

The Relationship between Psychosocial Factors and Cell phone-use related Risk Behavior in Junior High School Students

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The purpose of this study was to investigate the relationship between manners, norm-consciousness, sensation-seeking, and risk behaviors associated with cell phone use by junior high school students. An anonymous questionnaire was administered to junior high school students (269 male and 256 female) at 2 junior high schools. The questionnaire measured possession and use of cell phones, collisions, manners, norm-consciousness, sensation-seeking, and tolerance of risk behavior. The rate of cell phone use was 60.1%. A total of 65.1% of students used cell phones while walking, and 45.1% did so while riding a bicycle. The manner and norm-consciousness scores of students using cell phones while walking or riding a bicycle were lower than those who did not use cell phones. Moreover, sensation-seeking scale and acceptance of risk behavior of students used cell phones were higher than who did not use cell phones. Acceptance of risk behavior and sensation-seeking of students that had the experience of visiting Internet dating or adults-content sites on cell phones were higher than those who had no experience with such sites. Findings indicated that risk behavior associated with cell phone use was negatively related to manners and norm-consciousness, and positively related to sensation-seeking and acceptance of risk behavior.

Keywords: manners, sensation seeking, norm-consciousness, collisions, internet dating sites

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1. Introduction

The convenience of cell phones has led to yearly increases in the number of service subscribers in Japan. According to a survey conducted by the Telecommunications Carriers Association, the number of cell phone service subscribers as of November 2008 had reached approximately 105.4 million, nearly three times the number of people using cell phones 10 years ago and a number that represents roughly one cell phone for each person in Japan. Along with the overall rate of cell phone use, the number of young people using cell phones has also increased annually. The rate of elementary school students with cell phones is approximately 30%; however, the number of junior high school students is approximately 50% and the percentage of high school students has climbed to 90% or more (Cabinet Office 2007). While convenience remains an outstanding

feature, increased cell phone use among children has brought with it an increase in risky behaviors and accidents. According to the National Police Agency's *Study on the relationship between cell phone use and the awareness and behaviors of young people* (2004), cell phone use is higher among delinquent junior high school students. In addition, the study pointed out that regardless, cell phone users engaged in more delinquent behaviors than non-cell phone users, both male and female.

According to a report by Watanabe et al. (2002) on the relationship between cell phone use and accidents, the rate of university students who have been involved in minor collisions with pedestrians or bicycles during cell phone use is 4.1% while walking and 3.9% while riding a bicycle. The rate of university students who have had near-miss collisions with pedestrians or bicycles during cell phone use is 30% or more while walking or riding a bicycle. Cell

phone use while walking or riding a bicycle serves as a distraction as users divert their attention away from their surroundings to their cell phone screens and operations, and this distraction creates a high potential for accidents. In response to this, the National Police Agency proposed prohibiting hand-held cell phone use while riding a bicycle. For the first time in the 30 years since the issuance of “Instructions for the Teaching of Traffic Rules,” the instructions were amended to stop one-handed bicycle riding while talking on a cell phone.

Fraudulent billing for fictitious services and bullying that have taken place over the Internet are incidents associated with cell phone use, the seriousness of which being exemplified by the case of a female junior high school student in Saitama who committed suicide after being bullied on a website. The recent introduction of flat-rate charges for Internet access and other services has allowed convenient, unlimited Internet and e-mail use via cell phones. At the same time, however, it has become easier to access inappropriate sites and engage in inappropriate communications, which have become serious issues within society.

Juvenile risk behavior is defined as “Behavior that tends to begin in the juvenile stage and exposes the individual or others to current or future health and lives to serious danger” (Nozu, et al. 2006). In this study, we consider the use of cell phones while walking or riding a bicycle and access to harmful websites as risk behaviors, defining them as “risk behaviors associated with the use of cell phones.”

Norm-consciousness and sensation seeking have been identified as factors in risk behaviors (Watanabe et al. 2001; Kubo et al. 2002). However, studies on risk behaviors associated with the use of cell phones are lacking.

The purpose of this study was to clarify cell phone use among junior high school students and examine the relationship among risk behaviors associated with cell phone use, norm-consciousness, and sensation seeking.

Furthermore, cell phone manners in public have become an issue. Suzuki (2008) pointed out that although cell phone manners have improved, many teens continue to use them on trains. Therefore, we also decided to examine the relationship between risk behaviors associated with the use of cell phones and cell phone manners in this study.

2. Methods

Subjects were 526 students at two public junior schools in Ibaragi Prefecture asked to complete an anonymous, self-administered questionnaire. One response was judged to contain insufficient information for use and excluded from the analysis. As a result, the number of valid responses in this study was 525 (male: 269, female: 256).

The survey was conducted between November and December 2007 under the supervision of classroom teachers during health, physical education and other class periods. Survey content included questions on basic attributes, cell phone possession and use, manners and norm-consciousness, delinquent and risk behaviors, including actual experience or acceptance of behavior, and the degree of sensation seeking.

