrimental effects such as poor physical fitness (Lepp et al., 2013, Rebold et al., 2016), academic inadequacies (Lepp et al., 2014, Prabu et al., 2015), and confusion for drivers and pedestrians (Elhai et al., 2017). Smartphone addiction is defined as the excessive use of smartphones to the point where it becomes difficult to go about daily activities (Demirci et al., 2014).Among the most well-liked and necessary devices for today's youth is the smartphone. The widespread usage and obsession with modern media players, social networking, mobile gaming, email and message accessibility, fast and simple access to GPS navigation apps, and small, high-resolution cameras are all contributing elements to these Smartphone. The increased usage of smartphones has raised the risk of experiencing musculoskeletal pain (AlAbdulwahab et al., 2017). The use of Smartphone has changed family relations, emancipative attitudes, social contacts, everyday routines, and behavior in public. According to Thomee et al. (2011), there is a link between continuously checking and/or utilizing smartphone applications around the clock and reduced physical activity, poor academic performance, anxiety, stress, withdrawal, and trouble falling asleep. Problematic Smartphone Usage thus creates issues for us personally as well as from an organizational and societal perspective. One technological advancement that has grown quite popular and important in contemporary culture is the smartphone. Compared to many other devices, such as laptops and smartphones, it offers an extra small computing platform (Barnes et al., 2019; Bernroider et al., 2014).

Utilization of Smartphone is prevalent throughout a variety of settings, including the workplace, personal life, and interactions with organizations that are both public and private. To explain this, it is currently believed that there are more smartphone users internationally than there are people (Konok et al., 2017). It is controversial how frequently and for how long smartphone use must become troublesome because Smartphone are increasingly available and acceptable in the community (Kim et al., 2018). The way consumers work, interact, and spend their leisure time has changed dramatically in the last two decades thanks to the widespread availability of smartphones and the worldwide availability of the internet. However, while all of the advantages that these technological advancements have resulted in, worries about the possibility of harm that they might cause to people's mental and physical health have grown. (Su et al., 2020). Although research has investigated the prevalence and implications of internet addiction and problematic smartphone use, little of it has particularly investigated the extent to which hand discomfort can be attributed to these habits in an assortment of age groups. Developing focused interventions and preventive strategies to lessen the potential adverse consequences of excessive smartphone usage and internet addiction requires an understanding of the prevalence and severity of hand discomfort among different age cohorts (Yildirim et al., 2016).The Addiction Construct in Relation to Smartphone Use In the Pew Research study, 46% of smartphone owners stated they "couldn't live without" their gadgets (Smith and Page, 2015, April 1). When people are cut off from their Smartphone, many report feeling like they are going through a physiological withdrawal (Cheever et al., 2014) and experiencing an increase in anxiety (Clayton et al., 2015). Numerous individuals report feeling phantom vibrations on their Smartphone, even in the absence of incoming phone notifications (Kruger and Djerf, 2016). Other phrases used to characterize Smartphone use include "addiction," "excessive use," "compulsive use," and "compensatory use," in addition to "problematic smartphone use." Griffiths and Widyanto (2006); Kardefelt-Winther (2014)). Long periods of inactivity during this

exercise incorporate out the muscles and increase the risk of developing a number of musculoskeletal disorders. In 2021, Mustafaoglu et al. Furthermore, a recent study discovered a link between stress, sleeplessness, abnormal behavior, mood swings, and even hopelessness and mobile phone addiction. According to Chen et al. (2017), students nowadays are more reliant on their phones than they were a generation ago, and they may also be more vulnerable to smartphone addiction. According to a recent Indian study, 46.9% of students said they experienced discomfort in their necks and 29.2% said they had pain in their thumbs after using their smart phones for extended periods of time (Ahmed et al., 2021). According to Kim et al. (2015) and Neupane et al. (2017), using a smartphone for extended periods of time can cause pain in the neck, shoulders, and upper back. pain in the hand, shoulder, and cervical regions in addition to discomfort in the muscles (Ahmed et al., 2021 & Ahmed et al., 2019). Musculoskeletal pain in the upper limbs (Sharan et al., 2014). This is consistent with the findings of the ongoing study.

Goldberg first used the term "Internet addiction disorder" to characterize the similarities between pathological gambling and Internet addiction illness. This is because there are those internet users who, when offline, exhibit greater impulsivity. The notion of mental health comprises of various aspects such as subjective well-being, perceived self-efficacy, competency, independence, intergenerational reliance, and the awareness of one's capacity to reach their maximum emotional and intellectual potential. It has also been described as a "mental health state in which people acknowledge their abilities, can manage everyday stressors, work effectively and productively, and contribute to their communities." In addition to one's material, spiritual, and bodily well-being, one of the most basic (Swami, et al., 2007)

MATERIALS & METHODS

Selection of sample

The respondents were selected through the use of multistage random sampling, ninety male and ninety female respondents from three age groups (i.e. 18 to 29; 30 to 59, and above 60) totally of 180 only those from Lucknow city were chosen as responders.

