

An Analysis of the Factors that Influence Internet Searches on Cyber Bullying Using Social Big Data

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Introduction

- **Education**

- Ph.D. in Criminal Justice, School of Criminal Justice, Michigan State University
- M. A. in Criminal Law, College of Law, Hanyang University
- B. A. in Law, College of Law, Hanyang University

- **Professional Background**

- Associate Research Fellow, Korean Institute of Criminology
- Assistant Professor, Department of Criminology, University of West Georgia

- **Research Interest**

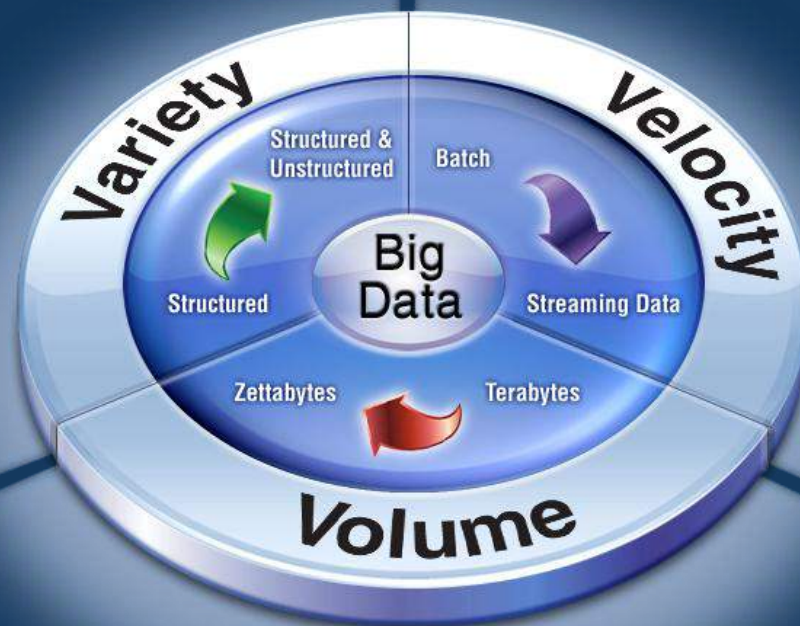
- Delinquency (Bullying, Cyber Bullying, Underage Prostitution)

What is Big Data?

- “Every day, we create 2.5 quintillion bytes of data — so much that 90% of the data in the world today has been created in the last two years alone. This data comes from everywhere: sensors used to gather climate information, posts to social media sites, digital pictures and videos, purchase transaction records, and cell phone GPS signals to name a few.

This data is “big data.”

The 3 Vs: Volume, Velocity, Variety + The 2Vs, 1C: Veracity, Value, Complexity



Big Data Analysis Example



US health care

- \$300 billion value per year
- ~0.7 percent annual productivity growth



Europe public sector administration

- €250 billion value per year
- ~0.5 percent annual productivity growth



Global personal location data

- \$100 billion+ revenue for service providers
- Up to \$700 billion value to end users



US retail

- 60+% increase in net margin possible
- 0.5–1.0 percent annual productivity growth



Manufacturing

- Up to 50 percent decrease in product development, assembly costs
- Up to 7 percent reduction in working capital

Whom does it matter?

- Research Community
 - Social Science
 - Criminology
 - Crime Prevention
- Business Community
 - New tools, new capabilities, new infrastructure, new business models etc.
- On sectors

The Research Project

- Risk Terrain Modeling
 - Big Data from police, criminal career
 - GIS software
 - Hot spot → Prediction on Crime
 - Risk factors on Environment → Crime rate

The Social Layer in an Instrumented Interconnected World

12+ TBs
of tweet data
every day

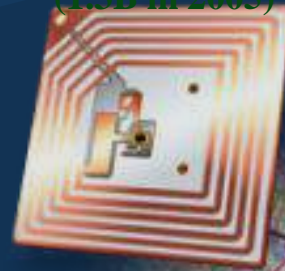


? TBs of
data every day



25+ TBs of
log data
every day

30 billion
RFID tags today
(1.3B in 2005)



4.6 billion
camera
phones
world wide



100s of million
s of
GPS
enable
d devices
sold
annually



76 million smart
meters in 2009...
200M by 2014



http://www.

2+ billion
n people
on the
Web by
end 2011

Definition of Cyber Bullying

- **Computers in Human Behavior**

<http://www.sciencedirect.com/science/article/pii/S0747563213003579>

- Willful and repeated harm inflicted through the medium of electronic text(Hiduja and Patchin, 2006)
- Cyber bullying involves the intentional use of e-mail, networking sites, cell phones, chat rooms, websites and other forms of internal communications to harass, threaten, or victimize an individual or a group by an individual or group

Cyber Bullying

- Involves the intentional use of e-mail, networking sites, cell phones, chat rooms, websites and other forms of internal communications to harass, threaten, or victimize an individual or a group by an individual or group.
- Two main forms:
 - Internet
 - Cell phones

The appeal of cyber bullying is that one may remain anonymous. Bullying a victim is easier when the effects are not seen by the bully.