Using the social norm scale developed by Ishikawa (2005) as a reference, we created questionnaires to elicit information on manners. We provided examples of 12 behaviors and asked subjects to judge the acceptability of each behavior on a 5-point scale. The choices were from [1. Extremely unacceptable] to [5. Not unacceptable in the least]. Total scores were from 12 to 60 points, with higher scores indicating a lower awareness of the unacceptability of the behavior.

The questionnaires included 18 items related to norm-consciousness developed in reference to questionnaires developed by Kuze et al. (1987). Scoring was based on a 5-point scale from [1. Applies] to [5. Does not apply]. Total scores were from 18 to 90, with the higher scores indicating higher norm-consciousness.

Twenty-nine items related to delinquent and risk behaviors, created in reference to questionnaires developed by Shimizu et al. (2004). A 3-point scale was used to evaluate experience and acceptance of delinquent and risk behaviors using [1. I have never thought about doing this], [2. I have thought about doing this], and [3. I have done this.]. The total scores were considered as risk behavior points in a range from 29 to 87, with higher scores indicating higher acceptance of delinquent and risk behaviors.

Sensation Seeking Scales show the degree to which new and various stimuli are sought without concern for danger. In this study, we utilized the Sensation Seeking Scale developed by Furusawa (1989). The Sensation Seeking Scale consists of three categories; thrill and adventure seeking (TAS), disinhibition (Dis), and experience seeking (ES), with 15 items

in total. We used a 5-point scale from [1. Does not apply] to [5. Applies]. Total scores are from 15 and 75, with higher scores indicating a more intense search for stimuli.

For data analysis, we categorized “Have my own cell phone” and “Have a cell phone jointly with my parents” into “Have a cell phone,” and “Do not have my own cell phone” into “Do not have a cell phone.” Furthermore, we defined the use of a cell phone while walking or riding a bicycle, collisions and falls while walking or riding a bicycle, and the use of Internet dating and adult-content sites as the risk behaviors. Falls and collisions caused by the use of cell phone while walking or riding a bicycle are secondary results; however, behaviors causing such results should be considered and defined as risk behaviors. In order to analyze such behaviors, we first produced a simple total of the answers for each question. Next, we totaled scores by gender, with or without cell phones, with or without the experience of using Internet dating and adult-content sites, and performed t-test to assess significance. In order to assess significance by grade, we conducted analysis of variance and multiple comparisons employing the Tukey method. Analysis of covariance was applied

to other questions in groups of three or more and multiple comparisons employing the Bonferroni method was also applied with gender and grade as covariates to adjust for impact. Analysis of Sensation Seeking was also conducted on the lower scales. All analyses were carried out on SPSS 11.0 for Windows and the level of significance was set at 5%. Questionnaires with any questions left unanswered were excluded from analysis.

To examine the reliability of the manners, norm-consciousness, acceptance of delinquent and risk behaviors, and Sensation Seeking scales, Cronbach’s α coefficient was calculated for each. As a result, all showed relatively high values, 88 for manners, 85 for norm-consciousness, 88 for risk behaviors, and 89 for Sensation Seeking Scale, which indicates internal consistency.

To comply with ethical standards, we explained the content of our research plan to university faculty in writing in advance and obtained approval for this study. Teachers supervising the questionnaire verbally explained to students that participation was anonymous and voluntary and that data would be used only for the purpose of research. Completion of the questionnaires was deemed consent.

Table 1 Cell phone possession by grade and gender

		Have a cell phone		Do not have a cell phone		Total	
		n	%	n	%	n	%
Male	1st	23	29.1	56	70.9	79	100.0
	2nd	53	62.4	32	37.6	85	100.0
	3rd	58	63.7	33	36.3	91	100.0
Female	1st	51	59.3	35	40.7	86	100.0
	2nd	60	73.2	22	26.8	82	100.0
	3rd	70	69.3	31	30.7	101	100.0
Total		315	60.1	209	39.9	524	100.0

Table 2 Cell phone use

	While walking						While riding a bicycle					
	Male		Female		Total		Male		Female		Total	
	n	%	n	%	n	%	n	%	n	%	n	%
All functions*	41	30.6	43	23.8	84	26.6	22	16.4	20	11.0	42	13.3
Call only	23	17.2	26	14.4	49	15.6	27	20.1	17	9.4	44	14.0
Mail • games	18	13.4	50	27.6	68	21.6	25	18.7	27	14.9	52	16.5
Do not use any functions	51	38.1	59	32.6	110	34.9	55	41.0	100	55.2	155	49.2
Do not ride bicycle							3	2.2	15	8.3	18	5.7
Other	1	0.7	3	1.7	4	1.3	2	1.5	2	1.1	4	1.3
Total	134	100.0	181	100.0	315	100.0	134	100.0	181	100.0	315	100.0

*All functions means use of telephone calling, mail and games.

