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Psychological and Demographic Predictors of Cellular Phone Use of College Students

The present study examined psychological and demographic predictors of cellular phone use of college students. The participants were 158 undergraduate students enrolled at a public university in the Southeastern United States. Each participant reported demographic information and completed the Coopersmith Self-Esteem Inventory, the Trait Scale of the State-Trait Anxiety Inventory, and the Cellular Telephone Inventory. Participants' responses to the Cellular Telephone Inventory produced four measures of cellular phone use: daily phone use in minutes, instrumental use, emotional/social use, and problematic use. Multiple regression analyses were used to determine the degree to which a set of six predictor variables (self-esteem, trait anxiety, gender, age, class rank, and mileage from hometown) predicted each of the cellular phone use measures. The predictor variables accounted for 6% of the variance in daily phone use scores, 12% of the variance in the instrumental use scores, 26% of the variance in the emotional/social use scores, and 8% of the variance in the problematic use scores. The psychological variables of self-esteem and trait anxiety did not make a significant contribution to the prediction of any of the four cellular use measures; however, several demographic variables were significant predictors. Suggestions for future research on cellular phone use in the college population are discussed.

The increasing popularity of cellular phones is a global phenomenon. Statistics gathered on worldwide cellular phone use revealed more than a billion users in 2001 (Wei & Lo, 2006), with that number having doubled by 2006 (Leo, 2006). Globally, the number of cellular phone plan subscribers has surpassed land-line subscribers (Srivastava, 2005), and in the United States over 66% of households have at least one cellular phone (Wei & Lo, 2006). Studies examining the demographic

characteristics of cellular phone users have indicated that women are using cellular phones more extensively than men (Srivastava, 2005; Wei & Lo, 2006) and young people are especially drawn to cellular phones (Aoki & Downes, 2003; Srivastava, 2005).

College students, in particular, are avid users of cellular phone technology. Cellular phones have become an important accessory for these young adults, and many students carry their phones with them all the time. Aoki and Downes

(2003) conducted focus group interviews and used a self-report questionnaire to examine college students' motives for using cellular phones. While many students originally purchased their phones for safety/security reasons and cost economy for long-distance communication, using the phones to stay in touch with family and friends became increasingly important. Cellular phones were also viewed as a tool to enhance time management and to maintain a social image among peers. Additionally, the researchers reported that dependency on cellular phones increased the longer the student owned the phone, the more calls the student had received, and the stronger the student's belief that a cellular phone is a modern necessity.

The cellular phone has been found to play an important role in establishing social identity and status in youth (Srivastava, 2005). Cellular phone marketing capitalizes on this function by offering a vast array of accessories to personalize one's phone including screen wallpapers, popular ring tones, and colorful phone covers. Srivastava (2005) made the following observation regarding the social impact of cellular phones:

...the personalization of the telephone is now essential to individual identity, particularly among the youth. Many young people show off their mobile phones to each other. The ringing tones they use and the number and quality of messages stored on their mobile phones enhances their social status. (p. 115)

While carrying a pager was a symbol of "being cool" and afforded social status to college students in the 1990s (Leung & Wei, 1998), current university trendsetters carry a cutting edge cellular phone.

Cellular phone ownership can be advantageous for students for a variety of social and task-related purposes. However, cellular phone usage may become problematic when the phones are used in inappropriate settings. Researchers report that overhearing a one-sided cellular phone conversation in a public setting is

more aversive than listening to a normal two-way interaction (Monk, Fellas, & Ley, 2004). A more dangerous situation is the use of cellular phones while driving. Seo and Torabi (2004) administered a questionnaire to a large sample of college students to assess the extent of cellular phone use while operating a vehicle. Their results indicated that 86% of cellular phone owners reported talking on their phones while driving, with more female students than male students engaging in this behavior. More disturbing was the finding that 21% of reported auto accidents or near-accidents occurred when the driver was using a mobile phone.