Cyber Bullying and the Effects

Physical

Psychological

Emotional

Physical

- loss or gain
- Bruises or cuts
- Substance abuse
- Death

Cyber Bullying and the Effects

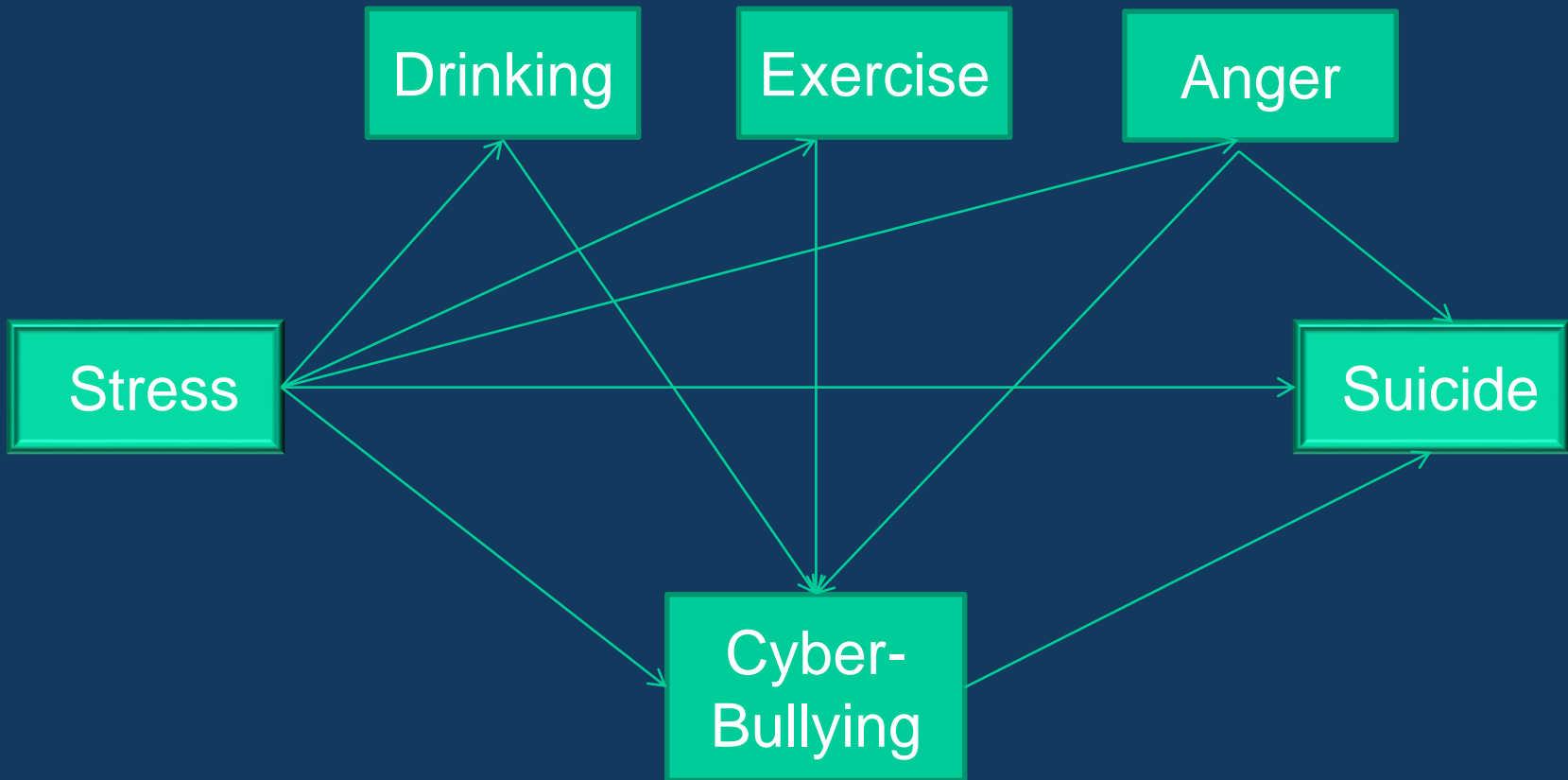
Psychological

- Anxiety
- Depression
- Loss of self worth
- Loss of self esteem

Emotional

- Extreme sensitivity
- Aggression
- Helplessness

The Model



Level 2

- Economically active population
- Rental Price Index
- Suicide Rate

Level 1

- Searching Suicide
- Searching Stress
- Searching Alcohol
- Searching Exercise
- Searching Anger



