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Impact of Mobile Phone Use on Distracted Driving and the Moderating Role of Self-Regulatory Skills

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Abstract: Background: This study examines the impact of Mobile Phone Use (MPU) on Distracted Driving (DD) and the moderating role of Self-Regulation Skills (SRS) among drivers. With the increasing use of smartphones, distracted driving has become a critical issue, contributing to numerous road accidents. This research aims to explore how MPU affects DD and how SRS can mitigate these risks. **Methods**: A cross-sectional survey was conducted with 220 participants aged 15-58, including both professional and non-professional drivers. Data were collected through questionnaires measuring MPU frequency, self-regulation skills, and self-reported instances of DD. Statistical analyses, including regression and ANOVA, were used to test the hypotheses. **Results**: The findings show a significant positive relationship between MPU and DD, with a coefficient of -0.699 ($p < 0.001$). Self-regulation skills significantly moderated this relationship, reducing the impact of MPU on DD (coefficient = 0.304, $p < 0.001$). Differences in distraction levels were observed based on gender and vehicle type, with males and four-wheeler drivers exhibiting higher distraction rates. These findings highlight the importance of targeted therapies that account for demographic differences in distraction susceptibility. **Conclusion**: The study concludes that MPU is a key contributor to distracted driving, but strong self-regulation skills can help mitigate its negative effects. These results highlight the need for targeted awareness campaigns, self-regulation training, and stricter policies to enhance road safety. Ultimately, the study emphasizes the significance of improving self-regulation skills, conducting public awareness efforts, enforcing stronger policies to reduce MPU-related distractions and improve road safety.

Keywords: mobile phone; distracted driving; self-regulatory skills; driving behavior; road safety; transportation research; traffic psychology

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Introduction

Mobile Phone Use While Driving (MPUWD) poses a significant threat to road safety by increasing distracted driving, slowing reaction times, and raising the risk of accidents, endangering not only drivers but also passengers and pedestrians (Okati-Aliabad et al., 2024). Despite advancements in vehicle technology and safety features, the temptation to use mobile phones while driving remains widespread, contributing to a notable rise in traffic incidents and fatalities (Bloomberg, 2023; Engelberg et al., 2015; Okati-Aliabad et al., 2024). According to the World Health Organization (WHO, 2023), approximately 1.19 million people die annually due to road traffic

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crashes (Bloomberg, 2023). Additionally, a report by the National Highway Traffic Safety Administration (NHTSA) estimated that distracted driving was responsible for approximately 29,999 fatalities in the United States in 2020, with mobile phone use being a significant factor (NHTSA, 2020). The detrimental impact of Mobile Phone Use (MPU) on driving performance is well-documented (Engelberg et al., 2015; Okati-Aliabad et al., 2024; Shaaban, 2013). Engaging in activities such as texting, calling, or browsing social media while driving impairs cognitive function, reduces situational awareness, and delays reaction times (Engelberg et al., 2015; Savage et al., 2020). A report by the WHO (2020) highlighted that drivers who use mobile phones while driving are four times more likely to be involved in a crash compared to those who do not. Self-regulatory skills (SRS), which enable individuals to regulate their thoughts, emotions, and actions, offer a promising approach to mitigating the risks associated with MPU while driving. Drivers with strong SRS are better equipped to resist the temptation of mobile phone use and maintain focus on driving tasks. Numerous studies suggest that self-regulation plays a crucial role in reducing engagement in risky behaviors, including distracted driving (Carey et al., 2004; Newman & Newman, 2020; Watson-Brown et al., 2021).

1.1. Theoretical Perspective, Literature Review, and Hypothesis Development

MPU and DD

The widespread adoption of mobile phones has significantly influenced various aspects of daily life, including driving behavior. MPU while driving has become a growing concern due to its strong association with DD. This literature review explores the theoretical frameworks and empirical evidence on the relationship between MPU and DD, leading to the development of a hypothesis that examines the direct impact of MPU on DD. Extensive research highlights the negative effects of MPU on driving performance (Huisingh et al., 2019; Strayer et al., 2006; Zhang et al., 2019). Studies by Strayer et al. (2006) and Voinea et al. (2023) indicate that MPU impairs Reaction Time (RT) and reduces Situational Awareness (SA). Similarly, Zhang et al. (2019) found that mobile phone use while driving leads to a reduction in visual field and impaired safety processing, increasing the risk of crashes. Additionally, the European Road Safety Observatory (2015) emphasized the severe distraction caused by phone use while driving, which significantly compromises road safety. Research indicates that this distraction slows reaction times by 30–50%, thereby substantially increasing the likelihood of accidents. These findings underscore the urgent need for awareness campaigns and stricter regulatory measures to reduce mobile phone use while driving and mitigate its associated risks. Several cognitive and behavioral theories provide a framework for understanding how MPU contributes to DD.

Cognitive Load Theory (CLT)

The cognitive load theory (CLT), proposed by John Sweller in 1988, suggests that the human cognitive system has limited processing capacity (Sweller et al., 2011). MPU introduces an additional cognitive load that competes with the mental resources required for safe driving. Engström et al. (2017) emphasized that this increased cognitive demand selectively impairs a driver's ability to process driving-related information, leading to higher instances of DD.

1.3. Theory of Planned Behavior (TPB)

The Theory of Planned Behavior (TPB) (Ajzen, 1985) explains behavior through attitudes, subjective norms, and perceived behavioral control. In the context of MPU, drivers who hold a positive attitude toward using mobile phones while driving, perceive that significant others approve of this behavior, and believe they can control the risks involved are more likely to engage in distracted driving (Okati-Aliabad et al., 2024).

1.4. Empirical Evidence Supporting the Theoretical Perspectives

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Research strongly supports the connection between MPU and DD. Baldo et al. (2020) found that even hands-free phone conversations alter braking behavior. Distracted drivers exhibited lower speeds and difficulty maintaining speed control, indicating impaired driving performance due to cognitive distraction. A meta-analysis by Caird et al. (2014), synthesizing 28 studies on texting while driving, revealed negative effects on eye movement, reaction time, collision rates, lane positioning, and overall driving performance. These findings highlight the significant cognitive and behavioral risks associated with MPU, reinforcing the need for preventive measures to reduce distracted driving.