Smartphone addiction (SAS)

Ten questions on a 6-point Likert scale make up the SAS. From strongly rejecting to strongly agreeing, there are six points on the scale. The total score is between 10 and 60. A greater score indicates a greater probability of smartphone addiction. The tool used to assess smartphone addiction is reliable and valid. The internal consistency of SAS was validated by Cronbach's alpha, which in the teenage sample was 0.911 (Kwon et al., 2013).

Cornell Hand Discomfort Questionnaire (CHDQ)

The questionnaire consists of six items that address the following topics: 1. Frequency of musculoskeletal pain; 2. Discomfort; and 3. Interference with work during the preceding week. There is also a hand mapping schematic with six colored hand areas. Higher scores were associated with more discomfort. The formula Frequency × discomfort × interference was used to calculate the overall discomfort score. The highest possible score in each category is 90 0, and the total for all six sections is 560. Higher readings suggest more discomfort. Dr. Oguzhan Erdinc conducted a rigorous validity test of the CMDQ in Turkey, and the results were positive (Erdinçat et al., 2008).

Internet Addiction Scale (IAS)

The IAS is a 4-point, 26-item self-report assessment that evaluates compulsive consumption, withdrawal from substances, tolerance, interpersonal relationship issues, health issues, and time management issues as the five characteristics of Internet addiction. The range of the overall IAS score is 26 to 104. A higher IGD severity can be detected by a higher IAS score (Chen et al., 2003).

DATA COLLECTION

Three tools were used: an SAS with ten items on a 6-point Likert scale, as well as a self-made sociodemographic questionnaire for evaluating the respondents' demographic profile. On this scale, 1represents strongly disagreeing, while 6 represents strongly agreeing. The measurement tool for

smartphone addiction is reliable and valid. The CIAS is a 4-point, 26-item self-report assessment that evaluates compulsive consumption, withdrawal from substances, tolerance, interpersonal relationship issues, health issues, and time management issues as the five characteristics of Internet addiction. Cronbach's alpha of 0.911 in the adolescent population confirmed the internal consistency of SAS. The CHDQ is a useful tool for calculating hand discomfort. Three dimensions are covered by the questionnaire: pain interference, pain discomforts, and pain experience. The total discomfort scale was determined by multiplying frequency, unpleasantness, and interference. A single hand's highest score for a shaded area is 90, and the combined score for all six shaded areas is 540.

STATISTICAL ANALYSIS

For data analysis, we utilized the software SPSS 20.0. The mean and confidence intervals of 95% are used to display the continuous variables. Percentages as well as frequencies (in numbers) are used to represent categorical variables. The link between SAS, IAS, and CHDQ has been identified through an examination of correlation coefficient. The ANOVA test and the T-test were used to look at differences between the various data groups.

RESULTS AND DISCUSSION

During the conclusion of the current study, we aim to investigate, from a scientific standpoint, the discomfort in the upper limbs that is linked to smartphone use and internet addiction in different age groups. We observed that there was significant discomfort in the area F(wrist) across all age groups. We also found an association between smartphone usage and internet addiction. No noticeable gender differences were discovered, yet there were age-related significant differences**.**

Table 1: Socio-demographic details of the respondents.

S. No.	**Category**	**Frequency (in n)**	**Percentage(in %)**
Age			
1	Young adult	60	33.0
2	Middle aged	60	33.0
3	Above 60	60	33.0
	Total	180	100.0
Gender			
1	Male	90	50
2	Female	90	50
	Total	180	100.0
Family type			
1	Nuclear	124	58.9
2	Joint	56	31.1
	Total	180	100.0
Working status			
1	Working	93	51.7
2	Non-working	87	48.3
	Total	180	100.0

The above- given Table 1 summarizes the socio-demographic information of all respondents. Out of 180 respondents, 90 were male and 90 were female. 51% of participants were working and 48.3% were non-working There are 124 (58.9 %) respondents from the nuclear family and 56(31.1 % respondents from joint family.