Cyberbullying
Searching

Measurement

- 2011.1.1.~ 2012. 12. 31.
 - 371,209 Buzz
 - Suicide
 - Stress
 - Drinking
 - Exercise
 - Anger
- Multilevel Modeling
- Level 1 : Suicide, Stress, Alcohol, Exercise, Anger
- Level 2 : Economically active population,
Rental price index, Suicide rate

<Table 1> Multivariate normality of the main variables

Year	Searching Cyberbullying				Searching Suicide				Searching Stress			
	Mean ±S.D.	K ^{a)}	S ^{b)}	N ^{c)}	Mean ±S.D.	K ^{a)}	S ^{b)}	N ^{c)}	Mean ±S.D.	K ^{a)}	S ^{b)}	N ^{c)}
2011	270.13 ±302.27	21.87	3.87	98,082	7.36 ±33.49	41.44	6.29	8,033	4.90 ±4.04	13.07	3.09	1,788
2012	744.84 ±651.88	79.63	7.38	271,808	21.95 ±35.52	69.48	6.83	8,033	9.72 ±5.32	8.97	2.05	3,556
Year	Searching Alcohol				Searching Exercise				Searching Anger			
	Mean ±S.D.	K ^{a)}	S ^{b)}	N ^{c)}	Mean ±S.D.	K ^{a)}	S ^{b)}	N ^{c)}	Mean ±S.D.	K ^{a)}	S ^{b)}	N ^{c)}
2011	7.86 ±8.12	45.50	5.88	2,868	6.89 ±5.24	26.41	4.01	2,515	1.85 ±2.63	32.59	4.56	674
2012	12.22 ±7.16	9.41	2.34	4,473	11.07 ±6.45	24.42	3.37	4,050	2.65 ±2.43	18.55	3.00	971

* a) Kurtosis, b) Skewness, c) Number of case

<Table 2> The mediating effect between stress vulnerable factors (exercise, alcohol) and anger search

Route	Alcohol			Exercise		
	Total Effect	Direct Effect	Indirect Effect	Total Effect	Direct Effect	Indirect Effect ¹⁾
Stress -> Cyberbullying	.488	.354	.135*	.488	.355	.133*
DP→MP²⁾	.488* → .354*			.488* → .355*		
Route	Anger			Cyberbullying		
	Total Effect	Direct Effect	Indirect Effect	Total Effect	Direct Effect	Indirect Effect ¹⁾
Stress -> Suicide	.595	.517	.078*	.595	.322	.273*
DP→MP²⁾	.595* → .517*			.595* → .322*		
Cyberbullying -> Suicide	.716	.654	.062*			
DP→MP²⁾	.716* → .654*					

* a) Sobel Test: * p<0.01

b) Mediator Effect: DP(Direct Path coefficient), MP(Mediator Path coefficient)

<Table 5-1> Koreans' cyberbullying search determinants in the multi-level model (Fixed effect)

Parameter	Model	Unconditional Model		Unconditional Slope Model		Conditional Model	
		Coef.	S.E.	Coef.	S.E.	Coef.	S.E.
Fixed Effect		Coef.	S.E.	Coef.	S.E.	Coef.	S.E.
Level 1	Intercept (γ_{00})	2.58	0.07**	2.30	0.08**	2.31	0.05**
	Searching Suicide			0.09	0.02**	0.09	0.02**
	Searching Stress			0.02	0.02	0.02	0.02
	Searching Alcohol			0.05	0.02**	0.06	0.02**
	Searching Exercise			0.14	0.03**	0.14	0.03**
	Searching Anger			0.02	0.03	0.02	0.02
Level 2	Economically active population					-0.00	0.00*
	Rental Price Index					0.07	0.01**
	Suicide Rate					-0.01	0.01