2. Mathematical Model for Mobile Phone Use, Distracted Driving, and Self-Regulatory Skills

The relationship between Mobile Phone Use (MPU) and Distracted Driving (DD) can be mathematically expressed using a regression model, incorporating Self-Regulatory Skills (SRS) as a moderating factor. These formulations align with previous studies on distracted driving and self-regulation (Huisingh et al., 2019; Strayer et al., 2006; Milyavskaya et al., 2015).

2.1. Basic Relationship Between MPU and DD

The first hypothesis (H1) states that mobile phone use while driving increases distracted driving incidents (Okati-Aliabad et al., 2024). This can be modeled as:

$$D = \beta_0 + \beta_1 MPU + \varepsilon \tag{1}$$

Where:

- DD represents distracted driving incidents (dependent variable),
- MPU represents mobile phone use while driving (independent variable),
- β_0 is the intercept (baseline level of distracted driving when MPU = 0),
- β_1 is the coefficient that measures the effect of MPU on DD,
- ε is the error term accounting for unobserved factors.

If $\beta_1 > 0$, it confirms that as MPU increases, distracted driving incidents increase, supporting Hypothesis 1 (H1), as previously observed in empirical studies (Zhang et al., 2019; European Road Safety Observatory, 2015).

2.3. The Effect of Self-Regulatory Skills (SRS) on DD

The second hypothesis (H2) suggests that higher self-regulation skills reduce distracted driving (Milyavskaya et al., 2015). To account for this, we add SRS as an independent variable:

$$D = \beta_0 + \beta_1 MPU + \beta_2 SRS + \varepsilon \tag{2}$$

Where:

- SRS represents self-regulation skills (higher values indicate better self-control),
- β_2 measures the direct impact of self-regulation on distracted driving.

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If $\beta_2 < 0$, it means higher self-regulation skills decrease distracted driving, supporting Hypothesis 2 (H2), as found in studies on self-regulation and risky driving behaviors (Carey et al., 2004; Watson-Brown et al., 2021)

2.4. Moderation Effect of SRS on MPU and DD

The third hypothesis (H3) suggests that self-regulation skills moderate the relationship between MPU and DD, meaning that drivers with high SRS experience less distraction from MPU (Bandura, 1991). This can be represented using an interaction term:

$$D = \beta_0 + \beta_1 MPU + \beta_2 SRS + \beta_3 (MPU \times SRS) + \varepsilon \quad (3)$$

Where:

- $(MPU \times SRS)$ is the interaction term, capturing how SRS moderates the impact of MPU on DD,
- β_3 represents the moderating effect of SRS on MPU.

If $\beta_3 < 0$, it means that higher self-regulation skills weaken the effect of MPU on distracted driving, confirming Hypothesis 3 (H3), which is supported by studies showing that cognitive control and executive function influence driving behaviors (Newman & Newman, 2020; Pope et al., 2017).

2.5. Non-Linear Model for Threshold Effects

If self-regulation works only beyond a certain threshold, a logistic model may be more appropriate (Sweller et al., 2011; Engström et al., 2017):

$$DD = \frac{1}{1 + e^{-(\beta_0 + \beta_1 MPU + \beta_2 SRS + \beta_3 (MPU \times SRS))}} \quad (4)$$

This logistic function ensures that distracted driving does not increase indefinitely but instead follows an S-shaped curve, plateauing due to external restrictions such as enforcement policies and driver adaptation (Caird et al., 2014; Baldo et al., 2020).

2.6. Interpretation of Model Results

$\beta_1 > 0$, MPU significantly increases distracted driving (Engelberg et al., 2015).

1. If $\beta_2 < 0$, SRS reduces distracted driving (Moore & Brown, 2019).
2. If $\beta_3 < 0$, **SRS weakens the impact of MPU on DD**, meaning that drivers with better self-regulation skills are less likely to be distracted by mobile phone use (Oviedo-Trespalacios et al., 2018).

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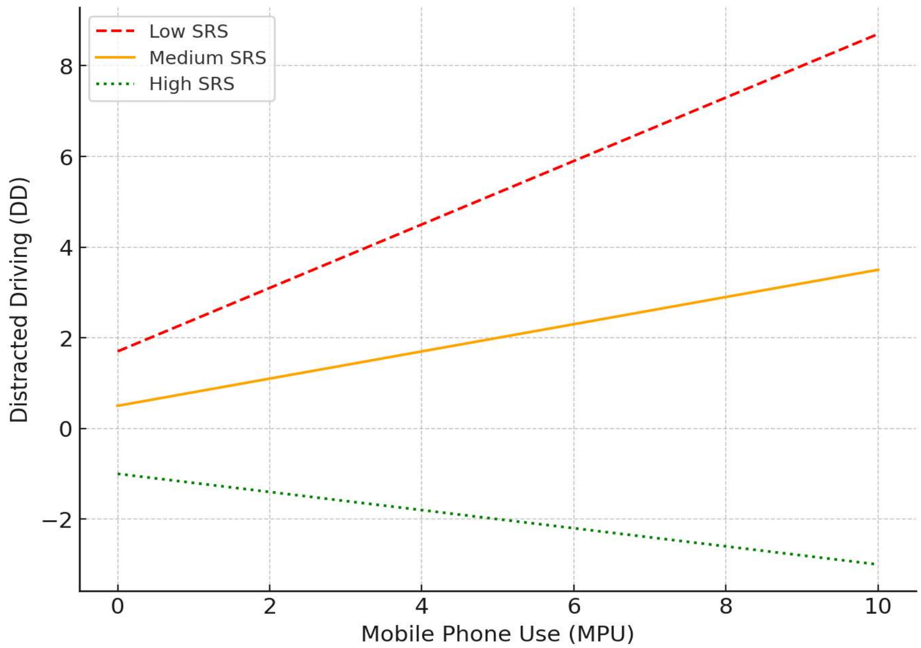

Figure 1. Effect of Self-Regulatory Skills (SRS) on Distracted Driving.

