

Risks and Side Effects of Digital Information Technology in Health, Education & Society

Manfred Spitzer, M.D., Ph.D.

Ulm University

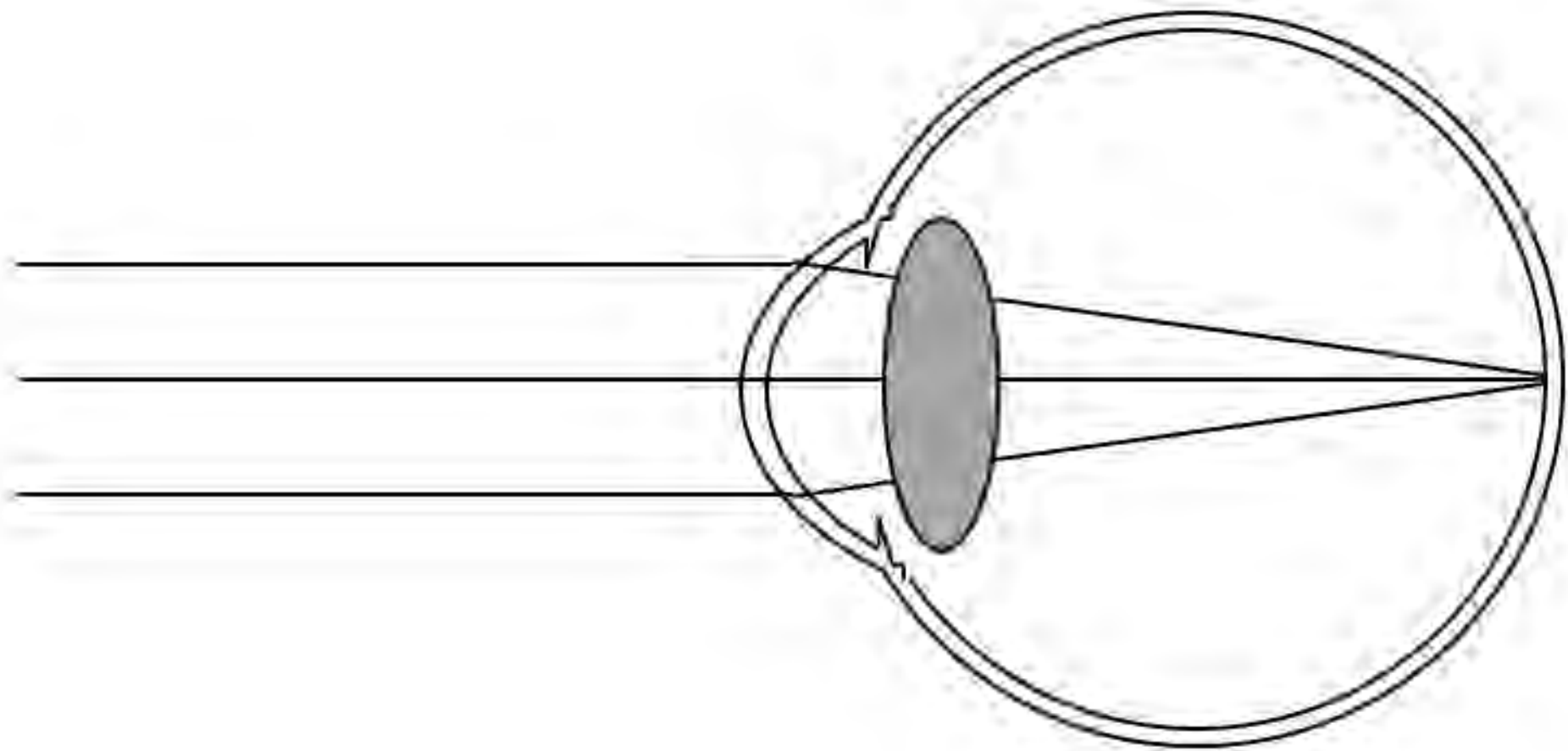
Health: Risks and Side Effects (body)

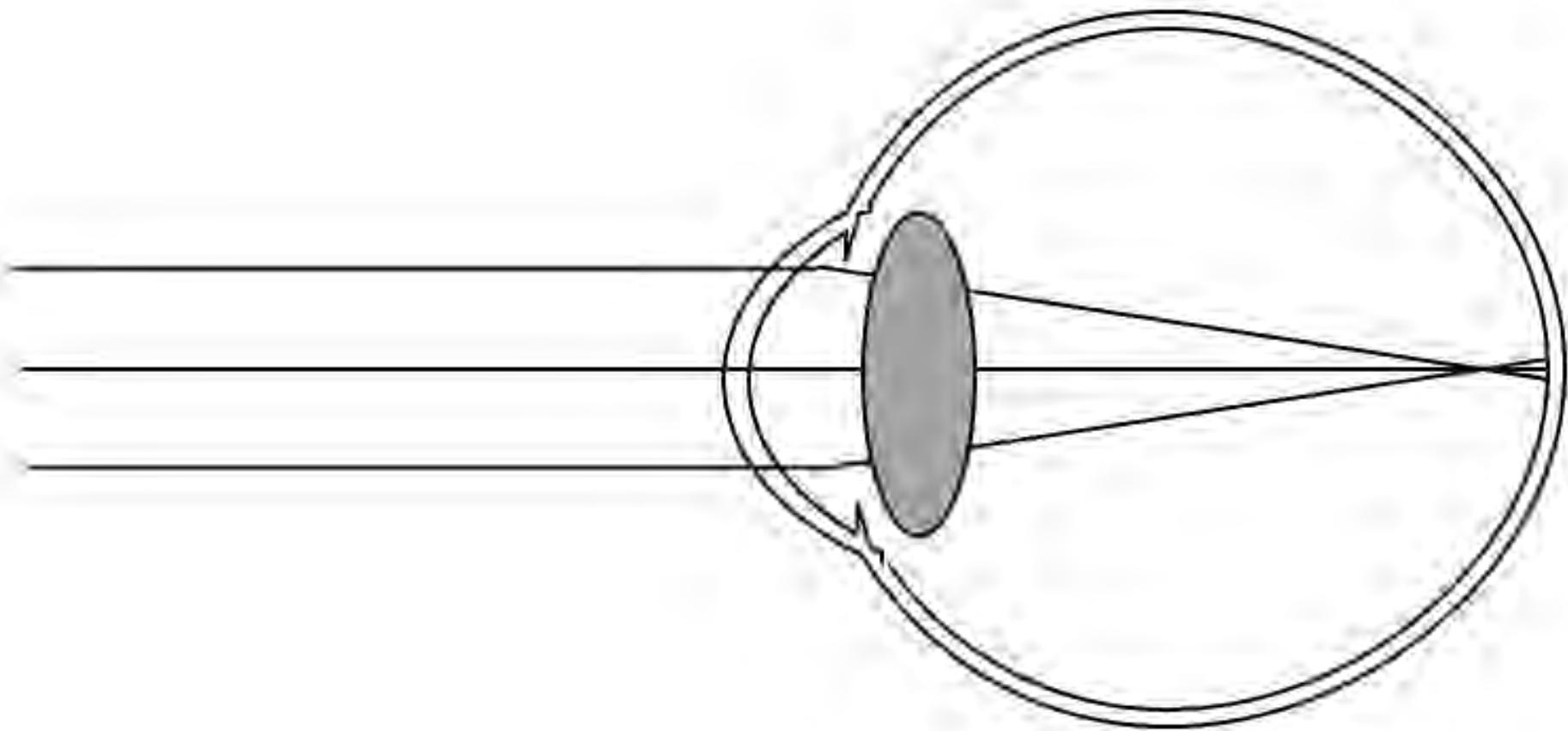
- bad body posture
- Overweight
- Diabetes (Stroke, heart attack)
- Hypertension (Stroke, heart attack)
- Short sightedness
- Sleep disorders
- Stress (Infections, cancer)
- high-risk behavior (road accidents, STMs)