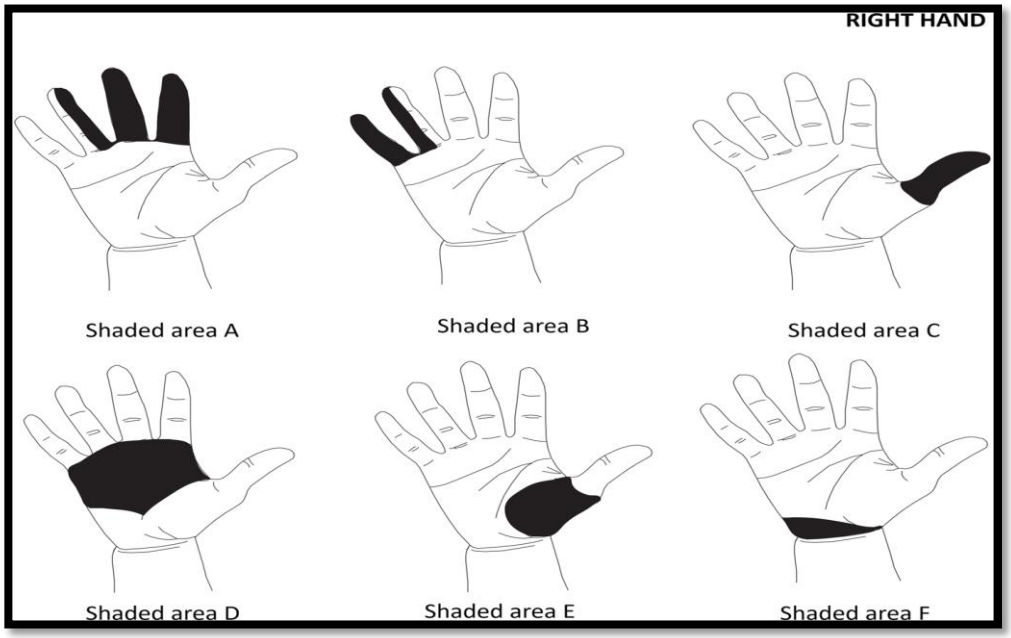

Fig: 1 The hand's shaded area is depicted in the hand map diagram.
Above Fig1 describe right hand different shaded area, shaded area A (index, middle, half ring) shaded area B (little finger half ring) shaded area C (thumb) shaded area D (palm) shaded area E (thumb joint) shaded area F (wrist).

Table 2: Pain experience in shaded area of hand across the gender.

		Male	Female	Total	P-value
Area A	Never	70(26.0%)	4 (23.8%)	134(49.8%)	.967
	1-2 Time Last Week	10 (3.7%)	13 (4.8%)	23(8.6%)	
	3-4time Last week	4 (1.5%)	5 (1.9%)	9(3.3%)	
	Once Every Day	3 (1.1%)	7 (2.6%)	10(3.7%)	
	Several Times Every Day	3 (1.1%)	1 (.4%)	4 (1.5%)	
Area B	Never	66(24.5%)	62(23.0%)	128(47.6%)	.576
	1-2 Time Last Week	18(6.7%)	21(7.8%)	39(14.5%)	
	3-4time Last week	1(.4%)	4(1.5%)	5(1.9%)	
	Once Every Day	4(1.5%)	1(.4%)	5(1.9%)	
	Several Times Every Day	1(.4%)	2(.7%)	3(1.1%)	
Area C	Never	61(22.7%)	61(22.7%)	122(45.4%)	.315
	1-2 Time Last Week	18(6.7%)	17(6.3%)	35(13.0%)	
	3-4time Last week	6(2.2%)	4(1.5%)	10(3.7%)	
	Once Every Day	4(1.5%)	4(1.5%)	8(3.0%)	
	Several Times Every Day	1(.4%)	4(1.5%)	5(1.9%)	
Area D	Never	55(20.4%	39(14.5%)	94(34.9%)	.171
	1-2 Time Last Week	17(6.3%	28(10.4%)	45(16.7%)	
	3-4time Last week	12(4.5%	15(5.6%)	27(10%)	
	Once Every Day	3(1.1%)	7(2.6%)	10(3.7%)	
	Several Times Every Day	3(1.1%)	1(.4%)	1(1.5%)	
	Never	61(22.7%)	55(20.4%)	116(43.1%)	.472

Area E	1-2 Time Last Week	20(7.4%)	27(10.0%)	47(17.5%)	
	3-4time Last week	7(2.6%)	4(1.5%)	11(4.1) %	
	Once Every Day	1(.4%)	3(1.1%)	4(1.5%)	
	Several Times Every Day	1(.4%)	1(.4%)	2(.7%)	
Area F	Never	59(21.9%)	51(19.0%)	110(40.9%)	.001
	1-2 Time Last Week	14(5.2%)	15(5.6%)	29(10.8%)	
	3-4time Last week	14(5.2%)	20(7.4%)	34(12.6%)	
	Once Every Day	2(.7%)	3(1.1%)	5(1.9%)	
	Several Times Every Day	1(.4%)	1(.4%)	2(.7%)	