3. Results

3.1. Status of Cell phone Possession and Use

Table 1 shows the rates of cell phone possession by grade and gender. Approximately 60.1% of all students possess cell phones, among which 52.5% were male and 67.3% were female. The rate of female cell phone possession was higher than that for males overall and the rate for both increased a grade level increased. Table 2 shows cell phone use by gender while walking and riding a bicycle. The highest number of respondents reported that they do not use cell phones while walking; and the next highest number of respondents reported using all functions. More than 30% of students, both male and female, reported not using cell phones while walking, the highest of all. More males reported using all functions and more females reported using e-mail and game functions.

The number of respondents reporting that they did not use cell phones while riding a bicycle was the highest followed by students reporting that they used

e-mail and game functions. The highest number of respondents, both male and female, reported not using cell phones. Male students reporting the use of cell phones for calls totaled 20.1%, and 14.9% of female respondents reported using cell phones for e-mail and games.

3.2. Internet Dating and Adult-Content Sites

Table 3 shows the rate of Internet dating and adult-content site use. A total of 1.9% of respondents reported using Internet dating sites, and 2.5% reported using adult-content sites.

3.3. Involvement in Collisions While Using Cell phones

Table 4 shows the rates of students involved in collisions while using cell phones. Students who reported being involved in minor collisions with pedestrians or bicycles while using cell phones while walking or riding a bicycle totaled 3% for both; however, those reporting near-miss collisions totaled

Table 3 Visits to Internet dating or adults-only sites

	n	%
Experience of visiting internet dating sites		
Have experience	10	1.9
Have no experience	504	98.1
Experience of visiting internet adult-content sites		
Have experience	13	2.5
Have no experience	502	97.5

Table 4 The number of respondents reporting collisions

		n	%
While walking	Collision with a pedestrian or a bicycle		
	Experienced an actual collision	7	3.4
	Experienced a near-miss collision	37	18.1
	Have not experienced any collisions	160	78.4
	Collision with objects or falls		
	Experienced an actual collision or fall	10	4.9
	Experienced a near-miss collision or fall	35	17.2
	Have not experienced any collisions or falls	158	77.8
While riding a bicycle	Collision with a pedestrian or a bicycle		
	Experienced an actual collision	4	2.8
	Experienced a near-miss collision	38	27.0
	Have not experienced any collisions	99	70.2

Table 5 Manner Score and Norm-Consciousness Score by Responses

	Manners				Normative consciousness			
	n	Mean	SD	p value	n	Mean	SD	p value
Gender*								
Male	250	20.64	8.025	p=.041	230	67.82	10.964	n.s.
Female	261	19.37	5.809		253	68.36	8.647	
Grade†								
1st ^a	162	19.88	7.860	n.s.	147	68.29	11.212	n.s.
2nd ^b	165	20.72	6.721		156	67.19	9.935	
3rd ^c	185	19.39	6.413		181	68.85	8.496	
Have a cell phone*								
Have a cell phone	307	19.68	6.795	n.s.	294	67.99	9.917	n.s.
Do not have a cell phone	204	20.42	7.322		189	68.42	9.787	
Have a cell phone (details)‡								
Have own cell phone ^a	282	19.95	6.904	n.s.	270	67.67	10.024	n.s.
Have a cell phone jointly with parents ^b	22	16.91	4.492		21	70.76	7.056	
Do not have a cell phone ^c	204	20.42	7.322		189	68.42	9.787	
Other ^d	2	15.00	4.243		2	71.00	9.899	
Functions used while walking‡								
All functions ^a	81	21.69	7.978	a>d (p=.012)	78	65.78	11.418	n.s.
Calling only ^b	48	18.54	5.243		45	69.96	8.456	
Mail•games ^c	66	20.15	6.110		63	66.75	9.268	
Do not use any functions ^d	107	18.36	6.442		103	69.29	9.070	
Do not have a cell phone ^e	207	20.40	7.271		193	68.49	9.783	
Functions used while riding a bicycle‡								
All functions ^a	38	23.89	8.989	a>d (p<.001)	37	63.59	10.823	a<d (p=.042)
Call only ^b	42	20.02	5.804		40	67.40	11.558	
Mail•games ^c	49	19.65	6.489		50	68.12	10.321	
Do not use any functions ^d	152	18.39	6.114		144	69.05	8.812	
Do not ride a bicycle ^e	18	19.67	5.980		18	67.78	7.496	
Do not have a cell phone ^f	208	20.48	7.288		192	68.44	9.794	
Experience visiting internet dating or adult-content sites*								
Have experience	17	19.12	6.537	n.s.	16	67.00	13.357	n.s.
Do not have experience	480	19.83	6.727		456	68.33	9.268	
Collision with a pedestrian or a bicycle while walking‡								
Experienced an actual collision ^a	7	18.86	5.900	n.s.	7	69.57	10.486	n.s.
Experienced a near-miss collision ^b	35	21.03	6.810		32	67.13	10.770	
Have not experienced any collisions ^c	263	19.55	6.826		253	67.95	9.792	
Collision with objects or falls while walking‡								
Experienced an actual collision or fall ^a	10	28.80	14.665	a>b (p=.003) a>c (p<.001)	9	59.11	16.205	a<b (p=.035) a<c (p=.016)
Experienced a near-miss collision or fall ^b	33	20.61	6.860		33	68.09	11.823	
Have not experienced any collisions or falls ^c	261	19.25	6.111		249	68.24	9.211	
Collision with a pedestrian or a bicycle while riding a bicycle‡								
Experienced an actual collision ^a	4	19.75	4.787	n.s.	4	59.25	12.121	n.s.
Experienced a near-miss collision ^b	37	21.89	6.319		34	66.68	9.883	
Have not experienced any collisions ^c	263	19.42	6.853		253	68.11	9.747	