In addition to problems that may arise from the use of cellular phones in inappropriate settings, excessive phone use may also become problematic. Overuse of cellular phones can interfere with productivity at school and work, cause financial difficulties, produce tension in social interactions, and create an unhealthy dependency on the phone. Bianchi and Phillips (2005) hypothesized that this type of problematic cellular phone use might be predicted by personality variables that are associated with addictive behaviors. To test this hypothesis, college students and members of the general public completed several psychological inventories and a cellular phone use survey which included the Mobile Phone Problem Usage Scale. A regression analysis was used to determine the degree to which the predictor variables of self-esteem, neuroticism, extraversion, age, and gender were predictive of problematic phone use. The results indicated that individuals who were young, extraverted, and low in self-esteem were more likely to score high on problematic phone use. Neuroticism and gender did not contribute significantly to problematic use. Bianchi and Phillips also examined the degree to which the predictor variables explained social and business uses of mobile phones. While the psychological variables did not contribute to the prediction of these types of use, age and gender were significant predictors. Younger people and women were more likely to use their phones for

social purposes while older individuals and men were more likely to use their phones for business reasons.

Previous researchers have reported relationships between cellular phone use and several demographic and psychological variables. However, most studies have examined general cellular phone use and few have focused exclusively on the college population. The purpose of the present study was to explore predictors of particular types of cellular phone use specifically among college students. The predictor variables of interest included the demographic factors of gender, age, class rank, and miles from the student's hometown and the psychological factors of self-esteem and trait anxiety. Multiple regression analysis was used to examine the relationship between the predictor variables and four types of cellular phone usage: daily time spent using the phone, instrumental use, emotional/social use, and problematic use.

Method

Participants

The participants were 158 undergraduate students enrolled at a Southeastern liberal arts university. The sample consisted of 65 men and 93 women. The participants ranged in age from 17 to 44 years, with an average age of 19.90 ($SD = 3.30$). The class rank distribution was as follows: 44 freshmen, 60 sophomores, 38 juniors, and 16 seniors. All of the participants served as volunteers in this study.

Materials

The materials included a demographic form, the Coopersmith Self-Esteem Inventory Adult Form (Coopersmith, 2002), the Trait Scale of the State-Trait Anxiety Inventory (Spielberger, 1983), and the Cellular Telephone Inventory (Hall, 2005). The demographic form was designed by the researchers and provided spaces for students to report their gender, age, major, class rank, and mileage from their hometown.

The Coopersmith Self-Esteem Inventory Adult Form is a self-report measure consisting of 25 self-

evaluative statements (Coopersmith, 2002). Respondents indicate whether each statement is "like me" or "unlike me." The possible range of scores on the inventory is 0 to 100, with higher scores indicating higher self-esteem. The reliability and validity of the Coopersmith Self-Esteem Inventory has been judged to be sufficient for research use (Peterson, Austin, & Sewell, 1985).

The researcher used Form Y-2 (the Trait Scale) of the State-Trait Anxiety Inventory; the Trait Scale is designed to assess an individual's general degree of anxiety proneness (Spielberger, 1983). On this 20-item self-report scale, respondents rate how often they experience each stated feeling on a 4-point scale. Scores on the Trait Scale can range from 20 to 80, with higher scores indicating higher levels of trait anxiety. Spielberger (1983) has reported adequate levels of test-retest reliability and concurrent validity for the State Trait Anxiety Inventory.

The Cellular Telephone Inventory is a two-part questionnaire used to examine amount and type of cellular phone use of college students (Hall, 2005). The first part consists of questions requesting information about the number of calls made, the number of calls received, and the number of minutes spent per day using a cellular phone. The second part of the Cellular Telephone Inventory is designed to assess three different dimensions of cellular phone use; instrumental, emotional/social, and problematic use. Instrumental use refers to task-oriented purposes such as checking the time or date, ordering pizza, and making work related calls. Emotional/social use is defined as using a cellular phone for personal or social reasons such as calling friends and family for support. Problematic use refers to excessive phone use which interferes with daily obligations. This part of the Cellular Telephone Inventory contains 23 items; 4 items relate to instrumental use, 9 items relate to emotional/social use, and 10 items relate to problematic use. Respondents rate how well each item describes their personal phone use on a 7-point scale. Scores can range from 4 to 28 for instrumental use, 9 to 63 for emotional/social use, and 10 to 70 for the problematic use. On each of these scales, higher scores indicate a higher degree of use. Acceptable

levels of reliability and validity have been reported for the three cellular phone use scales (Hall, 2005).