The above table shown frequency and percentage of pain experienced by males and females in various shaded locations. "Never" to "Several Times Every Day" are the ranges of pain experiences that each section represents. A p-value, or statistical significance, is given for every shaded area. Overall, there are no discernible differences in how men and women perceive pain in areas A, B, C, and E. Conversely, however, a substantial difference between males and females is seen for area F ($p = 0.001$).The greatest percentage of males (3.7%) and females (4.8%) experience aches, pain, and discomfort 1-2 time last week. Whereas the lowest percentage of males (1.1%) and 0.4%) experience aches, pain, and discomfort in several time every day in shade area A (index, middle, half ring), The highest percentage of males (6.7%) and females (7.8%) experience ache, pain and discomfort in 1-2 time last week. Whereas the lowest percentage of males (0.4%) and 0.7%) experience aches, pain, and discomfort in several time every day in shade area B(little finger half ring), The highest percentage of males (6.7%) and females (6.3%) experience ache, pain and discomfort in 1-2 time last week. Whereas the lowest percentage of males (.4%) and 1.5%) experience ache, pain, and discomfort in several time every day in shade area C(thumb), The highest percentage of males (6.3%) and Female(10.4%) experience aches, pain and discomfort in 1-2 time last week. Whereas the lowest percentage of males (1.1%) and 0.4%) experience aches, pain, and discomfort Several time every day in shade area D(palm), the highest percentage of males (7.4%) and Females (10.0%) experience aches, pain and discomfort in 1–2-time last week. Whereas the lowest percentage of males (0.4%) and 0.4%) experience aches, pain, and discomfort in several time every day in shade area E (thumb joint), The highest percentage of male (5.2%) and Females (5.6%) experience aches, pain and discomfort in 1–2-time last week. Whereas the lowest percentage of males (0.4%) and females ((0.4%) experience aches, pain, and discomfort in several time every day in shade area F (wrist).

Table 3: Pain experience shaded area of hand across the various age groups (n=180).

		Group- 1 (18-29years)	Group-2 (30-59years)	Group-3 Above 60	Total	p-value
Area A	Never	45(25.0%)	48(26.7%)	41(22.8%)	134(74.4%)	.967
	1-2 Time Last Week	5(2.8%)	5(2.8%)	13(7.2%)	23(12.8%)	
	3-4time Last week	5(2.8%)	2(1.1%)	2(1.1%)	9(5.0)	
	Once Every Day	4(2.2%)	3(1.7%)	3(1.7%)	10(5.6%)	
	Several Times Every Day	1(0.6%)	2(1.1%)	1(0.6%)	4(2.2%)	
Area B	Never	50(27.8%)	42(23.3%)	36(20%)	128 (71.1%)	.576
	1-2 Time Last Week	5(2.8%)	0 (%)	20(11.1%)	39(21.7%)	
	3-4time Last week	3(1.7%)	14(7.8%)	2(1.1%)	5(2.8%)	
	Once Every Day	1(.6%)	2(1.8%)	2(1.1%)	5(2.8%)	
	Several Times Every Day	1(.6%)	2(1.8%)	0 (0%)	3(1.7%)	
	Never	38(21.1%)	44(24.4%)	41(22.8%)	122(67.8%)	

Area C	1-2 Time Last Week	8(4.4%)	13(7.2%)	14(7.8%)	35(19.4%)	.315
	3-4time Last week	9(5.0%)	1(0.6%)	0(0%)	10(5.6%)	
	Once Every Day	3(1.7%)	1(0.6%)	4(2.2%)	8(4.4%)	
	Several Times Every Day	2(1.1%)	2(1.1%)	1(0.6%)	52.8%)	
Area D	Never	42(23.3%)	30(16.7%)	22(12.2%)	94(52.2%)	. 171
	1-2 Time Last Week	7(3.9%)	15(8.3%)	23(12.8%)	45(25.0%)	
	3-4time Last week	7(3.9%)	8(4.4%)	12(6.7%)	27(15.0%)	
	Once Every Day	3(1.7%)	5(2.8%)	2(1.1%)	10(5.6%)	
	Several Times Every Day	1(.6%)	2(1.1%)	1(0.6%)	4(2.2%)	
Area E	Never	44(24.4%)	38(21.1%)	34(18.9%)	116(64.4%)	. 472
	1-2 Time Last Week	10(5.6%)	16(8.9%)	21(11.7%)	47(26.1%)	
	3-4time Last week	4(2.2%)	3(1.7%)	4(2.2%)	11(6.1%)	
	Once Every Day	2(1.1%)	1(0.6%)	1(0.6%)	4((2.2%)	
	Several Times Every Day	0(0%)	2(1.1%)	0(0%)	2(1.1%)	
Area F	Never	51(28.3%)	38(21.1%)	21(11.7%)	110(61.1%)	.001
	1-2 Time Last Week	4(2.2%)	10	15(8.3%)	29(16.1%)	
	3-4time Last week	4(2.2%)	8(4.4%)	22(12.2%)	34(18.9%)	
	Once Every Day	0(0%)	3(1.7%)	2(1.1%)	5(2.8%)	
	Several Times Every Day	1(0.6%)	1(0.6%)	0((0%)	2(1.1%)	