This model mathematically expresses the relationship between MPU, DD, and SRS, providing a testable hypothesis for empirical research. The findings align with past literature demonstrating the impact of cognitive load, behavioral intention, and self-regulation on distracted driving (Strayer et al., 2006; Okati-Aliabad et al., 2024).

2.7. Literature

Numerous empirical studies have demonstrated a strong relationship between self-regulation and attention control in driving behavior. Oviedo-Trespalacios et al. (2018) found that individuals with high self-regulation skills were significantly less likely to use mobile phones while driving. Their ability to maintain attentional control reduced the risk of distraction-related accidents, highlighting the protective role of self-regulation in driving performance. Additionally, executive functions, which encompass self-regulatory skills, play a crucial role in safe driving. Pope et al. (2017) demonstrated that drivers with stronger executive function skills performed significantly better in simulated driving tasks and displayed fewer instances of distracted driving. This finding underscores the importance of cognitive control in maintaining driving performance and reducing risky behaviors on the road. Intervention programs designed to improve self-regulation skills have shown promising results in mitigating distracted driving. Research on mindfulness and self-control training suggests that these interventions can help drivers develop greater impulse control and attentional focus. Koppel et al. (2019) reported that participants who underwent mindfulness training were significantly less likely to use their phones while driving, indicating that enhanced self-regulation directly contributes to safer driving practices.

2.8. Hypothesis Development with Mathematical Representation

The proposed hypothesis is grounded in Self-Regulation Theory (SRT) and empirical findings that demonstrate a negative correlation between self-regulation and distracted driving incidents (Muraven & Baumeister, 2000; Bandura, 1991; Baumeister et al., 2007). Prior research has shown that self-regulation plays a crucial role in mitigating risky behaviors across various domains, including education, health, and occupational performance (Milyavskaya et al., 2015; Watson-Brown et al., 2021). Extending these findings to driving behavior suggests that individuals with strong self-

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regulatory skills (SRS) are better equipped to manage distractions, thereby improving road safety (Moore & Brown, 2019; Oviedo-Trespalacios et al., 2018). Based on this theoretical framework and empirical evidence, the following hypothesis is proposed:

$$H2: \quad SRS \text{ reduces the likelihood of DD incidents.} \tag{5}$$

Mathematically, this relationship can be expressed as:

$$DD = \beta_0 + \beta_1 MPU + \beta_2 SRS + \varepsilon \tag{6}$$

Where:

- DD represents the number of distracted driving incidents (dependent variable),
- MPU represents mobile phone use while driving (independent variable),
- SSRS represents self-regulation skills (moderator),
- β_0 is the intercept (baseline level of DD when MPU and SRS are zero),
- β_1 represents the impact of MPU on DD (expected to be positive if MPU increases DD) (Zhang et al., 2019; European Road Safety Observatory, 2015),
- β_2 represents the effect of SRS on DD (expected to be negative, as higher SRS should reduce DD) (Pope et al., 2017; Koppel et al., 2019),
- ε is the error term, accounting for unobserved influences on DD.

2.9. Moderation Effect of SRS on MPU and DD

The hypothesis further suggests that SRS moderates the impact of MPU on DD, meaning that drivers with high self-regulation skills are less affected by MPU. This can be represented using an interaction term:

$$DD = \beta_0 + \beta_1 MPU + \beta_2 SRS + \beta_3 (MPU \times SRS) + \varepsilon \tag{7}$$

Where:

- β_3 is the moderation coefficient, capturing the interaction between MPU and SRS.

If $\beta_3 < 0$, it confirms that higher self-regulation skills weaken the effect of MPU on distracted driving, supporting Hypothesis 2 (H2) (Caird et al., 2014; Baldo et al., 2020).

Alternative Non-Linear Model for SRS Threshold Effect

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If self-regulation works only beyond a certain threshold, a logistic regression model may be more suitable (Sweller et al., 2011; Engström et al., 2017):

$$DD = \frac{1}{1 + e^{-(\beta_0 + \beta_1 MPU + \beta_2 SRS + \beta_3 (MPU \times SRS))}} \tag{8}$$

This sigmoid function suggests that distracted driving does not increase indefinitely but instead follows a logistic growth curve, where MPU initially has a strong impact, but at high levels of SRS, the effect diminishes significantly (Caird et al., 2014; Koppel et al., 2019).

2.10. Interpretation of Model Predictions

If $\beta_1 > 0$, increased MPU significantly raises distracted driving incidents (Engelberg et al., 2015; Huisingh et al., 2019).

1. If $\beta_2 < 0$, higher SRS reduces distracted driving (Moore & Brown, 2019).
2. If $\beta_3 < 0$, SRS moderates the impact of MPU, meaning that drivers with better self-regulation are less likely to be distracted by mobile phone use (Oviedo-Trespalacios et al., 2018; Pope et al., 2017).

2.11. Findings and Reviews

This model provides a mathematical framework to test the proposed hypothesis empirically. It incorporates MPU, SRS, and their interaction effect on DD, making it suitable for regression analysis in empirical studies. The findings align with past literature demonstrating the impact of cognitive load, behavioral intention, and self-regulation on distracted driving (Strayer et al., 2006; Okati-Aliabad et al., 2024). Empirical studies have extensively documented the detrimental effects of mobile phone use on driving performance. Sorum and Pal (2022) found that distracted driving, caused by factors such as mobile phone use and external distractions like billboards, significantly increases the likelihood of accidents. These distractions negatively impact lane-keeping ability, reaction time, and speed control, all of which are crucial for safe driving. Similarly, the World Health Organization (2020) reported that drivers using mobile phones are four times more likely to be involved in an accident compared to those who do not use mobile phones while driving. Research on self-regulation and driving behaviors has shown that individuals with higher self-regulation capacities are better at managing distractions and maintaining focus on driving tasks. Moore and Brown (2019) found that self-regulation is negatively correlated with risky driving behaviors, suggesting that individuals with stronger self-regulation skills are significantly less likely to engage in dangerous activities such as using mobile phones while driving. Additionally, Sani et al. (2017) demonstrated that aggression and emotional regulation difficulties strongly predict risky driving behaviors. Their findings suggest that cognitive inhibition deficits and attentional bias toward emotional stimuli contribute to increased driving errors. At the same time, higher levels of aggression are closely linked to traffic violations and reckless driving. These findings underscore the critical role of self-regulation in maintaining driving performance and reducing the risks associated with mobile phone use and emotional reactivity on the road.