* T-test

† Tukey multiple test

‡ Bonferroni multiple test controlled study covariates including gender and grade after analysis of covariance

Table 6 Sensation Seeking Scale and Risk Behavior Score by Responses

	Risk behavior				Sensation Seeking			
	n	Mean	SD	p value	n	Mean	SD	p value
Gender*								
Male	248	38.52	8.580	n.s.	241	50.83	11.912	n.s.
Female	259	39.62	8.371		252	49.30	10.653	
Grade†								
1st ^a	163	36.77	8.851	a<b (p<.001) a<c (p=.016)	151	49.07	11.507	n.s.
2nd ^b	162	41.22	8.768		158	51.58	12.476	
3rd ^c	183	39.24	7.313		185	49.66	10.057	
Have a cell phone*								
Have a cell phone	303	40.39	8.863	p<.001	301	51.72	11.229	p<.001
Do not have a cell phone	203	37.12	7.509		192	47.55	11.109	
Have a cell phone (details)‡								
Have own cell phone ^a	278	40.51	8.947	a>c (p=.001)	275	51.60	11.178	a>c (p<.001)
Have a cell phone jointly with parents ^b	22	39.64	8.156		22	51.82	11.951	
Do not have a cell phone ^c	203	37.12	7.509		192	47.55	11.109	
Other ^d	3	34.67	4.041		3	55.00	3.000	
Functions used while walking‡								
All functions ^a	79	45.08	9.455	a>b (p<.001)	77	55.90	8.969	a>b (p=.012) a>d (p=.003) a>e (p<.001)
Calling only ^b	47	38.66	8.213	a>d (p<.001)	45	49.29	14.113	
Mail•games ^c	65	41.51	8.795	a>e (p<.001)	65	50.94	9.964	
Do not use any functions ^d	107	36.98	6.962	c>d (p=.004)	108	49.96	11.351	
Do not have a cell phone ^e	207	37.20	7.479	c>e (p=.011)	196	47.67	11.092	
Do not have a cell phone ^e	207	37.20	7.479	c>e (p=.011)	196	47.67	11.092	
Functions used while riding a bicycle‡								
All functions ^a	37	47.35	8.741	a>c (p<.001)	36	57.61	8.871	a>d (p<.001) a>f (p<.001) b>d (p=.002) b>f (p<.001) c>f (p=.029)
Call only ^b	43	43.42	8.751	a>d (p<.001)	42	56.57	8.139	
Mail•games ^c	50	40.06	7.692	a>e (p=.009)	47	52.81	8.855	
Do not use any functions ^d	150	37.97	8.315	a>f (p<.001)	151	48.74	12.242	
Do not ride a bicycle ^e	17	39.94	7.652	b>d (p<.001)	18	49.67	9.622	
Do not have a cell phone ^f	207	37.12	7.463	b>f (p<.001)	196	47.55	11.019	
Experience visiting internet dating or adult-content sites*								
Have experience	17	45.24	11.627	p=.002	17	57.35	11.774	p=.008
Do not have experience	477	38.82	8.231		463	49.68	11.256	
Collision with a pedestrian or a bicycle while walking‡								
Experienced an actual collision ^a	7	45.57	9.034	n.s.	6	68.67	7.941	b>c (p=.033)
Experienced a near-miss collision ^b	36	42.83	7.696		32	63.28	11.535	
Have not experienced any collisions ^c	259	39.96	8.936		259	57.33	12.293	
Collision with objects or falling down while walking‡								
Experienced an actual collision or fall ^a	10	50.20	11.361	a>b (p=.045) a>c (p<.001)	8	67.00	6.782	a>c (p=.016)
Experienced a near-miss collision or fall ^b	34	43.06	8.456		33	62.79	9.800	
Have not experienced any collisions or falls ^c	257	39.71	8.562		255	57.34	12.581	
Collision with a pedestrian or a bicycle while riding a bicycle‡								
Experienced an actual collision ^a	4	54.25	8.421	a>c (p=.002) b>c (p=.004)	4	67.25	2.630	b>c (p=.014)
Experienced a near-miss collision ^b	37	44.41	7.812		34	63.91	8.946	
Have not experienced any collisions ^c	260	39.67	8.720		259	57.31	12.576	