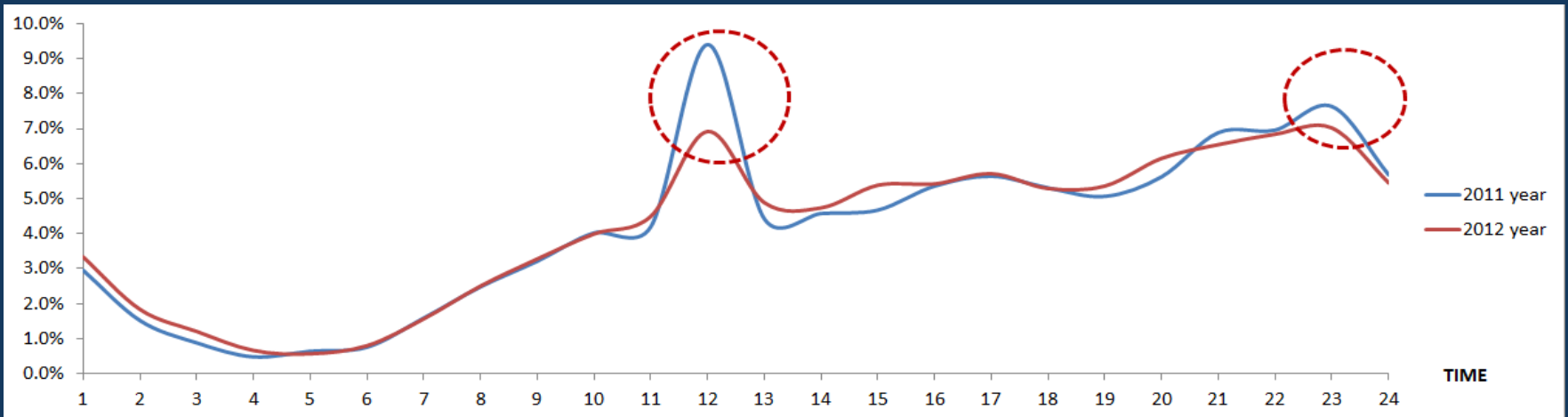
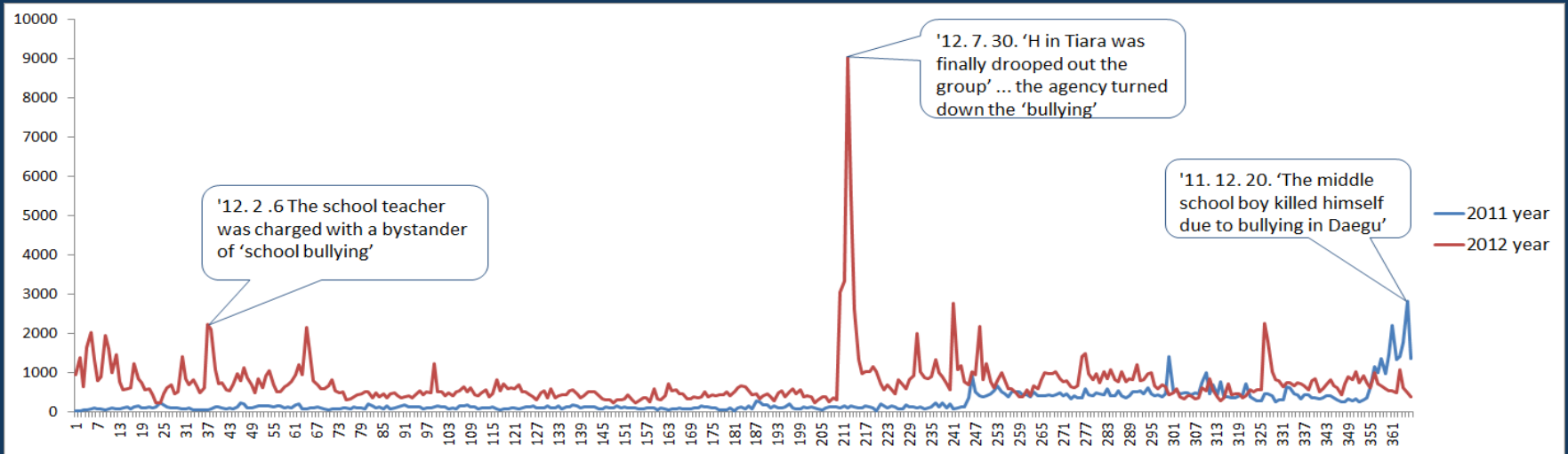
a)**p<.01, * p<.05

<Table 5-2> Koreans' cyberbullying search determinants in the multi-level model (Random effect)

Parameter	Unconditional Model		Unconditional Slope Model		Conditional Model	
	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.
Random Effect						
level 2,	0.124	2961.63**	0.135	215.66**	0.045	100.28**
level 1,	0.030		0.018		0.018	
Searching Suicide			0.01	48.28**	0.01	52.71**
Searching Stress			0.00	30.39		
Searching Alcohol			0.00	13.39		
Searching Exercise			0.02	37.00*	0.02	47.33**
Searching Anger			0.01	38.50*	0.01	31.77
ICC	.805		.882		.714	

a)**p<.01, * p<.05

- Multivariate Analysis of Factors for cyber bullying using Social Big Data



The Closing Comment



Thank you

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Contact Information

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