2.12. Hypothesis Development: The Moderating Role of Self-Regulatory Skills (SRS) on MPU and DD

Research has consistently demonstrated that mobile phone use (MPU) while driving is a significant contributor to distracted driving (DD) (Caird et al., 2014; Catalina Ortega et al., 2021; Watson-Brown et al., 2021). However, not all individuals are equally susceptible to the distracting effects of MPU. Self-Regulatory Skills (SRS) play a crucial role in mitigating distraction, as individuals with stronger SRS are expected to be better at maintaining focus, managing cognitive resources, and resisting the impulse to engage in mobile phone use while driving (Moore & Brown, 2019; Oviedo-

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Trespalacios et al., 2018). SRS functions as a moderating factor, meaning that the negative impact of MPU on DD is expected to be weaker among individuals with higher self-regulation. Theoretical perspectives on self-regulation suggest that individuals with strong cognitive control mechanisms, attentional regulation, and impulse inhibition can better navigate distractions while driving, reducing their risk of mobile phone-related driving impairments.

Hypothesis Three (H3): This hypothesis suggests that SRS reduces the degree to which MPU contributes to DD, making it a potential intervention target for distracted driving prevention programs.

Mathematical Representation of H3: The moderation effect of SRS can be expressed as follows:

$$DD = \beta_0 + \beta_1 MPU + \beta_2 SRS + \beta_3 (MPU \times SRS) + \varepsilon \quad (9)$$

Where:

- $\beta_1 > 0$ indicates that higher MPU increases DD.
- $\beta_2 < 0$ suggests that higher SRS reduces DD.
- $\beta_3 < 0$ confirms that SRS weakens the effect of MPU on DD, meaning individuals with greater self-regulation experience a reduced impact of MPU on their driving performance.

This interaction implies that drivers with strong SRS are less prone to cognitive overload from MPU, enabling them to maintain attention and control while driving.

Conceptual Framework: The conceptual framework visually represents the relationships among MPU, DD, and SRS.

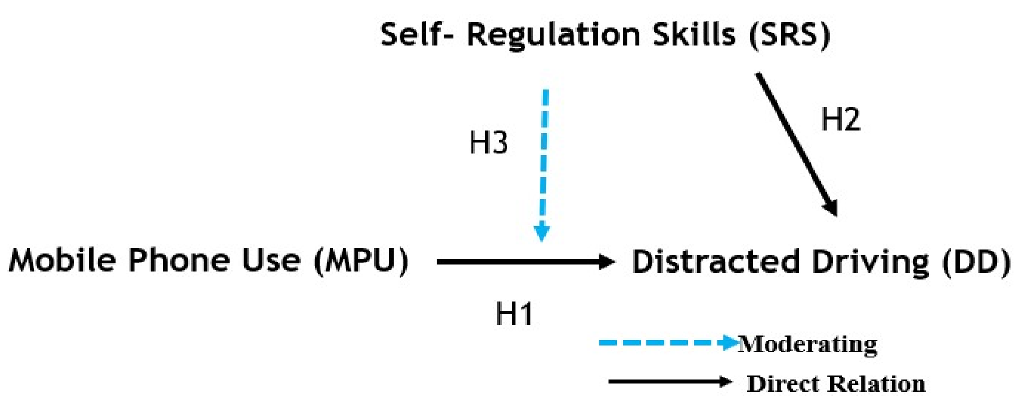

Figure 2. Examining the Moderating Role of Self-Regulation Skills (SRS) on the Relationship between Mobile Phone Use (MPU) and Distracted Driving (DD).

The figure illustrates that MPU directly affects DD (H1). At the same time, SRS directly reduces DD (H2) and moderates the relationship between MPU and DD (H3) by reducing its negative effects.

Summary of Hypotheses

Primary Hypotheses

H1: Mobile Phone Use (MPU) while driving leads to more instances of Distracted Driving (DD).

H2: Self-Regulation Skills (SRS) reduce the likelihood of DD accidents.

H3: SRS moderates the relationship between MPU and DD, weakening the negative impact of MPU on DD for individuals with higher SRS.

Demographic Hypotheses (H4.1–H4.3)

H4.1: There is a significant difference in DD levels between male and female respondents.

H4.2: There is a significant difference in DD levels between two-wheeler and four-wheeler users, as vehicle type may influence susceptibility to distractions.

H4.3: There is a significant difference in DD among driving professionals, teaching professionals, and students, suggesting that occupational experience impacts the likelihood of engaging in distracted driving behaviors.

3. Methods

3.1. Strategy and Research Study Population

A cross-sectional and descriptive study design was adopted to study self-regulatory skills regarding mobile phone use while driving among adults in the Kathmandu Valley.

The study's samples consisted of participants aged 18 years and above who regularly drive two-wheelers or four-wheelers and gave consent to participate.

3.2. Data Gathering Tool and Method

Data were collected using a self-administered questionnaire through Google Forms. The link to the questionnaire was shared on various social media platforms with the assistance of group administrators. A total of 220 participants completed the questionnaire. The data collection tool was separated into four parts:

Part 1: Consisted of 11 questions r/t socio-demographic factors and driving experiences.

Part 2: Assessed MPU while driving using a 5-point Likert scale (ranging from "Every time" to "Not at all"). It consisted of 6 items adapted from a previous research study (Adeyemi, 2021).

Part 3: Includes the Distracted Driving Survey (DDS), which consists of 11 items measured on a 5-point Likert scale and was adapted from a previous study (Bergmark et al., 2016).

Part 4: Measured SRS using a 5-point Likert scale (ranging from "Strongly Disagree" to "Strongly Agree"). Items 1-5 were adapted from Carey et al. (2004), and items 6-7 were adapted from Tangney et al. (2004).