* T-test

† Tukey multiple test

‡ Bonferroni multiple test controlled study covariates including gender and grade after analysis of covariance

Table 7 TAS, Dis and ES by Responses

	TAS				Dis				ES			
	n	Mean	SD	p value	n	Mean	SD	p value	n	Mean	SD	p value
Gender*												
Male	251	17.67	4.769	p<.001	251	15.15	4.570	n.s.	246	17.98	4.519	n.s.
Female	259	15.48	4.834		259	15.51	4.113		259	18.11	4.213	
Grade†												
1st ^a	159	16.30	4.890	b>c (p=.010)	160	15.04	4.292	n.s.	154	17.45	4.452	n.s.
2nd ^b	165	17.50	4.751		163	15.54	4.607		263	18.48	4.670	
3rd ^c	190	15.97	5.024		188	15.46	4.204		189	18.20	3.980	
Have a cell phone*												
Have a cell phone	312	17.22	5.032	p<.001	308	15.90	4.338	p=.001	308	18.48	4.272	p=.018
Do not have a cell phone	201	15.52	4.599		202	14.52	4.283		197	17.43	4.449	
Have a cell phone (details)‡												
Have own cell phone ^a	286	17.22	5.010	a>c (p<.001)	282	15.91	4.288	a>c (p=.006)	282	18.34	4.296	n.s.
Have a cell phone jointly with parents ^b	22	16.50	5.396		22	15.77	4.750		22	19.55	3.661	
Do not have a cell phone ^c	201	15.52	4.599		202	14.52	4.283		197	17.43	4.449	
Other ^d	3	20.67	0.577		3	12.33	2.887		3	22.00	3.606	
Functions used while walking†												
All functions ^a	83	18.67	4.872	a>e (p<.001)	82	17.12	4.004	a>d (p=.010) a>e (p<.001)	78	19.74	3.726	a>e (p=.002)
Calling only ^b	47	16.72	5.274		45	15.07	5.319		46	17.76	4.822	
Mail•games ^c	67	16.40	4.777		66	16.21	3.845		68	18.06	3.863	
Do not use any functions ^d	109	16.71	5.052		109	15.06	4.197		110	18.08	4.523	
Do not have a cell phone ^e	205	15.59	4.607		206	14.55	4.273		201	17.46	4.434	
Functions used while riding a bicycle†												
All functions ^a	39	19.74	4.266	a>d (p<.001)	38	17.92	3.830	a>d (p=.001) a>f (p<.001) b>f (p=.013)	37	19.70	3.908	b>d (p=.019) b>f (p=.003)
Call only ^b	44	19.05	4.215		44	16.89	4.473		42	20.17	3.154	
Mail•games ^c	51	18.04	4.064		49	16.41	3.517		50	17.92	3.492	
Do not use any functions ^d	153	16.05	5.232	b>d (p=.047)	152	14.90	4.545		154	17.79	4.757	
Do not ride a bicycle ^e	18	14.44	5.690	b>f (p<.001)	18	15.83	2.834		18	19.39	3.310	
Do not have a cell phone ^f	205	15.55	4.567	c>f (p=.001)	206	14.52	4.266		201	17.40	4.419	
Experience visiting internet dating or adult-content sites*												
Have experience	18	18.56	5.261	n.s.	18	17.78	4.697	p=.013	17	20.71	3.754	p=.010
Do not have experience	481	16.42	4.918		478	15.23	4.347		475	17.93	4.357	
Collision with a pedestrian or a bicycle while walking†												
Experienced an actual collision ^a	7	20.14	4.845	n.s.	7	16.14	3.976	b>c (p=.034)	6	22.17	2.317	n.s.
Experienced a near-miss collision ^b	36	18.94	4.433		34	17.71	4.079		33	19.24	3.825	
Have not experienced any collisions ^c	267	16.91	5.067		265	15.69	4.336		267	18.28	4.316	
Collision with objects or falling down while a walk†												
Experienced an actual collision or fall ^a	9	20.56	3.087	n.s.	10	17.90	3.542	b>c (p=.003)	9	20.22	3.866	b>c (p=.020)
Experienced a near-miss collision or fall ^b	34	17.94	5.069		33	18.09	3.892		33	20.24	3.000	
Have not experienced any collisions or falls ^c	266	17.03	5.063		262	15.57	4.335		263	18.17	4.366	
Collision with a pedestrian or a bicycle while bicycle riding†												
Experienced an actual collision ^a	4	20.00	3.266	n.s.	4	20.00	2.944	n.s.	4	19.75	0.500	n.s.
Experienced a near-miss collision ^b	38	19.03	3.672		37	17.32	4.000		34	19.91	2.999	
Have not experienced any collisions ^c	268	16.93	5.171		265	15.66	4.339		268	18.26	4.402	

* T-test

† Tukey multiple test

‡ Bonferroni multiple test controlled study covariates including gender and grade after analysis of covariance

18.1% while walking and 27.0% while riding a bicycle.