Procedure

The materials were organized into packets. Each packet included the demographic form, the Coopersmith Self-Esteem Inventory, the Trait Scale of the State Trait Inventory, and the Cellular Telephone Inventory.

Permission was obtained from professors to solicit participants in five undergraduate classes. The classes included two politics classes and one class in each of the following disciplines: geography, math, and computer science. These classes were selected because they are part of the core curriculum and the class enrollments provide a good representation of students in terms of major, gender, and age. The same procedure was followed in each of the five classrooms. The researcher introduced herself, described the nature of the study, and asked students to anonymously participate. All students were assured that responses would be held strictly confidential. Students who agreed to participate were given a packet of materials to complete. After all participants were finished, the researcher collected the completed packets, thanked the students for their participation, and provided contact information to receive the results of the study. Data collection required approximately 15 minutes per classroom.

Results

A score was recorded for each of the 158 participants on the following ten variables: self-esteem, trait anxiety, gender, age, class rank, mileage from hometown, daily cellular phone use (in minutes), instrumental cellular phone use, emotional/social cellular phone use, and problematic cellular phone use. As shown in Table 1, gender, class rank, and mileage from hometown were coded as categorical variables while the remaining variables were coded as continuous variables.

The six predictor variables included self-esteem, trait anxiety, gender, age, class rank, and mileage from hometown. The means, standard deviations, and the minimum and maximum scores for the

predictor variables are shown in Table 2. The four dependent variables were daily cellular phone use, instrumental cellular phone use, emotional/social cellular phone use, and problematic cellular phone use. The means, standard deviations, and minimum and maximum scores for the dependent variables are shown in Table 3.

A separate multiple regression analysis was conducted to determine how well the predictor variables of self-esteem, trait anxiety, gender, age, class rank, and mileage from hometown predicted scores for each of the four measures of cellular phone use. Tables 4-7 show the results of the analysis for daily cellular phone use, instrumental cellular phone use, emotional/social phone use, and problematic cellular phone use, respectively. Each table shows the standardized regression coefficient (β), the t -value of β , and the significance value for the t test (p) for the predictor variables.

Daily Cellular Phone Use

The multiple correlation between the predictor variables and daily cellular phone use was not significant, $F(6, 151) = 1.67, p = .132$. The predictor variables accounted for only 6% of the variance in daily cellular phone use. As shown in Table 4, gender made a significant contribution to the regression equation, with women spending more minutes per day on their cellular phones than men.

Instrumental Cellular Phone Use

A significant multiple correlation was found between the predictor variables and instrumental cellular phone use, $F(6, 151) = 3.96, p = .002$. The predictor variables accounted for 12% of the variance in the instrumental use scores. Age and mileage from hometown made significant contributions to the regression equation. Specifically, younger participants and those living further from their hometowns had higher instrumental use scores. The results of the regression analysis are shown in Table 5.

Emotional/Social Cellular Phone Use

The multiple correlation between the predictor variables and emotional/social cellular phone use was also significant, $F(6, 151) = 8.76, p = .001$.

The predictor variables accounted for 26% of the variance in this dependent variable. Gender was a significant predictor of emotional/social use, with women engaging in more of this type of phone use than men. Table 6 shows the results of this regression analysis.

Problematic Cellular Phone Use

The multiple correlation between the predictor variables and problematic cellular phone use was marginally significant, $F(6, 151) = 2.31, p = .053$. The predictor variables accounted for only 8% of the variance in the problematic cellular phone use scores. Class rank made a significant contribution to the regression equation, with students lower in rank having higher problematic use scores. The results of this regression analysis are presented in Table 7.