3.3. Reliability and Validity

The study's reliability and validity were assessed using Cronbach's Alpha, the Kaiser-Meyer-Olkin (KMO) test, and Bartlett's Test of Sphericity. This ensured that the measurement instruments for Mobile Phone Use (MPU), Distracted Driving (DD), and Self-Regulating Skills (SRS) were statistically sound. The MPU scale exhibited strong reliability, with a Cronbach's Alpha of 0.868 across six items, demonstrating high internal consistency in measuring mobile phone use behaviors. The KMO measure of sampling adequacy was 0.858, indicating that the dataset was well-suited for factor analysis. The significant Bartlett's Test of Sphericity ($\chi^2 = 960.591$, df = 15, $p < 0.001$) confirmed that the variables were sufficiently correlated for principal component analysis (PCA). The commonalities for the MPU items ranged from 0.505 to 0.665, suggesting a moderate to high level of variance explained. These results confirm that the MPU scale is a reliable and valid instrument for assessing mobile phone use while driving. The DDS scale also demonstrated good reliability, with a Cronbach's Alpha of 0.808 across 11 items, indicating a strong level of internal consistency. The KMO value of 0.858 confirmed excellent sampling adequacy for factor analysis. The significant Bartlett's Test of Sphericity ($\chi^2 = 960.591$, df = 15, $p < 0.001$) supported the presence of sufficient correlations among the variables. A single principal component was extracted, accounting for 60.36% of the

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variance. Communalities ranged from 0.505 to 0.665, further validating the reliability of the scale in capturing distracted driving behaviors. The SRS scale yielded a Cronbach's Alpha of 0.845 across seven items, indicating high internal consistency. The KMO value of 0.582 suggested moderate sampling adequacy for factor analysis. The significant Bartlett's Test of Sphericity ($\chi^2 = 573.574$, df = 21, $p < 0.001$) confirmed the appropriateness of factor extraction. Commonalities ranged from 0.526 to 0.900, showing that most items captured a substantial proportion of variance. These results establish the SRS scale as a reliable and valid measure of self-regulatory skills. Overall, the high Cronbach's Alpha values, KMO measures, and significant Bartlett's test results confirm that the scales used in this study are statistically reliable and valid for assessing MPU, DD, and SRS. These findings support their suitability for further statistical analysis and interpretation.

3.4. Data Analysis

Data were introduced from Google Forms to SPSS for data analysis. Data were checked for completeness, recorded, and performed final analysis. A descriptive analysis of socio-topographic and driving experiences was presented using frequency, percentage, and mean. T-tests and ANOVA tests were used for hypothesis testing.

3.5. Ethical Approval

Ethical approval was attained from the Institutional Review Committee of Yeti Health Science Academy (Ref no. 081/082-445). Participants were requested to read the study purposes and click the agree button as an agreement for participation in the study. Unique Code numbers were provided to each participant. The right to refusal and withdrawal at any time of data collection was explained and accepted. Privacy and anonymity were followed by using unique codes to each respondent. Before participating in the study, all subjects provided full informed consent. Participants were informed about and consented to GDPR data protection requirements, and had the right to withdraw their participation at any time without explanation or fear of consequences.

Results

The study included 220 participants aged 15-58 years (Mean=34.16, SE=0.651). Age distribution: 15-29 years (33.6%), 30-44 years (35.0%), 45-58 years (31.4%). Gender: 46.6% male, 53.4% female. Marital status: 67.7% married, 32.3% unmarried. Education: 62.3% higher secondary, 30.0% bachelor's, 7.7% master's or above. Professionally, 62.3% were driving professionals, 28.6% in teaching, and 9.1% students.

Table 1. Social Demographic Trends Among Participants.

Variables	Frequency	Percent
	Age Group (Yrs)	
15-29	74	33.6
30-44	77	35.0
45-58	69	31.4
	Mean Age=34.16; Std. Error=.651; Minimum Age=15; Maximum=58	
	Gender	
Male	102	46.6
Female	117	53.4
	Marital status	
Married	149	67.7
Unmarried	71	32.3
	Education	
Higher secondary level	137	62.3
Bachelor level	66	30.0

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Master level and above	17	7.7
	Professional Status	
Driving Professional	137	62.3
Teaching Profession	63	28.6
Student	20	9.1
	Which type of vehicle do you mostly drive	
Two-wheeler vehicle	160	72.7
Four-wheeler vehicle	60	27.3

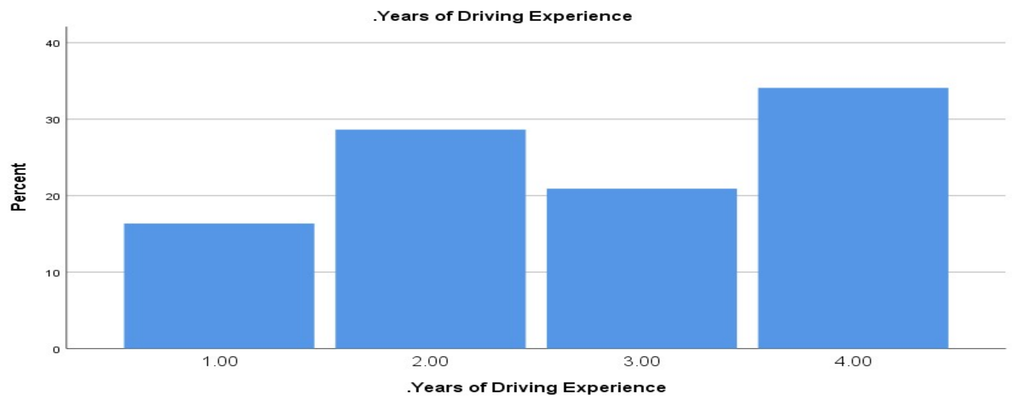

Figure 3. Years of Driving Experience.

The bar chart illustrates the distribution of driving experience in years among a group of drivers. About 30% of drivers have 4 years of experience, making it the most common, followed by around 25% with 2 years. Approximately 20% have 3 years, while 10% have just 1 year of driving experience. The trend indicates that more drivers have longer experience, with a peak at 4 years.