3.4. Differences in Scores for Each Scale

Tables 5, 6, and 7 show the average scores for manners, norm-consciousness, risk behaviors, Sensation Seeking, and Lower Categories of Sensation Seeking by gender, grade, with or without

cell phone use, status of use, and involvement in collisions.

Significant differences in manner scores were seen by gender, cell phone use while walking or riding a bicycle, minor collisions with objects or falls during cell phone use while walking. Males showed significantly higher manner scores than females did. In regard to cell phone use while walking or riding a bicycle, both male and female students who reported

using all functions showed significantly higher manner scores than those who do not use cell phones. Students who reported experiencing minor collisions with objects and falls while walking showed significantly higher scores than those who reported near-miss but not actual collisions.

Significant differences in norm-consciousness were based on cell phone use while riding a bicycle and minor collisions with objects or falls while walking. In regard to cell phone use while riding a bicycle, students who use all functions showed significantly lower norm-consciousness scores than those who do not use all functions. Students who reported minor collisions with objects or falls during the use of cell phones while walking, students showed significantly lower norm-consciousness scores than other students.

Significant differences were seen in risk behavior scores based on grade, status and details of cell phone possession, status of cell phone use while walking or riding a bicycle, visits to Internet dating and adult-content sites, collision with objects or falls while walking, and collisions with pedestrians or bicycles while riding a bicycle. The risk behavior scores of 2nd year junior high school students were highest and 1st year student scores were the lowest. There were significant differences between 1st and 2nd year, and 1st and 3rd year students. There were also significant differences between students with and without cell phones. Students reporting having their own cell phones showed significantly higher risk behavior scores than those reporting not having a cell phone. In regard to cell phone use while walking, students who reported using all functions showed the highest risk behavior scores, and those who reported not using all functions while walking showed the lowest scores. In regard to the status of cell phone use while riding a bicycle, students who reported using all functions showed the highest risk behavior scores and those who reported not having a cell phone showed the lowest scores. Students who reported having visited Internet dating or adult-content sites showed a significantly higher risk behavior than those who did not report such experience. Although there were some exceptions, risk behavior scores were generally higher among students who reported experiencing actual collisions and those who reported experiencing near-miss collisions than those who reported not having experienced collisions.

Significant differences were seen in Sensation Seeking scores based on cell phone possession,

cell phone use while walking and riding a bicycle, visiting Internet dating and adult-content sites, minor collisions with pedestrians or bicycles while using a cell phone while walking, minor collisions with objects or falls while using a cell phone while walking, and minor collisions with pedestrians or bicycles while using a cell phone while riding a bicycle. Students who reported having a cell phone showed significantly higher Sensation Seeking scores than those who reported not having a cell phone and students who reported having their own cell phone showed significantly higher Sensation Seeking scores than those who reported not having a cell phone. Students who reported using all functions showed significantly higher Sensation Seeking scores than those who reported using the call function only or not having a cell phone. In regard to cell phone use while riding a bicycle, students who reported using all functions and those who reported using the call function only showed significantly higher Sensation Seeking scores than those who reported not using any functions or not having a cell phone. Students who reported using e-mail and games showed significantly higher Sensation Seeking scores than those who reported not having a cell phone. Furthermore, The Sensation Seeking scores of students who reported using all functions both while walking and riding a bicycle showed the highest scores, and those who reported not having a cell phone showed the lowest scores. The Sensation Seeking scores of students who reported visiting Internet dating or adult-content sites was significantly higher than those who reported not having visited such sites. Although there were some exceptions, students who reported experiencing actual collisions showed the highest Sensation Seeking scores, followed by those who reported experiencing near-miss collisions and those who reported not having experienced collisions.

Significant differences in TAS were seen based on gender, grade, status and details of cell phone possession, and cell phone use while walking or riding a bicycle. Male students showed significantly higher TAS than female students. Second-year students showed the highest and most significant differences with third-year students. Students who reported having a cell phone showed significantly higher TAS than those who reported not having a cell phone. Students who reported having their own cell phone showed significantly higher TAS scores than those who reported not having a cell phone. Students

who reported using all functions showed the highest TAS during cell phone use while walking or riding a bicycle and significantly higher scores than those who reported not having a cell phone.

