Gaming and gaming addiction in adolescence: Possible consequences

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% of Norwegian adolescents who play video games

	Boys	Girls
Daily or almost daily	41 %	6 %
Several days per week	33 %	12 %
One day per week	12 %	16 %
1-3 days per month	9 %	30 %
Never or almost never	4 %	37 %
	100 %	100 %

Frøyland, Hansen, Sletten, Torgersen & von Soest, 2010

«Gaming addiction»

- Is not a diagnostic category in the ICD or DSM
  – Foot in the door in DSM-V: «Internet use disorder» included as a subject of further empirical inquiry.

- Nevertheless, excessive gaming is associated with a host of different problems (Griffiths, Kuss & King, 2012)

Defining «gaming addiction»

''The persistent inability to control excessive gaming habits despite associated social or emotional problems''

(Lemmens, Valkenburg, & Peter, 2011, p. 38).

Strong engagement vs. addiction

Engagement vs. addiction

- Gaming engagement = peripheral addiction criteria, e.g.
  - Cognitive salience
  - Tolerance
  - Euphoria
- Gaming addiction = core addiction criteria, e.g.
  - Conflict
  - Withdrawal symptoms
  - Relapse and reinstatement
  - Behavioral salience

Charlton & Danforth, 2007

Gaming Addiction, Gaming Engagement, and Psychological Health Complaints Among Norwegian Adolescents

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Distinguishing high engagement with games from gaming addiction has been a challenge for researchers. We present evidence that an established self-report instrument can be used to distinguish

Data

- Data from the WHO survey Health Behavior in School-Aged Children (HBSC) 2009/10 (Currie et al., 2009).

- A nationally representative sample of Norwegian eight graders

- N= 1,320 (688 girls, 632 boys), mean age = 13.6 (SD D 0.32) years

Game addiction scale for adolescents (Lemmens et al. 2009)

How often…

Salience
Did you think about playing a game all day long?

Tolerance
Did you spend increasing amounts of time on games?

Mood Modification
Did you play games to forget about real life?

⟶ Engagement items

Relapse
Have others unsuccessfully tried to reduce your game use?

Withdrawal
Have you felt bad when you were unable to play?

Conflict
Did you have fights with others (e.g., family, friends) over your time spent on games?

Problems
Have you neglected other important activities (e.g., school, work, sports) to play games?

⟶ Addiction items

Gaming categories

- 1) **Addicted gamers** endorsed all four addiction items
- 2) **Problem gamers** endorsed two or three addiction items
- 3) **Highly engaged gamers** endorsed all the three engagement items, and 0 or 1 addiction item
- (4) Other adolescents = non-addicted/non-problem/non-highly engaged)

Psychological health complaints

- Six items from the Health Behavior in School-Aged Children Symptom Checklist (Haugland & Wold, 2001)

- "How often have you experienced the following":
  - Feeling low
  - Being irritable or in a bad mood
  - Feeling nervous
  - Difficulties sleeping
  - Tired and exhausted
  - Afraid.

- Scored 1 = regularly, 0 = not regularly

Research question

- Do the groups of gamers differ in terms of psychological health complaints?

Gaming engagement, gaming addiction and psychological health complaints

	Feeling low	Irritability or bad mood	Nervous	Trouble sleeping	Tired and exhausted	Afraid
	RR (95% CI)	RR (95% CI)	RR (95% CI)	RR (95% CI)	RR (95% CI)	RR (95% CI)
Contrast group	1.00	1.00	1.00	1.00	1.00	1.00
Highly engaged gamers	1.25 (0.56-2.76)	1.56 (0.95-2.55)	1.40 (0.66-2.95)	0.93 (0.50-1.74)	1.47 (0.92-2.36)	1.11 (0.16-7.87)
Problem gamers	1.69 (1.18-2.43)**	1.56 (1.16-2.11)**	1.91 (1.32-2.77)**	1.95 (1.49-2.54)***	1.89 (1.47-2.44)***	4.29 (2.42-7.61)***
Addicted gamers	2.13 (1.25-3.63)**	2.93 (2.16-3.98)***	4.59 (3.06-6.88)***	1.90 (1.21-2.99)**	2.95 (2.16-4.03)***	8.33 (4.53-15.32)***

Adjusted for gender and physical exercise; *P<0.05, ** P<0.01, ***P<0.001.