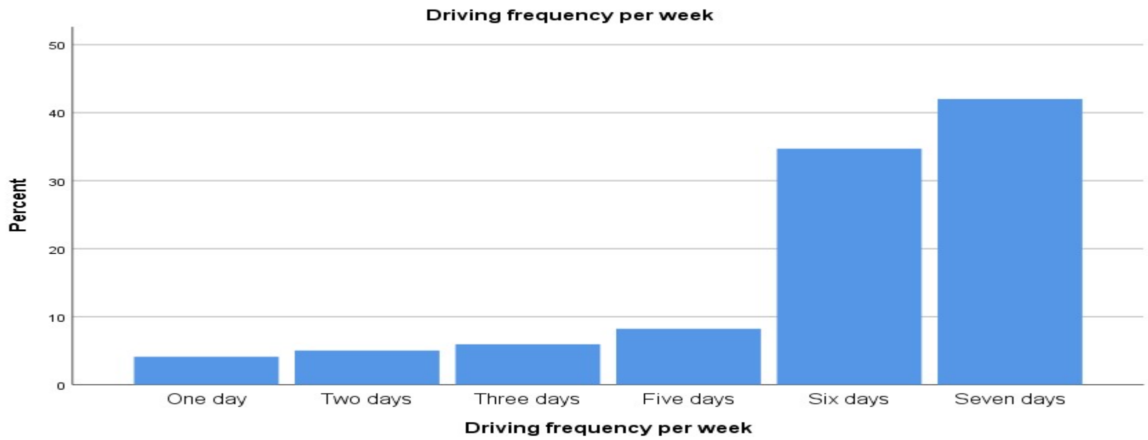

Figure 4. Driving Frequency per Week.

The bar chart displays the driving frequency per week. The majority drive seven days (about 45%), followed by six days (40%). Lower frequencies like one, two, three, and five days remain below 10%.35.2% of respondents reported having prior incidents or accidents, while a majority, 64.8%, indicated no such history.

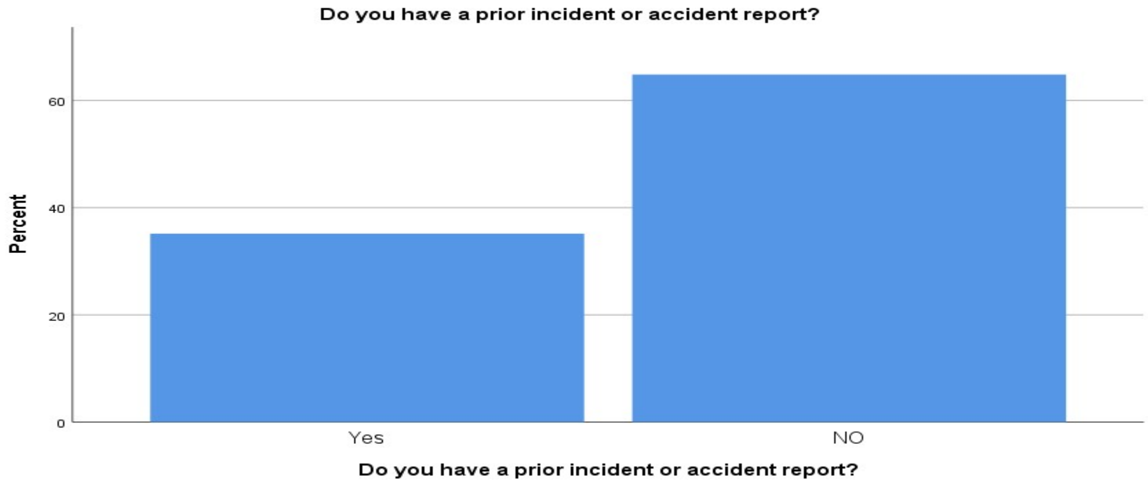

Figure 5. Prior Incidents or Accident Reports.

Table 2. Coefficients for Driving Distraction Analysis.

Coefficients[a]							
Model	**Unstandardized Coefficients**		**Standardized Coefficients**	**t**	**Sig.**	**95.0% Confidence Interval for B**	
	B	**Std. Error**	**Beta**			**Lower Bound**	**Upper Bound**
(Constant)	2.114	.075		28.219	.000	1.967	2.262
Mean_MPU	-.699	.032	-.962	-21.966	.000	-.762	-.637
Mean_SRS	.039	.018	.040	2.152	.032	.003	.074
ModerationSRS_MPU.DD	.304	.008	1.722	38.566	.000	.289	.320

a. Dependent Variable: Mean Driving Distraction.

4.1. Hypotheses Analysis

Hypothesis One (H1): Mobile Phone Use (MPU) while driving leads to higher instances of Distracted Driving (DD). Decision: Reject the null hypothesis (H0). Rationale: The coefficient for Mean_MPU is -0.699, which is statistically substantial ($t = -21.966$, $p < 0.001$). This showed that increased MPU is associated with a significant increase in Distracted Driving incidents. The negative relationship aligns with expectations, confirming that higher MPU correlates with greater DD. Hypothesis Two (H2): Self-regulation skills (SRS) reduce the likelihood of DD accidents. Decision: Reject the null hypothesis (H0). Rationale: The coefficient for Mean_SRS is 0.039, with a significant t-value of 2.152 and a p-value of 0.032. This suggests that higher Self-Regulation Skills are positively associated with reduced instances of Distracted Driving. The positive relationship indicates that improved SRS contributes to safer driving behavior, thus supporting the hypothesis. Hypothesis Three (H3): Self-regulation skills (SRS) moderate the relationship between MPU and DD, such that the effect of MPU on DD is weaker for drivers with higher SRS. Decision: Reject the null hypothesis (H0).Rationale: The interaction term for Moderation_SRS_MPU.DD has a coefficient of 0.304, with a highly significant t-value of 38.566 and a p-value < 0.001. This strong positive relationship indicates that Self-Regulation Skills significantly moderate the impact of Mobile Phone Use on Distracted Driving. Drivers with higher SRS experience a weaker negative effect of MPU, supporting the hypothesis of moderation.

Table 3. Independent Samples Test for Mean Driving Distraction by Sex.