The above-given Table 3 shows the frequency and percentage of pain experienced for each of the shaded areas indicated in the table for each age group (n = 180). "Never" to "Several Times Every Day" is the range of pain levels that each section represents. For every shaded area, the statistical significance (p-value) is also shown. Overall, for areas A, B, C, and E, there are no appreciable variations in pain perception among age groups. Nonetheless, a noteworthy difference has been seen in area F (p = 0.001) between the age groups. The greater percentage of age group first (2.8%), age group second (2.8 %), and age group third (7.2%) experience aches, pain, and discomfort 1–2-timelast week. While as lowest percentage of the first age group ((0.6%)) second age group (1.1 %) and third age group ((0.6%)) experience aches, pain, and discomfort several time savory day in shade area A (index, middle, half ring). The highest percentage of age group first (2.8%), age group second (0%), and age group third (11.1%) experience aches, pain, and discomfort 1–2-timelast week. While as lowest percentage of the first age group (0.6%) second age group (1.8%) and third age group (0%) experience aches, pain, and discomfort several time every day in shade area B(little finger half ring).

The greatest percentage of people in the first age group (4.4%), second age group (7.2%), and third age group (7.8%) reported having pain, discomfort, or soreness once or twice in the previous week. In shade region C (thumb), the lowest percentage of people in the first age group (1.1%), second age group (1.1%), and third age group (0.6%) report having aches, pains, and discomfort many times a day. Age groups first (3.9%), second (8.3%), and third (12.8%) had the highest percentage of people experiencing aches, pains, and discomfort in their bodies in the recent week. He highest percentage of age groups first (5.6%), second (8.9%), and third (11.7%) experienced aches, pains, and discomfort in 1-2 instances last week, while the lowest percentage of age groups first (1.7%), second (2.8%), and third (5.6%) experienced these symptoms multiple times a day in shade area D (palm).While the least amount of people in the first age group (0%), second age group (1.1%), and third age group (0%) report having aches, pains, and discomfort in shade region E (thumb joint) multiple times per day, the greatest percentage of people in the first age group (2.2%), second age group (5.6%), and third age group (8.3%) reported having pain, discomfort, or soreness once or twice in the previous week. In shade region F

(wrist), the lowest percentage of people in the first age group (1.6%), second age group (1.6%), and third age group (0%) report having aches, pains, and discomfort many times a day.

Table 4: Showing the descriptive statistics of scores on SAS scale.

	SAS	Gender of the respondent		**Total**
		Male	Female	
1	Addict	45	55	**100**
2	Non addict	45	35	**80**
Total		90	90	**180**

The above-given Table 4, shown Smartphone Addiction Scale (SAS) scores of 180 respondents, 50% of the male respondents have been classified as non-addicts, and the other 50% as an addict. Approximately 61.11% of the female respondents were identified as Addict, while 38.89% were classified as non-addict. Overall, 44.44% of respondents were classed as non-addict, and 55.56% of respondents were classified as Addict.

Table - 5 Showing the Level of smartphone addiction of the respondents.

Gender of the respondents	Level of smartphone addiction				Total
	No addiction (10-33)	low addiction (33-42)	Moderate addiction (42-57)	Severe Addiction (51-60)	
Male	45	24	21	0	90
Female	35	38	17	0	90
Total	80	62	38	0	180

The various levels of smartphone addiction among respondents appear to be broken down by gender in the table above. The level of addiction is divided into four categories: "No addiction," "Low addiction," "Moderate addiction," and "Severe addiction." Ninety-five male respondents were categorized as having "No addiction," twenty-four as having "Low addiction," and twenty-one as having "Moderate addiction". 35 of the 90 female respondents were categorized as having "No addiction," 38 as having "Low addiction," and 17 as having "Moderate addiction". None of the respondent fits into the "Severe addiction" category in terms of gender.