Discussion

This study examined the degree to which the variables of self-esteem, trait anxiety, gender, age, class rank, and mileage from hometown predicted four types of cellular phone use of college students. The set of predictor variables explained the largest amount of variability in emotional/social cellular phone use (26%). The predictors had less explanatory power for the other three cellular phone use measures, accounting for only 12% of the variance in instrumental use, 8% in problematic use, and 6% in daily phone use.

Bianchi and Phillips (2005) reported that the psychological variables of self-esteem and extraversion were predictive of problematic cellular phone use. The psychological variables examined in the present study, self-esteem and trait anxiety, did not contribute significantly to any of the four phone use measures. The discrepant findings regarding problematic cellular phone use could be related to the different scales used to assess this form of phone use. The problematic use scale of the Cellular Telephone Inventory is less extensive than the Mobile Phone Problem Use Scale designed by Bianchi and Phillips. Additionally, participants in the present study had relatively low problematic scores and their scores were much less variable than those reported by Bianchi and Phillips. Further

investigation is needed to determine if these two scales are measuring different aspects of problematic cellular phone use.

Several of the demographic variables were significant predictors of cellular phone usage. Gender was a significant predictor of daily phone use, with women spending more time on the phone than men. This finding is consistent with some previous reports of general cellular phone use (Srivastava, 2005; Wei & Lo, 2006), although Bianchi and Phillips (2005) failed to find a difference between men and women in weekly time spent on cellular phones. Gender also made a significant contribution to the prediction of emotional/social use in the present study, with women making greater use of the phone for social reasons than men. Bianchi and Phillips (2005) reported a similar gender effect in their examination of social use of mobile phones.

Age and miles from home were significant predictors of instrumental cellular phone use. Compared to older students and those living closer to the university, younger students and those living further from home reported using their phones more for informational and task-oriented purposes. Perhaps these students, being more transient, are less likely to have a land-line telephone provider. This would necessitate using their cell phones for instrumental purposes.

Finally, class rank was a significant predictor of problematic cellular phone use. Underclassmen scored higher on problematic use than upperclassmen. This finding may be related to the status enhancement function of cellular phones (Srivastava, 2005). Compared to juniors and seniors, greater pressures to "fit in" coupled with lower levels of social and academic maturity may contribute to excessive use and dependency on cellular phones among underclassmen. A longitudinal study in which cellular phone use is assessed at the beginning of a student's freshman year and then reassessed periodically throughout the student's college career might provide useful information regarding the changing role of cellular phones in the lives of college students.

The professors in whose classrooms this study was conducted expressed a high level of interest in the study and discussed problems they have

experienced with inappropriate cellular phone use. They reported that cellular phone interruptions during class are becoming increasingly frequent, particularly in classes that enroll predominately freshmen and sophomore level students. In addition to being annoyed by inappropriate phone use in class, the professors were disturbed by the negative impact of phone interruptions on students' concentration. Another concern the professors expressed was that when class time is taken to deal with cellular phone offenses, the total time available for course instruction is reduced. The professors' observations suggest the need for additional research on cellular phone use in the college population. Studies examining the relationship between cellular phone use and academic achievement would be useful to determine if students who score high on problematic use are at greater risk for academic failure. Additionally studies are needed to devise and evaluate techniques to teach cellular phone etiquette to incoming college students. An effective short course in "Cell Phone 101" might help students avoid the pitfalls that can accompany cellular phone use and return the classroom to a learning environment.

One difficulty encountered while conducting the study was the speed with which participants completed the materials. As noted above, data collection required approximately 15 minutes per classroom. In each class, students participated in the study prior to the professor's lecture and it appeared that students were rushing to complete the forms. Although more time consuming than group data collection, having students meet individually with the researcher might produce more careful and thoughtful responses to the instruments.