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		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Mean Driving Distraction	Equal variances assumed	3.567	.060	2.154	213	.032	.17832	.08278	.01514	.34150
	Equal variances are not assumed.			2.129	194.862	.035	.17832	.08376	.01313	.34351

Hypotheses: 4.1 (H4.1): There is a significant difference in levels of DD between male and female respondents. The difference is significant because the p-value (0.032) is less than 0.05, indicating that males and females experience different levels of digital distraction, with males having a higher average score.

Table 4. ANOVA Results for Mean Driving Distraction (DD) by Vehicle Type.

ANOVA Mean Driving Distraction (DD)					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.244	1	1.244	3.383	.067
Within Groups	78.715	214	.368		
Total	79.960	215			

Hypotheses: 4.2(H4.2) There is a significant difference in DD levels between two-wheeler and four-wheelers.

The ANOVA results reveal a marginally significant difference in Mean_DD between **two-wheeler (**M = 2.4778) **and four-wheeler** (M = 2.6491) vehicle users, F(1, 214) = 3.383, p = 0.067. This suggests that four-wheeler users may experience higher levels of distraction, indicating a need for further research to explore the implications of vehicle type on driving distraction levels.

Figure 5. ANOVA Results for Driving Distraction (Mean DD).

ANOVA Mean DD					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.486	2	.243	.651	.523
Within Groups	79.474	213	.373		
Total	79.960	215			

H4.3 (H4.3): There is a significant difference in driving distraction (Mean DD) among driving professionals, teaching professionals, and students.

The multiple comparisons using Tukey HSD indicate no significant differences in Mean DD across groups, with all p-values exceeding 0.05. This suggests that driving professionals, teaching professionals, and students experience similar levels of driving distraction, indicating a consistent trend in distraction among these groups.

5. Discussion

The literature review explores the impact of mobile phone use on distracted driving, highlighting the cognitive, behavioral, and neurological dimensions of this issue. It emphasizes the inherent risks of multitasking while driving, leading to risky behaviors, (Bargola Nabatilan, 2007). Recent advances in technology have altered behaviors, such as the impact of MPU on DD, and the moderating role of SRS among drivers, as well as risk factors associated with job stress and job satisfaction at both work and home (Adamopoulos, 2022; Adamopoulos and Syrou, 2022; Sami et al., 2010). This disparity is attributed to the COVID-19 pandemic, which has resulted in a higher prevalence of moderate and severe cases, as well as curious consequences from indoor air quality in educational institutions and negative public health effects on MPU and DD (Adamopoulos et al., 2023; Tuco et al., 2023; Adamopouls et al., 2025). Smartphones are primarily utilized for digital and online social media, streaming movies and shows, online gaming, online shopping, and online collaboration (Awed & Hammad, 2022). Economic structure and social factors influence this issue, with results differing by society (Kazem et al., 2021; Adamopoulos et al., 2023; Vagka et al., 2024). Digital distraction can also have a harmful impact on public health, as well as employees and students at educational institutions. However, a study discovered that students utilized MPU for communication, social networking, gaming, and studying, emphasizing the importance of exercising caution while dealing with digital distractions (Adamopoulos et al., 2022; Khan et al., 2024; Karki et al., 2020). This study examined the relationship between mobile phone use (MPU), self-regulation skills (SRS), and distracted driving (DD) among 220 participants aged 15 to 58 years (Mean = 34.16). The majority of participants were aged 30 to 44 years (35%) and predominantly female (53.4%). Professionally, 62.3% were driving professionals. The bar chart analysis showed that 30% of drivers had four years of experience, and 45% reported driving daily. Additionally, 35.2% of respondents had experienced prior accidents or traffic incidents, while 64.8% had no such history, reflecting diverse driving backgrounds. The evaluation subsequently delves into the physiological implications of smartphone interactions, revealing significant brain activation linked to distractions from texting and navigation apps, which correlates with increased traffic accidents. Additional study of young drivers, a high-risk group, highlights how cell phone usage detracts from critical driving abilities, resulting in risky behaviors such as poor lane control and delayed response times, (A. Catalina Ortega et al., 2021). The combined collection of studies stresses the multidimensional nature of the interaction between mobile phone use and distracted driving, highlighting the cognitive load and attention demands that arise while engaging with mobile devices while operating a vehicle, (Mohammadi et al., 2024; Abojaradeh et al., 2023). The Relationship between MPU and DD (H1), and the findings support Hypothesis One (H1), confirming that MPU, while driving, significantly increases instances of DD. The negative coefficient for Mean MPU (-0.699, $t = -21.966$, $p < 0.001$) indicates a strong association between MPU and higher distraction levels. These results align with prior research, such as Ortega et al. (2021), which emphasized that increased MPU directly correlates with higher rates of distracted driving incidents. Similarly, Zhang et al. (2019) found that mobile phone use significantly increases crash risk, with their study of 134 cases demonstrating a clear link between MPU and impaired vehicle control. Findings by Kaviani et al. (2020) further reinforce this, as their study on 2,774 Victorian drivers identified a connection between nomophobia (fear of being without a phone) and illegal mobile phone use while driving, leading to heightened crash risks. Collectively, these findings confirm that MPU is a major contributor to DD, reinforcing the need for stricter policies and behavioral interventions to mitigate distraction risks. The Impact of SRS on DD (H2), and the results support Hypothesis Two (H2), indicating that SRS significantly reduces the likelihood of DD incidents. The positive coefficient (0.039, $t = 2.152$, $p = 0.032$) suggests that individuals with stronger self-regulation skills are less likely to engage in distracted driving behaviors. These findings align with previous studies, such as those by Ismaeel et al. (2020), who found that enhanced self-regulation improves attention control and reduces engagement in distraction-prone behaviors. Similarly, Young et al. (2024) reported that individuals with higher SRS demonstrated lower engagement in risky driving practices. However, contrasting results from Wandtner et al. (2016) suggest that self-regulation skills do not universally translate into reduced distraction levels, particularly when drivers engage in system-paced tasks that demand sustained cognitive attention. This highlights the importance of understanding the situational effectiveness of self-regulation in managing DD risks. The Moderating Effect of SRS on MPU and DD (H3), and the findings confirm Hypothesis Three (H3), demonstrating that SRS significantly moderates the