Significant differences in Dis were seen based on the status and details of cell phone possession, cell phone use while walking or riding a bicycle, visits to Internet dating and adult-content sites, minor collisions with pedestrians or bicycles while using a cell phone while walking, and minor collisions with objects or falls while using a cell phone while walking. Students who reported having a cell phone showed significantly higher Dis than those who reported not having a cell phone. During use of cell phones while walking and riding a bicycle, students who reported using all functions showed significantly higher Dis than those who reported not using any functions or not having a cell phone. Students who reported visiting Internet dating or adult-content sites showed significantly higher Dis than those who reported not having visited such sites. In regard to minor collisions with pedestrians or bicycles and minor collisions with objects or falls while using cell phones while walking, students who reported experiencing near-miss collisions showed significantly higher Dis than those who reported not having experienced such collisions.

Significant differences in ES were seen based on status of cell phone possession, status of cell phone use while walking, status of cell phone use while riding a bicycle, experience of visiting Internet dating or adult-content sites, and minor collisions with objects or falls while using cell phones while walking. Students who reported having cell phones showed significantly higher ES than those who reported not having a cell phone. During the use of cell phones while walking, students who reported using all functions showed higher ES than those who reported not having a cell phone. Furthermore, during the use of cell phones while riding a bicycle, students who reported using only the call function showed significantly higher ES than those who reported not using any functions and not having a cell phone. Students who reported visiting Internet dating or adult-content sites showed significantly higher ES than those who reported not visiting such sites. In regard to minor collisions with objects or falls while using cell phones while walking, students who reported experiencing near-miss collisions showed significantly higher ES than those who reported not

having experienced collisions.

4. Discussion

This study revealed that the rate of students reporting possession of a cell phone was 60.1%, which is higher than the rate reported by the Cabinet Office in 2007 (45.9%). Results also showed that male students reported a higher rate of cell phone possession than female students did; and the higher the grade, the higher the rate of students who possess a cell phone becomes.

Approximately 50% of students reported using cell phones while both walking and riding a bicycle, with 21.5% thereof reporting having experienced minor collisions with pedestrians or bicycles or near-miss collisions. Such collisions are thought to result from reduced attention to actual movement within the field of vision (Kawakami et al., 2000) and a delay in dynamic motion detection, which normally functions to allow prompt and accurate detection of and reaction to sudden changes within the visual field that occur beyond the range of prediction (Kanemitsu, 1999) while using cell phones. Cell phone use also impacts the handling of automobiles (Kanemitsu, 2000), and bicycles (Kanda, 2005). Addressing the problem of accidents associated with cell phones is important because of their connection to the health and safety of the public, especially in light of the fact that fatalities from such accidents have become the number one cause of death in juveniles (Health & Welfare Statistics Association, 2007). Furthermore, many of the risk behaviors are mutually connected, beginning from the juvenile period and gradually becoming habitual (Di Clemente, RJ., Hansen, WB., Ponten, Le., 1996; Igra, V., Irwin, CE., 1996), creating the potential for such risk behaviors to be exhibited when the individual who has developed them begins driving a car or other motor vehicle in the future. It is necessary to provide thorough safety education at an early stage to teach appropriate use of cell phones.

This study clarifies the correlation among the basic attributes of students, cell phone possession and use, manners and norm-consciousness, degree of sensation seeking, and acceptance of risk behaviors.

Existing studies report that male students show higher sensation seeking scores than female students (Terasaki et al., 1987; Watanabe, 1998), and this study showed a similar tendency although the difference was not significant ($p=0.84$). This tendency may

result from a difference in androgenic hormone levels, which makes individuals more active and aggressive.

Second year Junior high school students showed the highest acceptance of risk behaviors, and the 2nd and 3rd year students showed significantly higher acceptance of risk behaviors than 1st year students. This indicates that the higher the grade becomes, the more students accept delinquent and risk behaviors, which was also reported by Kojima & Matsuda in 1999. Second year students have become used to school life and have entered a susceptible period; therefore, they show interest in various areas and become more accepting of risk behaviors.

Furthermore, this study showed that norm-consciousness was lowest in 2nd year students, which was also reported by Usui & Kikkawa in 2007.

Second year students showed significantly high TAS scores, indicating a strong tendency to enjoy thrills and adventures, which seems to increase the acceptance of risk behaviors. Although the difference was not significant, 2nd year students showed lower manner awareness and more sensation seeking scores. This suggests the merit of considering educational measures focusing on the 2nd year students.

Students who have a cell phone showed significantly higher sensation seeking scores and acceptance of risk behaviors than those who do not have a cell phone. This suggests that students who have a higher sensation seeking attitude may tend to become interested in cell phones, which might then lead them to possess a cell phone. In addition, high sensation seeking correlated with high acceptance of risk behaviors. However, due to the characteristics of a cross-sectional study, it is impossible to determine such casual correlations. Clarification requires further study.

Students who use all functions of their cell phones while walking showed low manner awareness and norm-consciousness, and a high sensation seeking attitude and acceptance of risk behaviors. The status of cell phone use while riding a bicycle showed a similar tendency. While there were no significant differences in the status of cell phone use, students who use all functions showed significantly lower manner awareness, which revealed a stronger correlation of manner awareness and status of cell phone use than the status of cell phone possession.