Conclusion

"…the risk of psychological health complaints was greater for gaming addicts and problem gamers compared to adolescents without problems and with high engagement."

"The current study supports the growing notion that gaming addiction and strong engagement with games are qualitatively different phenomena."

Study II

«Possible consequences of video gaming and gaming addiction: A first differencing approach»

Previous studies

- Studies have shown that game **playing** is:
- Positively associated with depression (Lemona et al., 2011)
- Negatively associated with academic performance (Gentile et al., 2004; Anand, 2007)
- Positively associated with drinking (Ream et al., 2011).
- Positively associated with conduct problems (Holtz & Appel, 2011)

Previous studies

- Studies have shown that video game **problems** are:
- Positively associated with depression
  - (Gentile et al., 2011; Mentzoni et al., 2010),
- Negatively associated with academic performance
  - (Chang & Law, 2008; Hawi, 2012; Skoric et al., 2009),
- Positively associated with drinking
  - (Ream et al., 2011).
- Positively associated with conduct problems (Jeong et al., 2010; Rebein et al., 2010)

Research questions

- Are **both** the amount of gaming and the amount of problems related to

- 1) Depression?

- 2) School achivement?

- 3) Binge drinking?

- 4) Conduct problems?

Data

- "Young in Norway 2010-2012" Longitudinal school based survey of adolescents.

- Representative sample of Norwegian adolescents (8 490) aged 12 to 17 collected spring 2010. Response rate 73%

- A subsample of 2 450 participated twice, in 2010 and 2012.
    - 29% response rate
    - About 30% of attrition was due to declining second survey in 2010
    - The rest of the attrition was mainly due to refusal at the school level + missing addresses.

- Those aged 12 (elementary school) not included in analysis (different questionnaire)

- Some selection bias: Gender, age and school grades predicted attrition.
- Data were weighted for gender, age and school grades.

- Analyses based on N=1928, 55.5% female
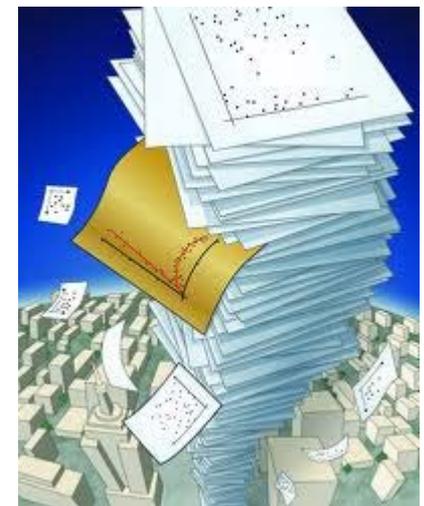
Measures

- Gaming amount: quantity x frequency per month
- Game addiction scale for adolescents (Lemmens et al., 2009). Continuous, range 1-5
- School grades: Average of Norwegian, Maths and English.
- Depression: 6 items from SCL-90 (Derogatis et al., 1974)
- Frequency of alcohol intoxication
- Conduct problems…

Conduct problems (Pedersen et al., 2001).

- «Serious»
  - Theft > NOK 1000
  - Vandalizing > NOK 1000
  - Breaking windows etc.
  - Burglary
  - Fighting with weapon
- «Aggressive»
  - Violent quarrel with teacher
  - Cursing in front of teacher
  - Summoned to school principal
  - Sent out of classroom
- «Covert»
  - Sneaking into bus, cinema, without paying
  - Playing truant
 - Theft<NOK 500
  - Being away whole night

Descriptives

	Mean	Std. Dev.	Min	Max
Gaming amount (h)	23,56	46,51	0	210
Gaming addiction	1,37	0,61	1	5
Depression	1,89	0,73	1	4
Grades	3,98	0,80	2	6
Binge drinking	1,50	1,60	0	5
Serious CP	0,13	0,51	0	5
Aggressive CP	0,32	0,32	0	4
Covert CP	0,66	0,93	0	4

Cross sectional results (everything measured at t2)

	Depression	Grades	Binge drinking	Serious CP	Aggressive CP	Covert CP
Gaming amount	-0.01**	-0.01***	-0.03**	0.03***	0.06***	0.03*
Gaming problems	0.16***	-0.08***	-0.22*	0.35***	0.62***	0.50***

Coefficients are elasticities: 1% change in IV = X% change in DV.