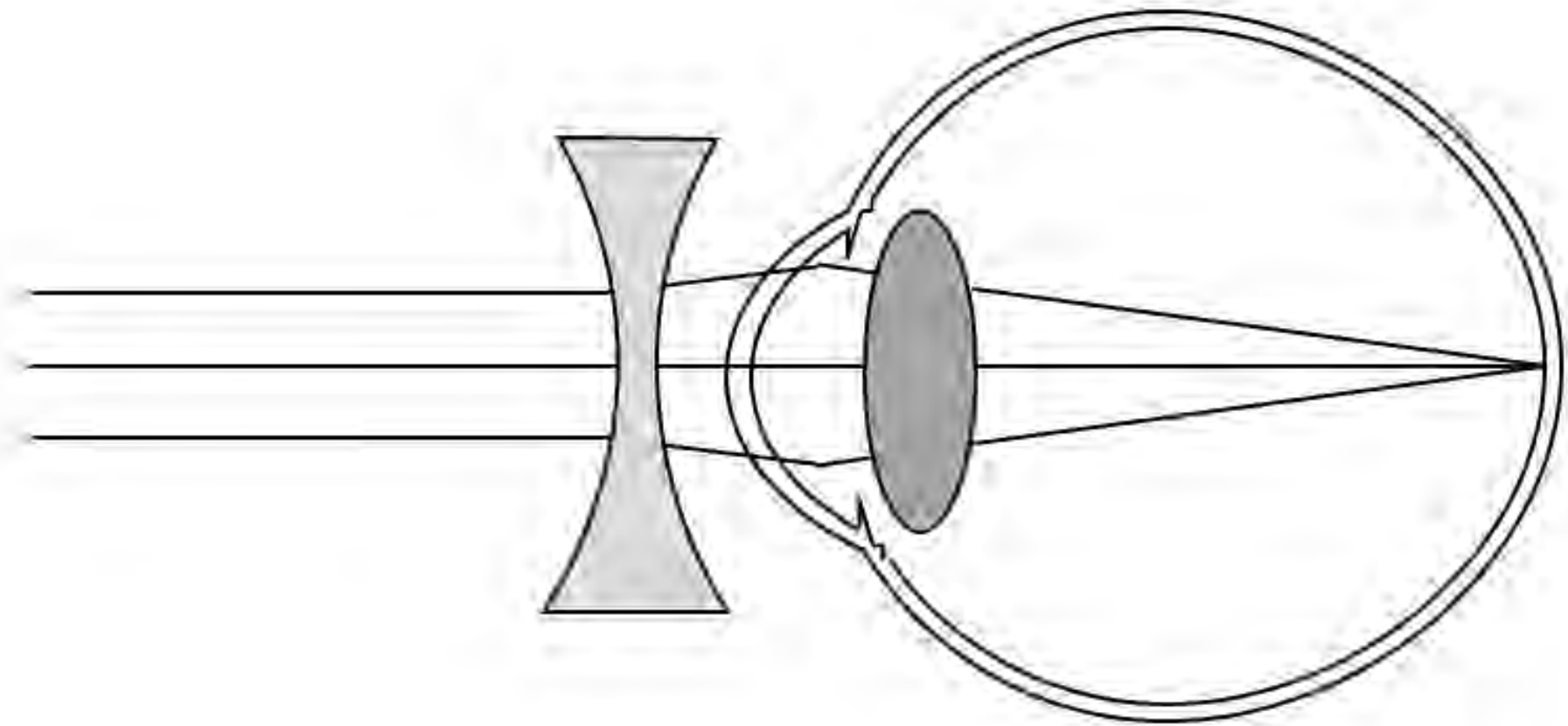
Risks and Side Effects (body)

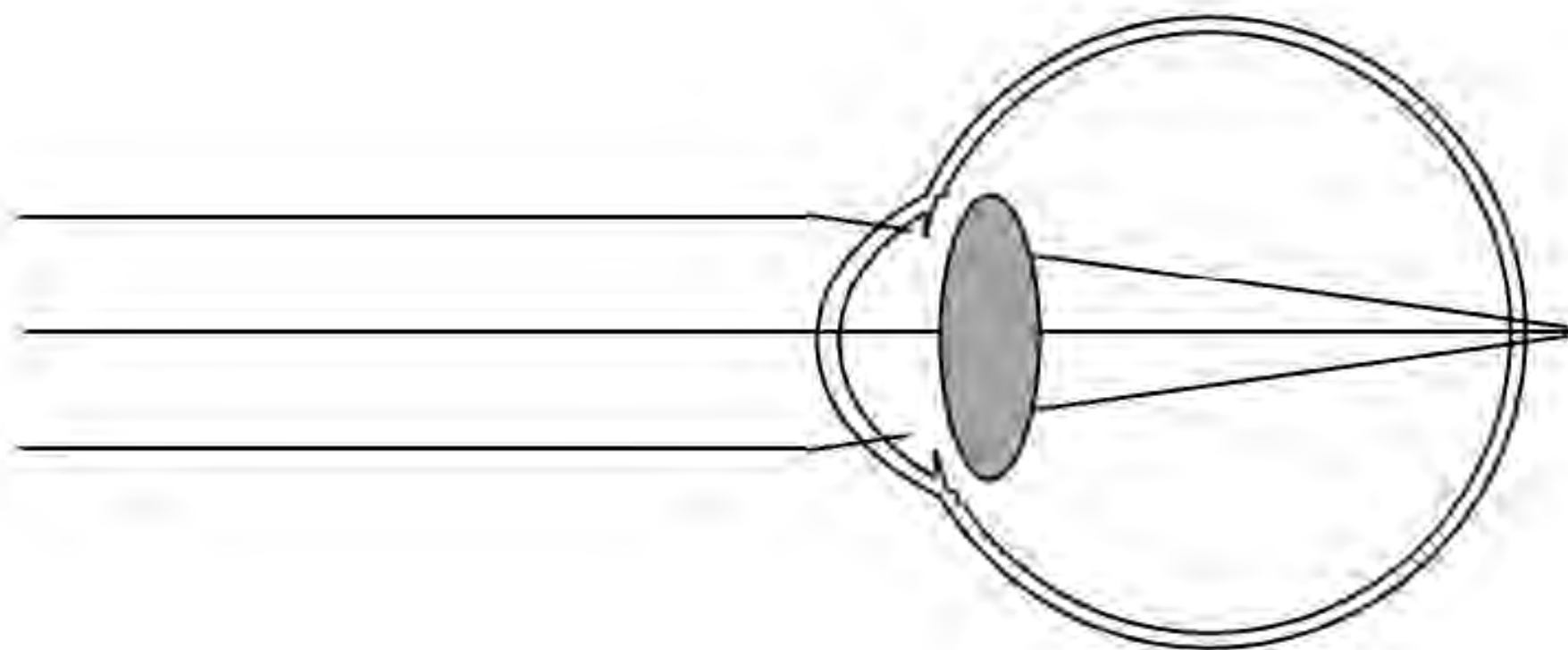
- bad body posture
- Overweight
- Diabetes (Stroke, heart attack)
- Hypertension (Stroke, heart attack)
- Short sightedness (Myopia)
- Sleep disorders
- Stress (Infections, cancer)
- high-risk behavior (road accidents, STMs)