Cellular phone technology is evolving rapidly. Each change impacts the manner in which individuals carry out daily tasks and interact with others. As more features and functions become available on cellular phones, the potential for dependency and inappropriate phone use increases as well. Continued research will be needed to assess consumers' mobile phone needs as well as the effects of the changing technology on their lives.

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Table 1

Coding of Variables for the Regression Analyses

Variable	Coding
Self-esteem	One continuous variable
Trait Anxiety	One continuous variable
Gender	One categorical variable (0 = <i>male</i> , 1 = <i>female</i>)
Age	One continuous variable
Class Rank	One categorical variable (0 = <i>freshman</i> , 1 = <i>sophomore</i> , 2 = <i>junior</i> , 3 = <i>senior</i>)
Mileage From Home	One categorical variable (0 = <i>0-100 miles</i> , 1 = <i>101-200 miles</i> , 2 = <i>201-300 miles</i> , 3 = <i>301 or more miles</i>)
Daily Phone Use (minutes)	One continuous variable
Instrumental Use	One continuous variable
Emotional/Social Use	One continuous variable
Problematic Use	One continuous variable

Table 2

Mean, Standard Deviation, Minimum Score, and Maximum Score of Self-Esteem, Trait Anxiety, Gender, Age, Class Rank, and Mileage from Hometown

<i>Predictors</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>Min.</i>	<i>Max.</i>
Self-Esteem Score	158	74.49	18.07	12	100
Trait-Anxiety Score	158	38.15	8.43	20	62
Gender	158	0.59	0.49	0	1
Age	158	19.90	3.30	17	44
Class Rank	158	1.16	0.95	0	3
Mileage from Hometown	158	1.67	1.38	0	3

Table 3

Mean, Standard Deviation, Minimum Score, and Maximum Score of Daily Phone Use, Instrumental Phone Use, Emotional/Social Phone Use, and Problematic Phone Use

<i>Dependent Variables</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>Min.</i>	<i>Max.</i>
Daily Phone Use (in minutes)	158	65.27	53.11	0	230
Instrumental Phone Use	158	23.61	5.49	4	31
Emotional/Social Phone Use	158	37.47	13.60	4	63
Problematic Phone Use	158	19.41	10.92	10	60

Table 4

Regression Analysis Summary for Predictors of Daily Cellular Phone Use

<i>Predictors</i>	β	<i>t</i>	<i>p</i>
Self-esteem score	-0.04	-0.37	0.714
Trait Anxiety score	-0.08	0.78	0.437
Gender	0.20	2.38	0.018
Age	-0.07	-0.78	0.437
Class Rank	-0.08	-0.87	0.388
Mileage from Hometown	-0.06	0.68	0.496

Table 5

Regression Analysis Summary for Predictors of Instrumental Cellular Phone Use

<i>Predictors</i>	β	<i>t</i>	<i>p</i>
Self-esteem score	0.00	0.04	0.972
Trait Anxiety score	-0.12	-1.31	0.194
Gender	0.04	0.47	0.642
Age	-0.28	-3.13	0.002
Class Rank	0.12	1.36	0.175
Mileage from Hometown	0.19	2.37	0.019

Table 6

Regression Analysis Summary for Predictors of Emotional/Social Cellular Phone Use

<i>Predictors</i>	β	<i>t</i>	<i>p</i>
Self-esteem score	0.03	0.32	0.753
Trait Anxiety score	0.05	0.59	0.554
Gender	0.51	6.98	0.001
Age	-0.07	-0.86	0.390
Class Rank	0.01	0.09	0.928
Mileage from Hometown	0.03	0.46	0.648

Table 7

Regression Analysis Summary for Predictors of Problematic Cellular Phone Use

<i>Predictors</i>	β	<i>t</i>	<i>p</i>
Self-esteem score	-0.02	-0.15	0.878
Trait Anxiety score	0.13	1.34	0.184
Gender	0.15	1.79	0.075
Age	-0.05	-0.55	0.586
Class Rank	-0.19	-2.14	0.034
Mileage from Hometown	-0.10	-1.19	0.235