Students who have experienced actual collisions and those who have experienced near-miss collisions during cell phone use while walking or riding a

bicycle showed lower manner awareness and norm-consciousness and a higher sensation seeking attitude and acceptance of risk behaviors than those who reported not having experienced any collisions. The results showed a similarity with the report by Watanabe (1998), namely, a strong correlation between high sensation seeking attitude and risk behaviors, and the report by Ichikawa (2008) which showed a mutual relationship between risk recognition in junior high school students and bicycle collisions during the use of a cell phone.

In this study, students who experienced near-miss collisions showed significantly higher Dis and ES scores than those who reported not having experienced any collisions. As a result, collisions while walking showed a correlation with the tendency to seek ways of being free from traffic rules and manner, and norm-consciousness.

Students who reported experience visiting Internet dating or adult-content sites showed significantly lower norm-consciousness and higher acceptance of risk behaviors and sensation seeking scores (Dis and ES) than those who reported not having experience. This shows that the acceptance of delinquent and risk behaviors of students also promote interest in accessing Internet dating or adult-content sites. In 2009, the National Police Agency reported that 85.0% of the victims of crimes related to the Internet dating sites whose owners were arrested in 2008 were below 18 years of age. Victims under 18 years of age who used a cell phone to access the Internet dating sites was 98.6% (National Police Agency, 2009). This suggests a connection between cell phone use and victimization as well as traffic accidents.

Therefore, the correlation between individual psychological characteristics such as norm-consciousness and sensation seeking attitude in junior high school students clarified in this study will contribute to the consideration of effective measures. However, as was pointed by Watanabe (1998), it is still unknown whether or not sensation seeking attitude may easily change and what educational methods might be effective. Zuckerman (1979) reported that there was a tendency for higher TAS characteristics in individuals engaged in high-risk work such as a firefighting; therefore, it is impossible to simply conclude that reducing the sensation seeking characteristics is the best method.

It is thought that the best way to reduce the students' acceptance of risk behaviors is not to reduce

sensation seeking characteristics, but to teach a code of conduct and increase norm-consciousness and awareness of manners. In other words, one way of reducing risk behaviors related to cell phone use is to teach information ethics and a code of conduct including the proper cell phone use.

The rate of cell phone possession among junior high school students will increase and the problems related to cell phone use will increase along with it. It is essential to establish measures to increase psychosocial factors that reduce risk behaviors regarding cell phone use revealed in this study.

A limitation of this study is the low number of students who have experience visiting Internet dating or adult-content sites and those who have experienced collisions while using a cell phone. It is necessary to conduct research targeting more subjects in these categories.

5. Conclusion

This study was carried out to examine the correlation between risk behaviors and psychosocial factors related to cell phone use among junior high school students. Psychosocial factors such as norm-consciousness and sensation seeking have been correlated with risk behaviors in many existing studies; however, the correlation with risk behaviors has not been examined.

This study clarified the following:

1. The rate of possession of cell phones was 52.5% for male students and 67.3% for female students, and that the higher the grade becomes, the higher the possession rate becomes.

2. The rate of students who use a cell phone while walking was 60% or more for both male and female students. The rate of students who use a cell phone while riding a bicycle was 56.8% for male students and 36.5% for female students. The rate of students who have experienced actual collisions with pedestrians or bicycles was approximately 3%; however, the rate of students who have experienced near-miss accidents while walking was 18.1% and those who have experienced near-miss accidents while riding a bicycle totaled 27.0%.

3. The rate of students who have experience visiting Internet dating or adult-content sites was around 2%.

4. Students who have a cell phone showed significantly higher scores in acceptance of risk

behaviors, sensation seeking, TAS, and Dis than those who do not have a cell phone.

5. Students who use all functions while walking showed the highest scores of acceptance of risk behaviors and sensation seeking scores and the lowest scores of manner awareness and norm-consciousness.

6. Students who have experienced actual collisions during the cell phone use while both walking and riding a bicycle showed the highest in acceptance of risk behaviors and sensation seeking scores and lowest in manner awareness and norm-consciousness, followed by those who have experienced near-miss collisions and those who have not experienced any collisions.

7. Students who have experience visiting Internet dating or adult-content sites showed significantly lower norm-consciousness and higher acceptance of risk behaviors and sensation seeking (Dis and ES) than those who do not have experience.

The results of this clarified that risk behaviors related to cell phone use are correlated with psychosocial factors. Because the rate of cell phone possession in junior high school students will increase, it is necessary to take quick measures to reduce risk behaviors related to cell phone use.

However, this study is limited due to the small number of students who have experience visiting Internet dating or adult-content sites and those who have experienced actual accidents during the cell phone use. Therefore, it is necessary to conduct further research with more subjects.

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