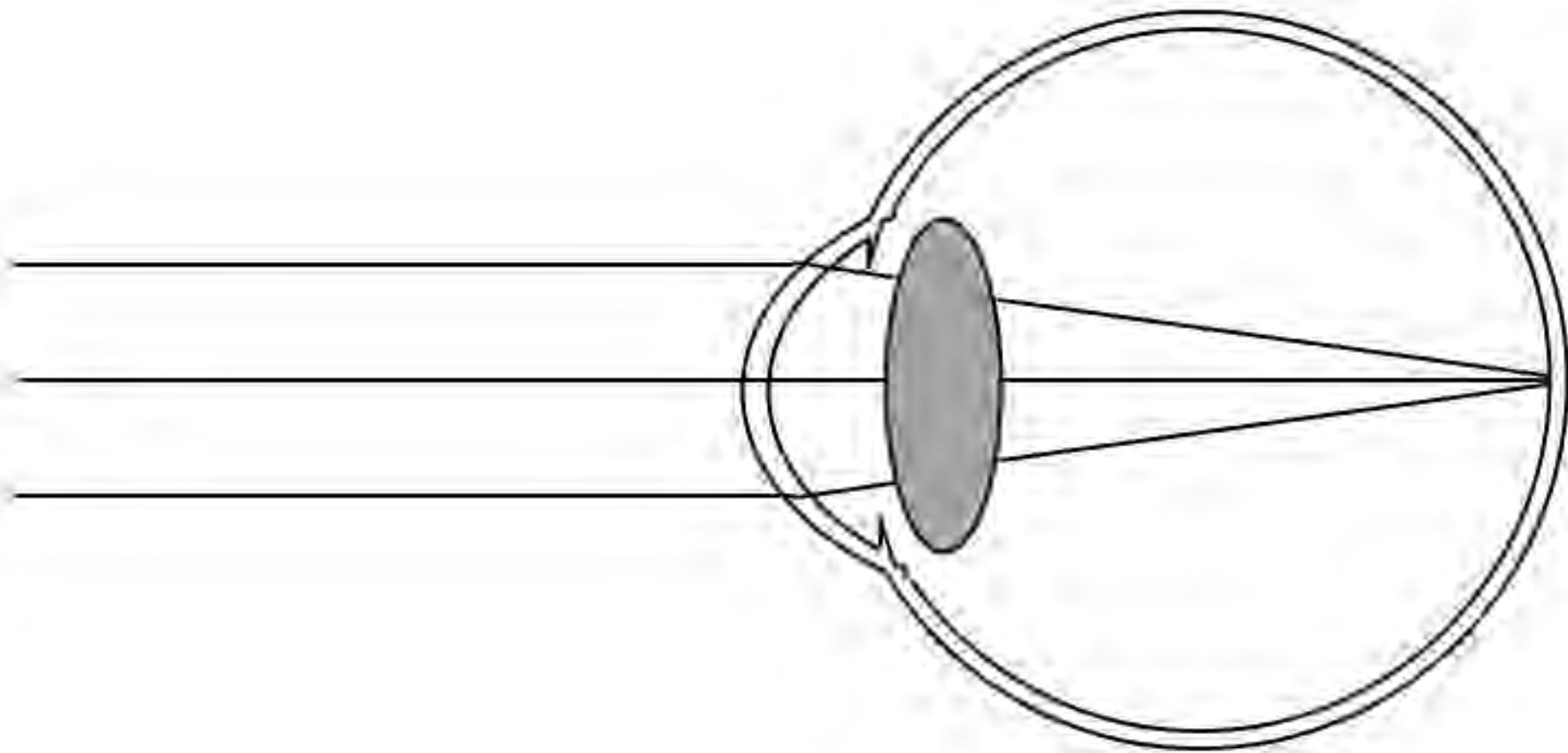


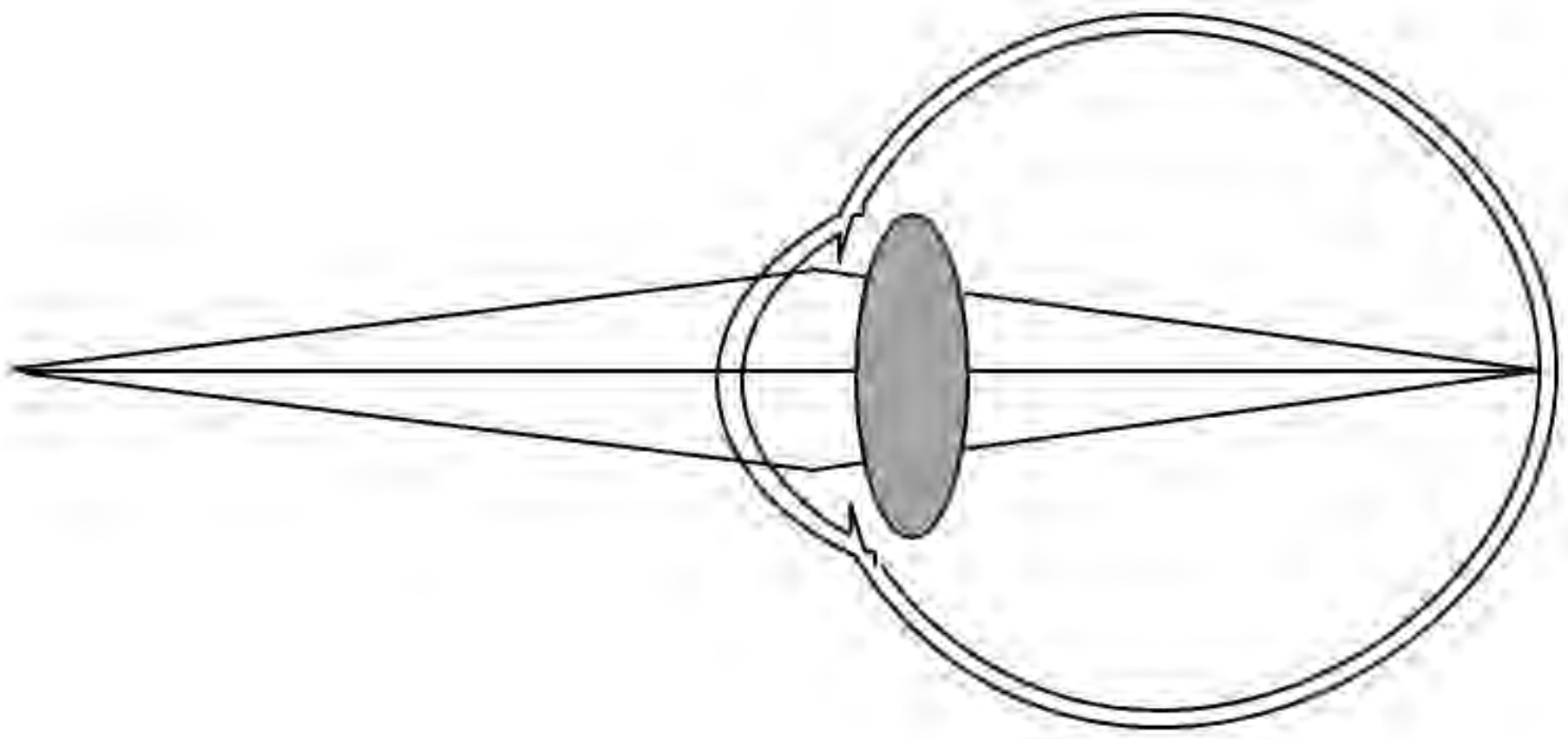


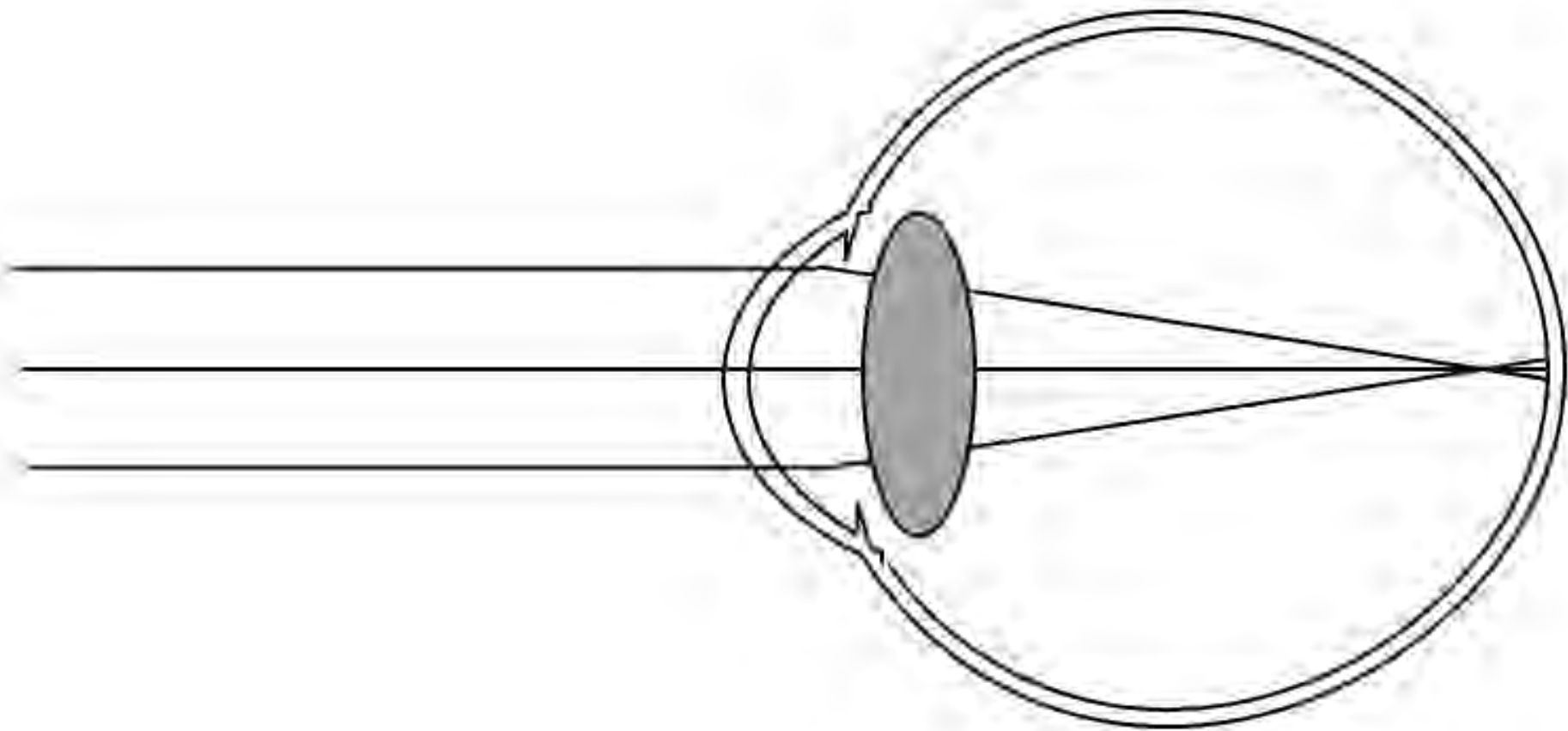












Prevalence of refractive error in Europe: the European Eye Epidemiology (E³) Consortium

Katie M. Williams^{1,2} · Virginie J. M. Verhoeven^{3,4} · Phillippa Cumberland⁵ · Geir Bertelsen^{6,7} · Christian Wolfram⁸ · Gabriëlle H. S. Buitendijk^{3,4} · Albert Hofman⁴ · Cornelia M. van Duijn⁴ · Johannes R. Vingerling^{3,4} · Robert W. A. M. Kuijpers^{3,4} · René Höhn⁸ · Alireza Mirshahi⁸ · Anthony P. Khawaja⁹ · Robert N. Luben⁹ · Maja Gran Erke^{6,7} · Therese von Hanno^{10,11} · Omar Mahroo¹ · Ruth Hogg¹² · Christian Gieger¹³ · Audrey Cougnard-Grégoire^{14,15} · Eleftherios Anastasopoulos¹⁶ · Alain Bron¹⁷ · Jean-François Dartigues^{14,15} · Jean-François Korobelnik^{14,15} · Catherine Creuzot-Garcher¹⁷ · Fotis Topouzis¹⁶ · Cécile Delcourt^{14,15} · Jugnoo Rahi^{5,18} · Thomas Meitinger^{19,20} · Astrid Fletcher²¹ · Paul J. Foster^{9,18} · Norbert Pfeiffer⁸ · Caroline C. W. Klaver^{3,4} · Christopher J. Hammond^{1,2}

Received: 20 August 2014 / Accepted: 3 March 2015 / Published online: 18 March 2015

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Relative frequency of short sightedness in people under the age of 20 years

- (for comparison) retired people, global: 1-5%
- Europe: 30%
- China: 80%
- South-Korea: >95%

What to do about it?

- It is caused by interfering with normal development
- There is no right way to look at a smartphone screen as long as your eyes develop.
- The dosage makes the poison!
- Therefore, we have to protect children and adolescents!
- Adults: no action needed

Risks and Side Effects: Education

- Decreased attention
- Decreased learning
- Decreased knowledge
- More dementia

Association between mobile phone use and inattention in 7102 Chinese adolescents: a population-based cross-sectional study

Feizhou Zheng¹, Peng Gao¹, Mindi He¹, Min Li¹, Changxi Wang², Qichang Zeng³, Zhou Zhou¹, Zhengping Yu¹ and Lei Zhang^{1*}

Zheng *et al. BMC Public Health* 2014, **14**:1022
<http://www.biomedcentral.com/1471-2458/14/1022>



Abstract

Background: The dramatic growth of mobile phone (MP) use among young people has increased interest in its possible health hazards in this age group. The aim of this cross-sectional study was to investigate the association between MP use and inattention in adolescents.