The third variable problem...

Gaming

Drinking

?
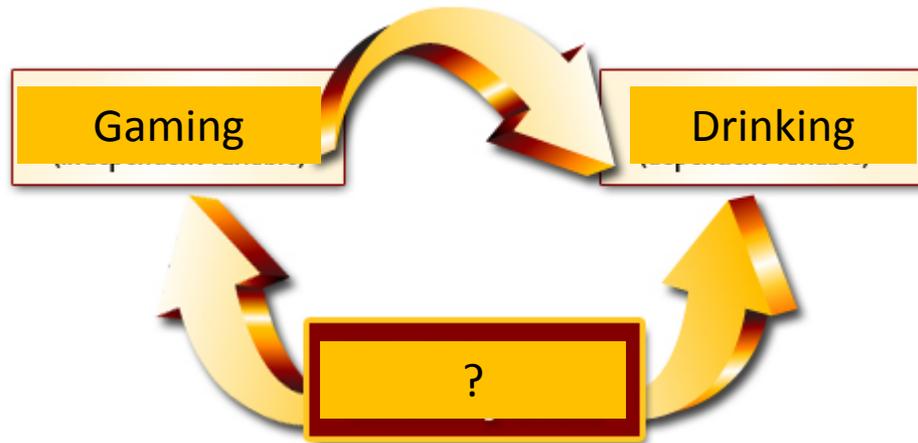
- Impulsivity, «addictive personality», SES, home town?

First differencing

- Is used to address the problem of omitted variables in regression analysis.

- Requires panel data

- By regressing change in a dependent variable on change in an independent variable, the confounding influence of time-invariant third variables is removed (e.g. gender, birthyear, SES-background, personality, ability).

Wooldridge, Jeffrey M. (2001). *Econometric Analysis of Cross Section and Panel Data*. MIT Press.

Allows for…

Gaming → Drinking

Not controlling for 3rd variables
Cross sectional results:

	Depression	Grades	Binge drinking	Serious CP	Aggressive CP	Covert CP
Gaming amount	-0.01**	-0.01***	-0.03**	0.07***	0.09***	0.02
Gaming problems	0.16***	-0.08***	-0.22*	0.35***	0.62***	0.50***

Controlling for time invariant 3rd variables: First difference method

	ΔDepression	ΔGrades	ΔBinge drinking	ΔSerious CP	ΔAggressive CP	ΔCovert CP
ΔGaming amount	0.00	-0.00	-0.02	0.01	0.05**	0.03*
ΔGaming problems	0.25***	-0.05***	-0.01	0.19*	0.51***	0.57***

Coefficients are elasticities: 1% change in IV = X% change in DV.

Conclusions

Gaming **amount** is weakly (negligibly) associated with depression, school acheivement, binge drinking and conduct problems.

Gaming **problems** are weakly (negligibly) associated with binge drinking.

…but associated with depression
- A 10% increase in gaming problems = 2.5% increase in depression.

…and conduct problems.
- A 10% increase in gaming problems =
  - 1.9% increase in «serious» CP
  - 5.1% increase in «aggressive» CP
  - 5.7% increase in «covert» CP

Limitations

- Attrition
- Direction of causality
- Time *variant* confounders not controlled for
- Self report bias
- Blind to game content/category

Implications for research

- Should focus on problems associated with gaming, not on the amount of gaming

- Come to an agreement concerning definitions and on which measures to use (King et al., 2013)

- Continue efforts to establishing causal relationships and directionality
  - Experimental studies
  - Longitudinal studies

Implications for treatment

- Adolescents who have problems with gaming, probably have other problems too
  - A broad focus may be necessary

- If problems with gaming goes untreated, or treatment is delayed, it could lead to more problems, which makes treatment more complex.

Thanks for your attention!