Table 6: Showing the descriptive statistics of scores on IAS scale.

IAS	**Gender of the respondent**		**Total**
	Male	**Female**	
Addicted	45(50%)	39(35.1%)	84 (46.67%)
Non addicted	45 (50%)	51(45.9%)	96(53.33) %
Total	90	90	180

The above-given table 6 shows descriptive statistics for scores on the Internet Addiction Scale (IAS) among 180 respondents, The Internet Addiction Scale (IAS) scores of 180 respondents are shown in Table 1.5, 50% of the male respondents have been classified as non-addicts, and the other 50% as an addict. Approximately 35.1% of the female respondents were identified as Addict, while 45.9% were classified as non-addict. Overall, 53.33% of respondents were classed as non-addict, and 46.67% of respondents were classified as addict.

Table 7: Showing the internet addiction level of respondents.

Internet Addiction Scale	Gender of the respondent		Total
	Male	Female	
No Addiction (26-64)	45	51	96
Less Addiction (64-77)	39	37	76
Moderate Addiction (77-90)	5	0	5
Severe(90-104)	1	2	3
Total	90	90	180

The above-given table describes the level of addiction of the respondents, out of 180 respondents 96 respondents 45 male and 51 female have IAS score between(26-64) which indicate no addiction while 76 respondents IAS score between (64-77) which 39 male and 37 female that indicate less internet addiction, five male have IAS score between (77-90) that show moderate addiction level, and 3 respondent 1 male and 2 female only have (90-104) IAS score that indicate severe and level.

Table 8: Showing the distribution analysis of SAS score of respondents across the various age groups.

		Age group of respondents			Total
		18-29	30-59	Above 60	
SAS	Addict	30	30	40	100
	Non-Addict	30	30	20	80
Total		60	60	60	180

The distribution analysis of Smartphone Addiction Scale scores among age groups is summarized in the table 8. Three different ages were present in total: (18–29, 30-59, and above 60.) Each age group has 60 respondents, making a total of 180. 30 individuals in the 18–29 age range reported being addicted, and 30 respondents (aged 30-59) reported being addicted. And 40 of the respondents are addicted and above the age of 60.100 people are addicts in all. Where 30 respondents are not addicted in the 18–29 age range. There are thirty non-addicted responders in the age range of 30-59, and there are 20 responses that are not attached in the age group above 60.

Table 9: Showing the Level of smartphone addiction of respondents across the various age groups:

Age group second of respondent	Level of smartphone addiction				Total
	No addiction (10-33)	Low addiction (33-42)	Moderate addiction (42-51)	Severe Addiction 51-60	
18-29	30	13	17	0	60
30-59	30	20	10	0	60
Above 60	20	29	11	0	60
Total	80	62	38	0	180

Table 9 presents the distribution of respondents' smartphone addiction levels across age groups. The levels of addiction are divided into four categories: Low addiction, Moderate addiction, and Severe addiction. For respondents in the (18–29) age group 30 respondents indicated no addiction; 13 reported low addictions; 17 reported moderate addiction, 0 reported severe addiction. Out of 60 respondents, ages (30-59,) 30 respondents showed no addiction, 20 showed low addiction,10 respondents showed moderate addiction, and none showed severe addiction, out of 60 respondents, a total of 60 responders, aged (60 and above),20 respondents showed no addiction, 29 showed low addiction, 11 showed moderate addiction, and none of these showed severe addiction. Number of responders who are not

addicted is 80, in which 62 respondents overall have low levels of addiction. 38 out of the total respondents.

Table 10: Showing the distribution analysis of IAS score of respondents across the various age groups.

	Age group of respondents			Total
	18-29	30-59	Above 60	
Addicted	26	22	36	84
non -Addicted	34	38	24	96
Total	60	60	60	180

The above-given table 10 summarizes the distribution analysis of the Internet Addiction Scale across various age groups. There are three age groups in total (18–29, 30-59, and above 60.)There are sixty responders in each age group, for a total of 180. Of the respondents in the 18–29 age range, 26 are addicted. In the second age group (30-59), 22 respondents are hooked, and in the age, group spanning 60 years, 36 respondents are addicted. In total, 96 people said they were free of addiction. There are approximately 84 responders that are addicted in all, there continue to be 180 responders in all. There are some variations in the distribution of addicted and non-addicted responders across various kinds of ages when we compare this table. For instance, the age group over 60 has more addicted respondents than the other age groups. However, the age group 18–29 had the most addicted respondents.