Results: In total, 7102 (91.99%) valid questionnaires were obtained. After adjusted for confounders, inattention in adolescents was significantly associated with MP ownership, the time spent on entertainment on MP per day, the position of the MP during the day and the mode of the MP at night. The strongest association between inattention and the time spent on the MP was among students who spent more than 60 minutes per day playing on their MP.



Contents lists available at [ScienceDirect](#)

Teaching and Teacher Education

journal homepage: www.elsevier.com/locate/tate

The myths of the digital native and the multitasker

Paul A. Kirschner^{a, b, *}, Pedro De Bruyckere^c

^a *Open University of the Netherlands, The Netherlands*

^b *Oulu University, Finland*

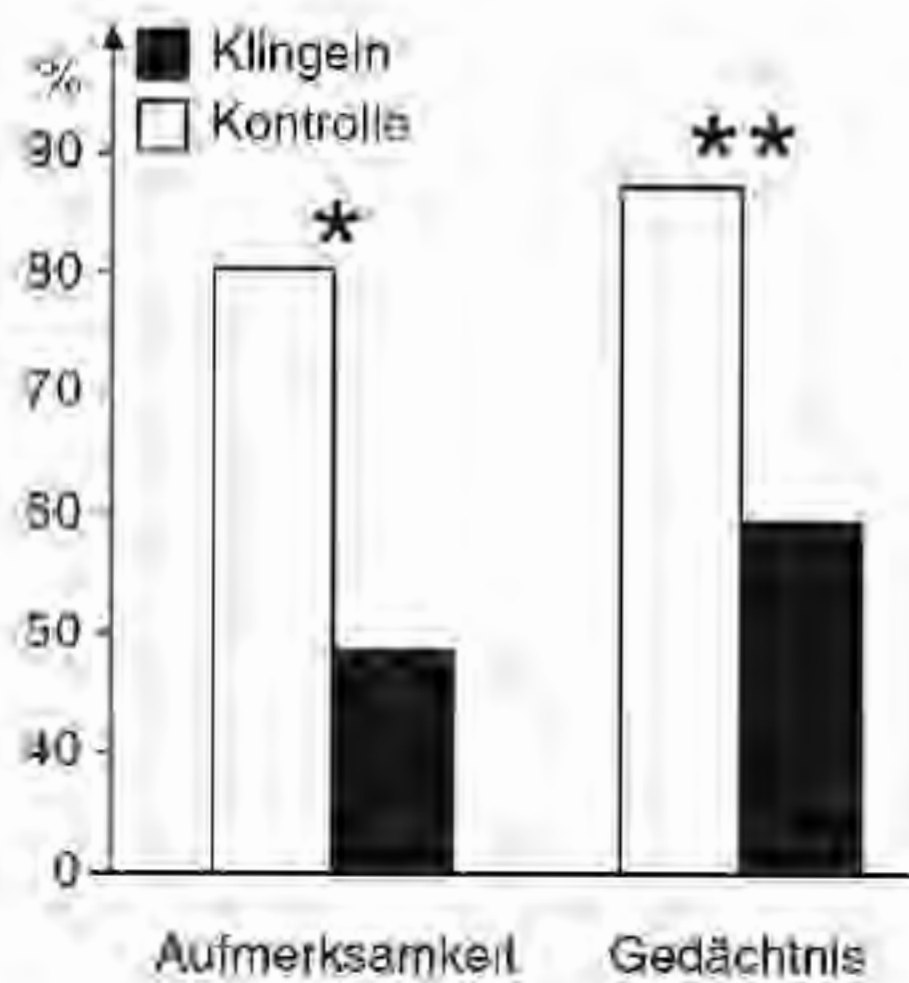
^c *Artevelde University College Ghent, Belgium*

Teaching of Psychology, 37: 55–57, 2010
Copyright © Taylor & Francis Group, LLC
ISSN: 0098-6283 print / 1532-8023 online
DOI: 10.1080/00986280903425912



Costly Cell Phones: The Impact of Cell Phone Rings on Academic Performance

Christian M. End, Shaye Worthman, Mary Bridget Mathews,
and Katharina Wetterau
Xavier University



Journal of the Association for Consumer Research (JACR) 2017

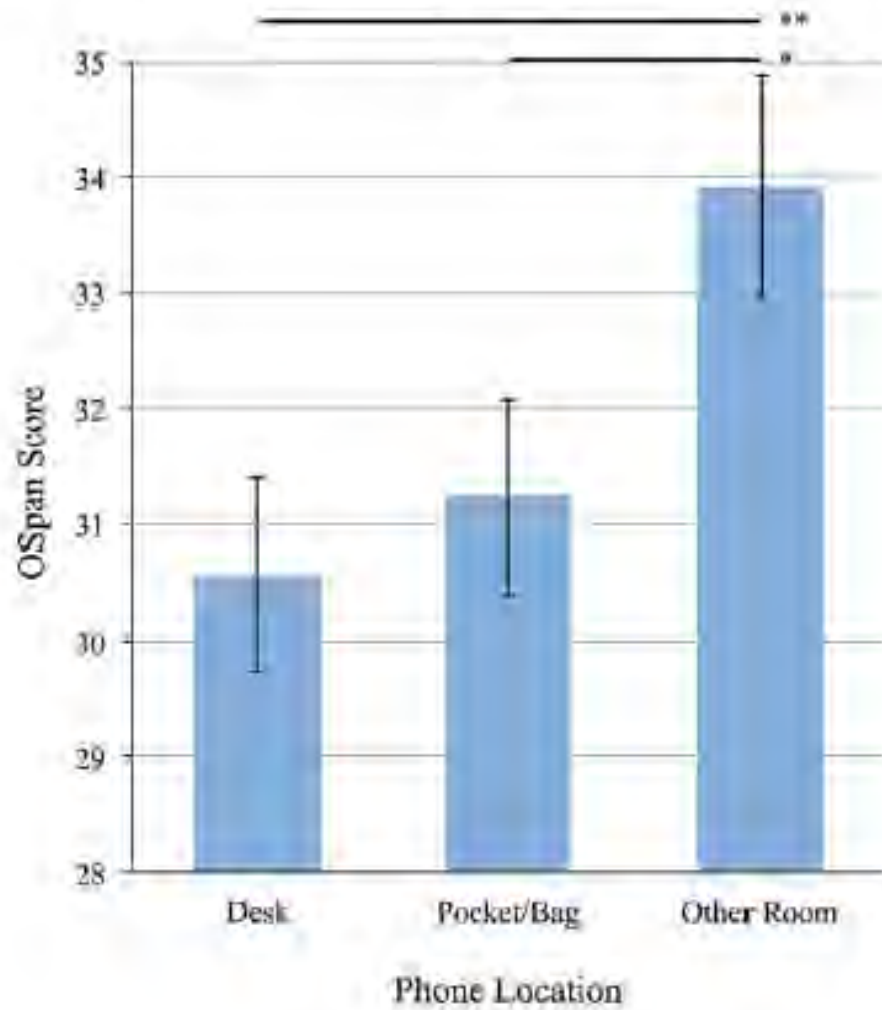
THE CONSUMER IN A CONNECTED WORLD

Brain Drain: The Mere Presence of One's Own Smartphone Reduces Available Cognitive Capacity