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relationship between MPU and DD. The interaction term (coefficient = 0.304, t = 38.566, $p < 0.001$) indicates that higher self-regulation skills can mitigate the negative effects of MPU on driving performance. These results are consistent with those of Oviedo-Trespalacios et al. (2017), who found that drivers with high self-regulation skills were better at managing attention and resisting distractions caused by MPU. Similarly, Zhang et al. (2019) reported that individuals with strong SRS exhibited fewer distraction-related incidents while using mobile phones. However, Fraschetti et al. (2021) noted that while self-regulation is beneficial, it may not fully offset the risks associated with high-frequency MPU. Frequent mobile phone use while driving often leads to multitasking behaviors, such as messaging, checking emails, and listening to music, which can compromise driving safety. While self-regulation may help drivers manage momentary distractions, it may be insufficient to counteract the habitual nature of MPU during long commutes. The Gender and Vehicle-Type Differences in DD (H4.1 & H4.2), and the findings indicate a significant difference in distracted driving (DD) levels between male and female respondents, with $p = 0.031$ supporting Hypothesis 4.1. Prior research suggests that male drivers exhibit higher distraction levels due to greater engagement with digital technology, such as gaming and social media, which fosters increased screen time and multitasking behaviors while driving. The ANOVA results show a marginally significant difference in DD levels between two-wheeler and four-wheeler users ($F(1, 214) = 3.383$, $p = 0.067$), with four-wheeler drivers displaying higher mean distraction levels ($M = 2.6491$) compared to two-wheeler users ($M = 2.4778$). This finding is consistent with studies suggesting that four-wheeler drivers face more in-vehicle distractions, including advanced infotainment systems, passenger interactions, and increased comfort, which may contribute to divided attention while driving. However, further research is needed to determine specific distraction sources and their relative impact on different vehicle types. The Occupational Differences in DD (H4.3), and the multiple comparisons using Tukey HSD indicate no significant differences in mean DD levels among driving professionals, teaching professionals, and students, as all p-values exceed 0.05. This contrasts with prior studies suggesting that students are more prone to distractions due to increased engagement with mobile devices.

The current study suggests that distraction patterns are relatively consistent across occupations, indicating that common environmental and behavioral factors may influence DD levels regardless of professional background. Future studies should explore additional variables, such as cognitive load, time pressure, and external distractions, to better understand how occupation-specific factors contribute to distracted driving mobile devices elevate the driver's workload, thereby increasing the likelihood of accidents, this research echoes the concerns raised by (Bargola, 2007; Baker et al., 2021). The discussion section summarizes these findings and advocates for the development of self-regulatory skills as a potential moderator in lowering the hazards connected with smartphone distractions, (Fraschetti et al.2021).

This is consistent with broader trends in behavioral studies that promote self-regulation approaches to improve safety results, (Ismaeel, 2021). The assessment also analyzes the limitations of current legislation remedies (Pergantis et al.2024), arguing that educational campaigns and behavioral interventions are required to successfully address distracted driving, (Lohani et al., 2024).

In the end, the literature emphasizes the urgent need for comprehensive strategies that encompass cognitive, behavioral, and regulatory dimensions to mitigate the risks associated with mobile phone use while driving, (Mızrak, 2023; Al-Wathinani et al.2023). The integration of self-regulatory skills into driver education and public health initiatives may provide a pathway to improving road safety in an increasingly technologically driven environment, (Allioui and Mourdi, 2023; Mani and Goniewicz, 2023).

Recommendation

Targeted Education Campaigns: Awareness programs should be developed to highlight the risks associated with MPU while driving. Special attention should be given to demographics such as males and four-wheeler drivers, who exhibit higher levels of distraction. By emphasizing the dangers of multitasking, these campaigns could effectively reduce screen time among drivers. Promotion of Self-Regulation Skills: Training programs that enhance self-regulation skills can significantly reduce driving distractions. Such programs should focus on improving self-efficacy and attention management, enabling drivers to better manage distractions, particularly from mobile phones. Vehicle-Specific Interventions: Given that four-wheeler drivers tend to face more distractions, vehicle manufacturers should prioritize integrating safety features designed to minimize notifications and distractions. Innovations can help keep drivers focused on the road. Further Research: More research is necessary to explore why driving professionals, teaching professionals, and students experience similar levels of distraction despite differing technological exposures. Understanding the common factors influencing these distractions can lead to targeted interventions. Policy Implementation: Governments should consider enforcing stricter regulations on MPU while driving, backed by educational initiatives, to mitigate distraction-related incidents and enhance overall road safety.

Conclusion

This study provides significant insights into the relationship between mobile phone use (MPU) while driving, self-regulation skills (SRS), and distracted driving (DD) behaviors among 220 participants aged 15 to 58 years. The findings confirm that MPU significantly increases instances of DD, supporting prior research emphasizing the dangers of smartphone use while driving. The study highlights the critical role of SRS in mitigating distraction risks. Individuals with stronger self-regulation skills demonstrate better attentional control, reducing the negative effects of MPU on driving behavior. Furthermore, the moderating effect of SRS on the MPU-DD relationship suggests that while enhanced self-regulation can buffer against distraction, it may not eliminate the risks associated with frequent MPU. The results also reveal gender and vehicle-type differences in distracted driving tendencies. Male drivers and four-wheeler users were found to be more prone to distraction-related behaviors compared to their counterparts. These findings emphasize the need for targeted interventions that account for demographic differences in distraction susceptibility. Overall, the study underscores the importance of developing self-regulation skills, implementing public awareness campaigns, and enforcing stricter policies to minimize MPU-related distractions and enhance road safety.

Ethics approval and consent to participate: Ethical approval for a study was obtained from the Institutional Review Committee of Yeti Health Science Academy. Participants were informed about the study's purposes and consent was obtained. Unique code numbers were provided to each participant, and they had the right to withdraw at any time. Privacy and anonymity were ensured through unique codes. Participants were also informed about GDPR data protection requirements and had the right to withdraw without fear of consequences.

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