Table 11: Showing the Internet addiction level across the various age groups

IAS	Age group second of respondent			Total
	18-29	30-59	Above 60	
No Addiction	34	38	24	96
Less Addiction	22	21	33	76
Moderate Addiction	3	0	2	5
Severe	1	1	1	3
Total	60	60	60	180

The above-given Table 11 shows the first age group (18–29 years old). 1 respondent has a severe addiction, 3 have a moderate addiction, 22 have less of an addiction, and 34 have no addiction out of 60 respondents, among the 60 responders. 38 responders in the second age group (30–59 years old) have no addiction. Out Of the 60 responders, 21 have less addiction, none have moderate addiction, and one has severe addiction, and 24 responders had none in the third age group (above 60). Out of the 60 responders, 33 have less addiction, 2 have moderate addiction, and one has severe addiction). This table provides information about the differences in addiction between different age groups by dividing addiction levels among age groups

Table -12: Correlation coefficients between smartphone /CHDQ /IAS

	SAS	**IAS**	**CHDQ**
SAS	**1**		
IAS	**.475****	**1**	
CHDQ	**.352****	**.318****	**1**

Correlation is significant at the 0.01 level (2-tailed)

Considering the results from both the Internet Addiction Scale and the Smartphone Addiction Scale, there appears to be a correlation ($r=.475 p<0.001$) between smartphone addiction and internet usage. Furthermore, a noteworthy substantial positive correlation ($r=.352$, $p<0.001$) appears to exist between the SAS and CHDQ scores, indicating that individuals with higher scores for smartphone addiction and

hand discomfort are also more likely to use Smartphone. IAS and CHDQ scores have a moderately positive connection (r=.318, p<0.001) between similar groups.

SUMMARY

This study uses a multistage random sample strategy to examine upper limb discomfort related to smartphone usage and internet addiction across different age groups. Ninety male and ninety female respondents, or 180 respondents in total, were chosen from various areas throughout Lucknow city. Among them were 60 young adults, or those in the 18–29 age range; 60 middle-aged people, or those in the 30-59 age range; and 60 elderly people, or those in the 60+ age range. Of the sample, 31.1% belonged to joint families and 68.9% to nuclear households. Furthermore, 48.3% of respondents were not employed, compared to 51.7% who were. Three evaluation instruments were used in the study: an original sociodemographic questionnaire including questions about age and gender, among other sociodemographic characteristics. The Chin Internet Addiction Scale (IAS), the Kwon, Kim, Cho, and Yang (2013) Smartphone Addiction Scale (SAS), the kind of household, and the employment status. The IAS evaluated withdrawal, tolerance, interpersonal relationships, health issues, and time management; in contrast, the SAS showed good internal consistency (Cronbach's alpha = 0.911).The Comprehensive Hand Discomfort Questionnaire (CHDQ), which covers pain experience, discomfort, and interference, was used to measure hand discomfort. The data was analyzed using SPSS 20.0 software, which performed t-tests, ANOVA, and correlation coefficients to look at associations and differences between SAS, IAS, and CHDQ scores. The findings showed that, across all age categories, there were substantial connections between upper limb discomfort and problematic smartphone usage and internet addiction.

The research highlights the need for specific remedies to address musculoskeletal issues resulting from overuse of technology. In this study, we found that there is no significant difference in the SAS scale scores between the first age group (18–29 years), the second age group (30–59 years), and the third age group (beyond 60 years) at either the 0.05 or 0.01 levels of significance. In indicate to the pain experienced by the various shaded areas, no significant difference was found between the scores on Area-A (p=.967), B (p =.576), C (p =.315), D (p =.171), and E (p = 472) across age groups at either the 0.05 or 0.01 level of significance; area F, on the other hand, revealed a significant difference between age groups (p = 0.001). an analysis of how results from the Smartphone Addiction Scale and Internet Addiction Scale vary by age group. There are three age groups for each of the two measures, for a total of sixty responses. The standard deviations show the range of addiction levels, while the mean score for each age group represents the average reported level of addiction. The statistical tests' significance level is indicated by the p-values when comparing addiction scores among age groups. The Smartphone Addiction Scale study reveals that, at both the 0.05 and 0.01 level of significance, there is no discernible difference in scores between age groups (p = 0.952). Likewise, the Internet Addiction Scale shows no statistically significant variation in scores between age groups, despite a p-value of 0.053. Therefore, rather than accurately reflecting differences in addiction levels, the observed fluctuation in mean scores among age groups is probably random. It suggests that those with higher rates of smartphone addiction are also more likely to have internet addictions, given the strong positive correlation seen between SAS and IAS scores. The SAS and CHDQ scores exhibited a significant moderate positive correlation, indicating that individuals with higher scores for smartphone addiction are also more likely to have hand discomfort related to smartphone use. Additionally, there appears to be a positive correlation between the IAS and CHDQ scores, indicating that people who score higher on the internet addiction scale also experience greater hand discomfort.