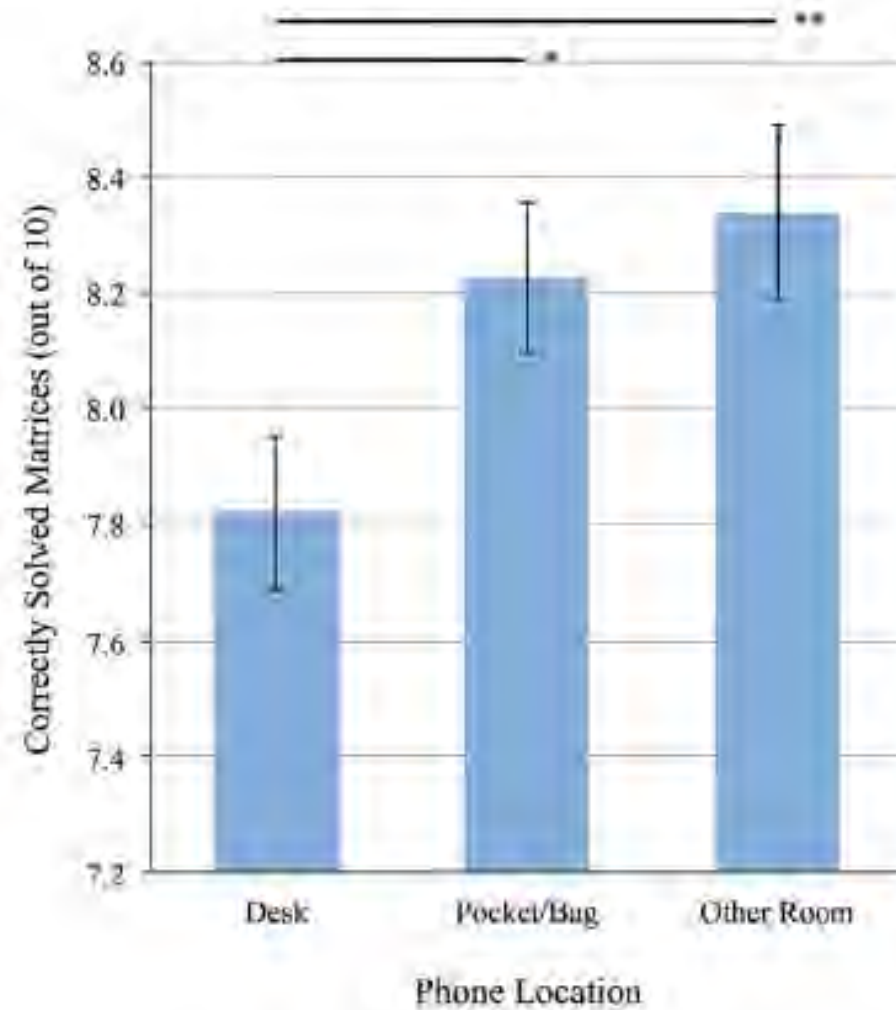
ADRIAN F. WARD, KRISTEN DUKE, AYELET GNEEZY, AND MAARTEN W. BOS

ABSTRACT Our smartphones enable—and encourage—constant connection to information, entertainment, and each other. They put the world at our fingertips, and rarely leave our sides. Although these devices have immense potential to improve welfare, their persistent presence may come at a cognitive cost. In this research, we test the “brain drain” hypothesis that the mere presence of one’s own smartphone may occupy limited-capacity cognitive resources, thereby leaving fewer resources available for other tasks and undercutting cognitive performance. Results from two experiments indicate that **even when people are successful at maintaining sustained attention**—as when avoiding the temptation to check their **phones—the mere presence of these devices reduces available cognitive capacity**. Moreover, these **cognitive costs are highest for those highest in smartphone dependence**. We conclude by discussing the practical implications of this smartphone-induced brain drain for consumer decision-making and consumer welfare.

A. Working Memory Capacity



B. Fluid Intelligence



- Decreased attention
- **Decreased learning**
- Decreased knowledge
- More dementia

Association Between Screen Time and Children's Performance on a Developmental Screening Test

Sheri Madigan, PhD; Dillon Browne, PhD; Nicole Racine, PhD; Camille Mori, BA; Suzanne Tough, PhD

January 2019

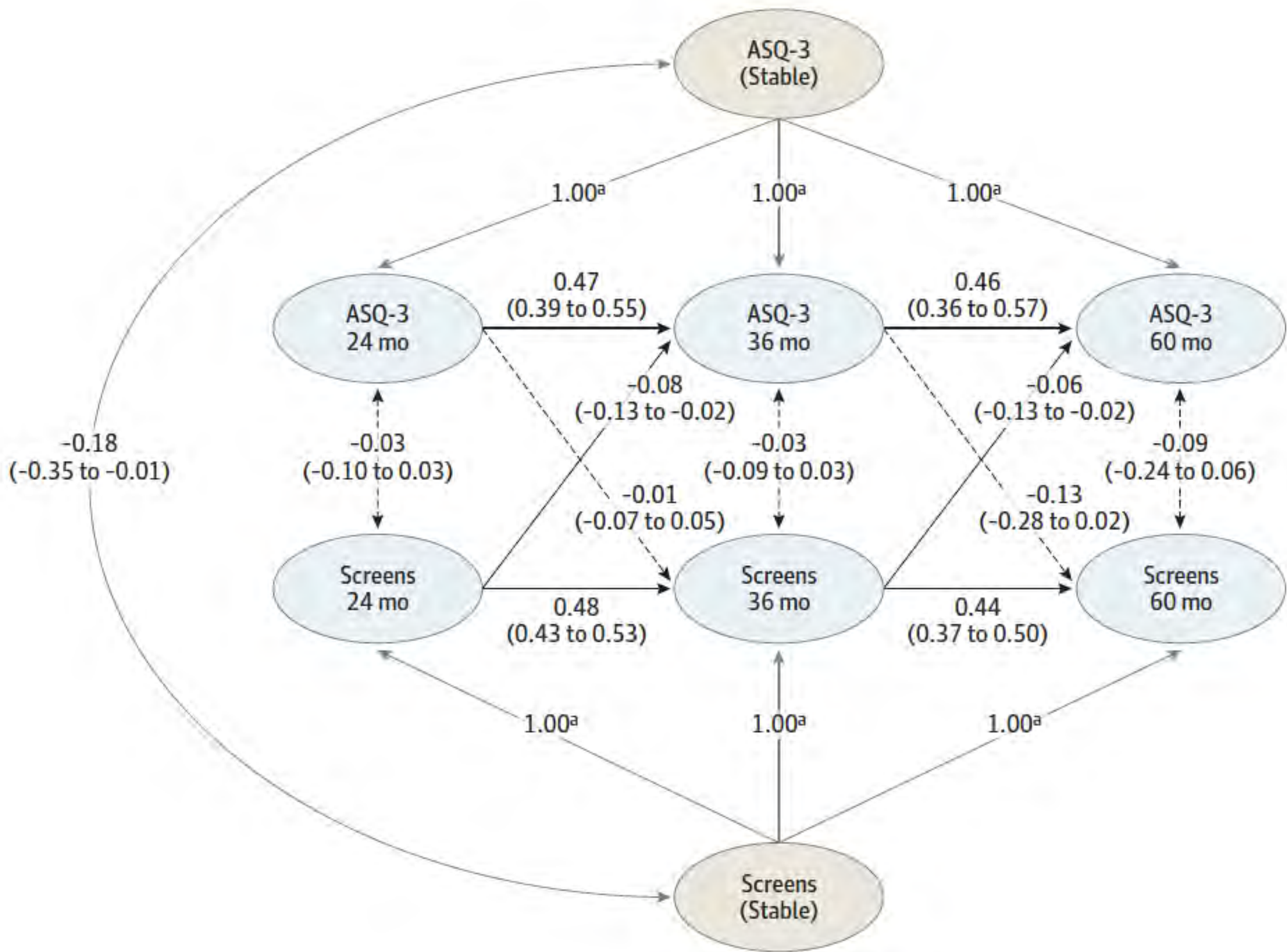


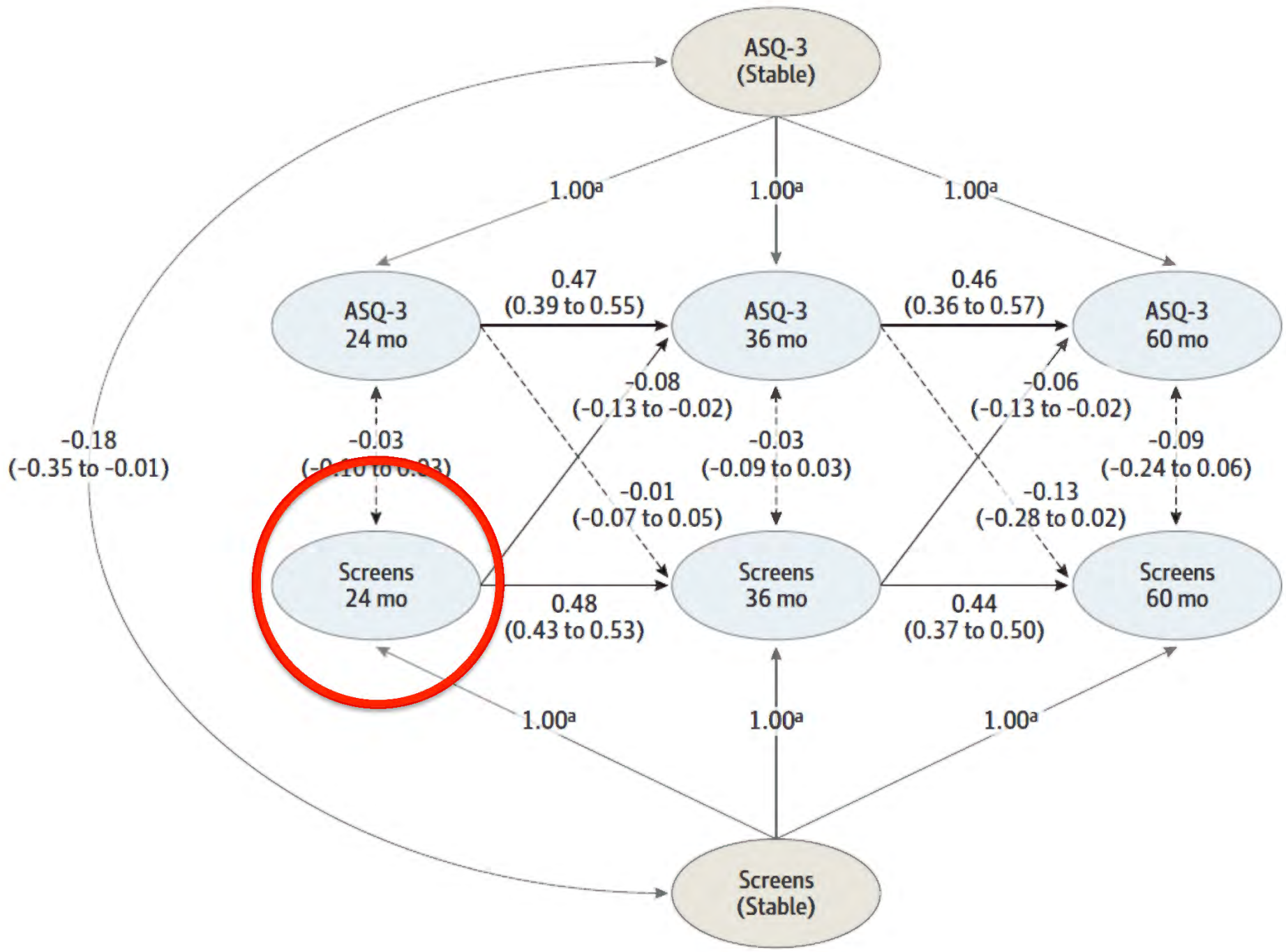
IMPORTANCE Excessive screen time is associated with delays in development; however, it is unclear if greater screen time predicts lower performance scores on developmental screening tests or if children with poor developmental performance receive added screen time as a way to modulate challenging behavior.