Conclusion:

The study examined the relationship between smartphone addiction and upper limb discomfort in Lucknow city across age groups. In total, 180 participants—180 men and 180 women—representative of the middle-aged, senior, and young adult demographics were involved. The assessment instruments employed in the study were the Smartphone Addiction Scale (SAS), Internet Addiction Scale (IAS), and Extensive Hand Discomfort Questionnaire (CHDQ). The findings demonstrated that there were significant relationships between smartphone use, internet addiction, and upper limb discomfort across all age groups. However, there was not a significant difference in the SAS scores between the age

groups. There were no statistically significant variations between age groups in the pain perception areas (A, B, C, D, and E); however, there was a significant difference in area F (the wrist), where most respondents reported hand discomfort. The study highlights the need for greater investigation into this area of study, preventative measures, and customized therapy to address musculoskeletal problems resulting from technology dependency. The Internet Addiction Scale and the Smartphone Addiction Scale tests show no statistically significant differences in addiction scores between age groups. However, the significant positive correlation between SAS and IAS scores suggests that internet addiction is more prevalent in those with greater levels of smartphone addiction. There were a significant moderate positive association found between the SAS and CHDQ scores, suggesting that people who score higher for smartphone addiction are also more likely to have hand discomfort from using their phones. Similarly, the IAS and CHDQ scores seem to positively correlate, suggesting that higher internet addiction scores are linked to greater hand discomfort.

DISCUSSION

The results of this study showed a strong relationship between the degree of smartphone influence and the participants' musculoskeletal discomfort. There was a somewhat favorable and substantial correlation ($p<0.001$) between SAS and both IAS and CHDQ. Furthermore, the highest values of Areas C and F on the CHDQ suggested increased discomfort in the thumb and wrist, while higher scores on the SAS and IAS indicated an addiction to smartphones and the Internet, respectively. According to Hakala et al.'s research, teenagers who use their phones a lot are more likely to have shoulder discomfort as well as lower back and neck problems. According to Lee et al., using a smartphone has been connected to upper-limb pain.18 However, Karthikeyan and associates came to the conclusion that although smartphone addiction could negatively affect a person's depression, it has no effect on the craniovertebral angle. The findings of this study agree with those of other studies in the same field. According to Shah and Sheth's (2018) research, students who are addicted to smart phones may experience short-term musculoskeletal issues in their hands and neck, particularly in the thumb, which could result in long-term restrictions (Ahmed et al., 2022).Addiction to Smartphone is positively and negatively correlated with musculoskeletal pain in the hands, elbows, shoulders, and neck. Upper extremity musculoskeletal problems (Sharan et al., 2014). According to Ahmed et al. (2019), 54% of students participating in physiotherapy courses reported having musculoskeletal issues in their neck, shoulder, thumb, and wrist. These findings suggest that the students are homophobic smartphone users. Long-term smartphone use may be detrimental to the hand's musculoskeletal system, according to a 2012 study by Sharan and Ajeesh. The physical risks associated with using a smartphone include flexion of the neck, abduction and flexion of the shoulder, flexion of the elbow, flexion of the wrist and fingers, and repeated thumb motions. Due to improper usage of their hand and shoulder muscles and repetitive neck bending, cell phone users may experience discomfort in their elbow, hand, shoulder, and neck. Using a smartphone for an extended amount of time can cause upper back pain. Muscle and bone discomfort in the upper limbs (Bonney & Corlett, 2002 & Sharan et al., 2014). Ahmed et al. (2021) experienced pain in the hands, shoulders, and neck; Ahmed et al. (2019) reported pain related to the musculoskeletal system in these areas.

GUIDELINES TO USE SMARTPHONES SMARTLY

Advantages of smart phones are that they may be used for a variety of things, such as increasing productivity, finding information, interacting with others, relaxing, and having fun (Deursen et al., 2015). Fortunately, a lot of people presently struggle with using their Smartphone excessively. For many, using a smartphone improperly can be hazardous. Although research has investigated the prevalence and implications of internet addiction and smartphone use, little of it has particularly investigated the extent to which hand discomfort can be attributed to these habits in an assortment of age groups. Developing focused interventions and preventive strategies to lessen the potential adverse consequences of excessive smartphone usage and internet addiction requires an understanding of the prevalence and severity of hand discomfort among different age cohorts (Yildirim et al., 2016).

Limitations:

- The respondents were selected only the Lucknow city.
- The sample size was small so we can’t generalize.

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