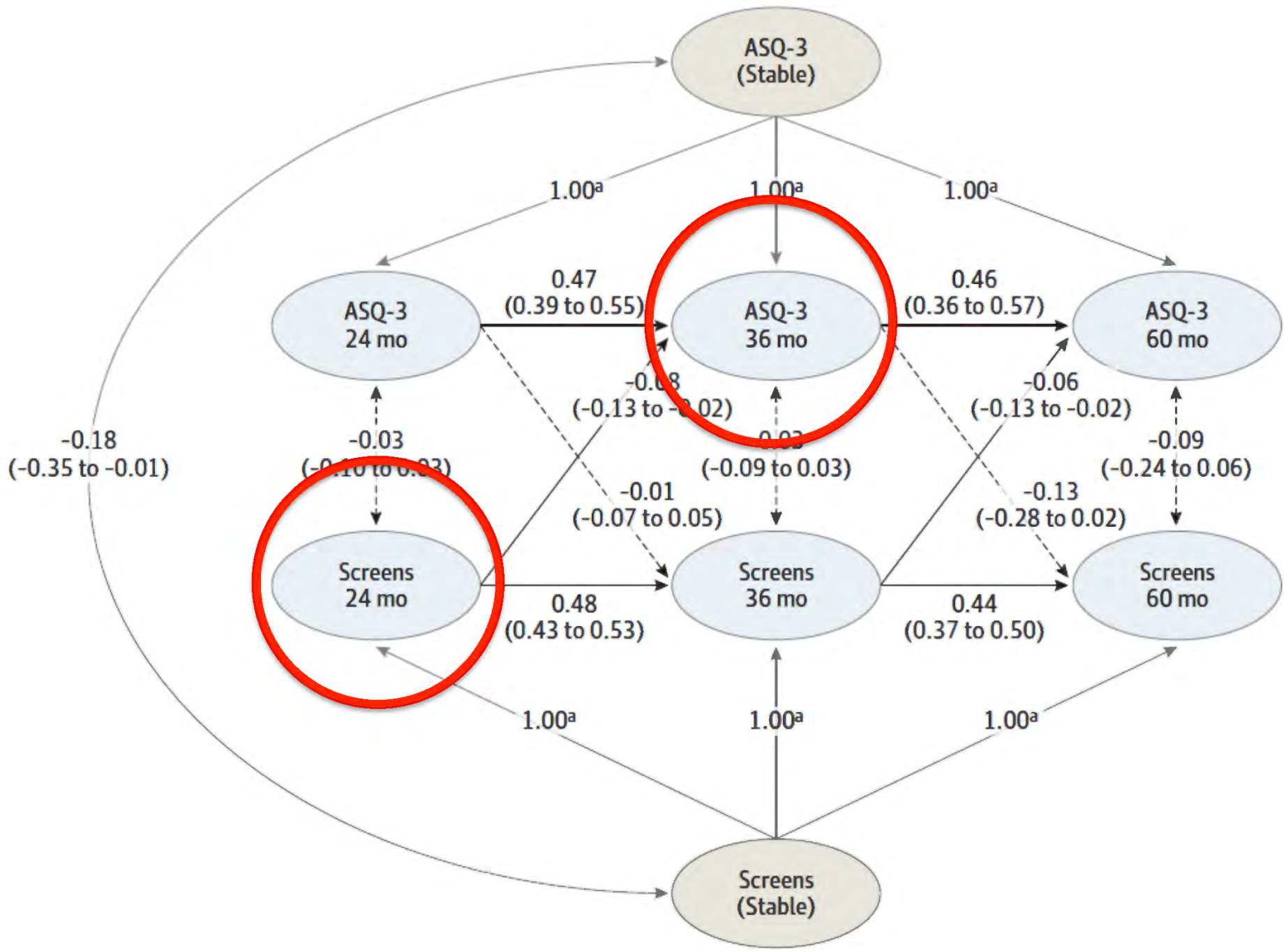
OBJECTIVE To assess the directional association between screen time and child development in a population of mothers and children.

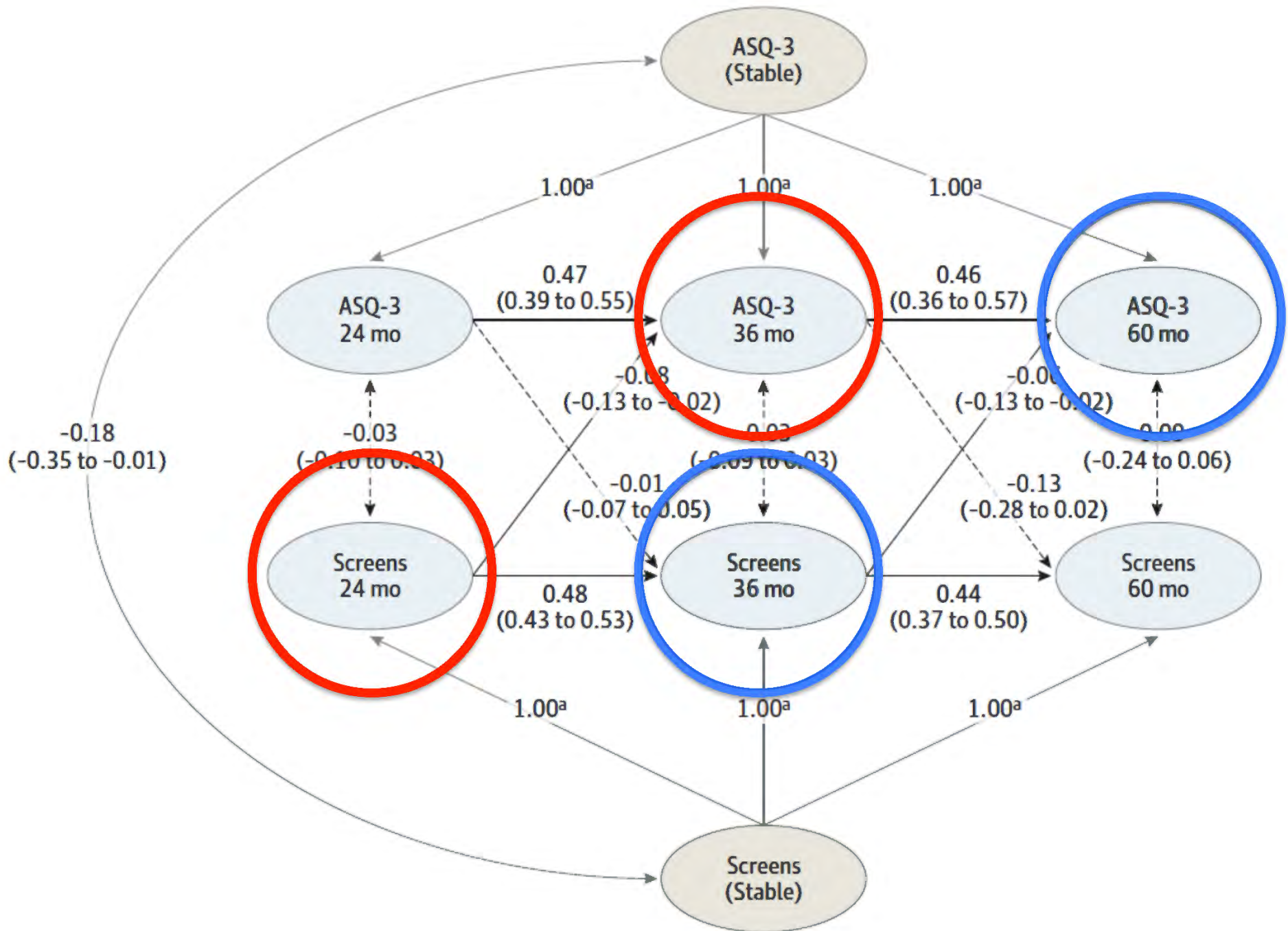
DESIGN, SETTING, AND PARTICIPANTS This longitudinal cohort study used a 3-wave, cross-lagged panel model in 2441 mothers and children in Calgary, Alberta, Canada, drawn from the All Our Families study. Data were available when children were aged 24, 36, and 60 months. Data were collected between October 20, 2011, and October 6, 2016. Statistical analyses were conducted from July 31 to November 15, 2018.

EXPOSURES Media.









Associations between 24 hour movement behaviours and global cognition in US children: a cross-sectional observational study



Jeremy J Walsh, Joel D Barnes, Jameason D Cameron, Gary S Goldfield, Jean-Philippe Chaput, Katie E Gunnell, Andrée-Anne Ledoux, Roger L Zemek, Mark S Tremblay

Summary

Background Childhood and adolescence are crucial periods for brain development, and the behaviours during a typical 24 h period contribute to cognitive performance. The Canadian 24-Hour Movement Guidelines for Children and Youth recommend at least 60 min physical activity per day, 2 h or less recreational screen time per day, and 9–11 h sleep per night in children aged 8–11 years. We investigated the relationship between adherence to these recommendations and global cognition.

Methods In this cross-sectional observational study, we obtained data from the first annual curated release of the Adolescent Brain Cognitive Development study, a 10-year longitudinal, observational study. Data were collected from 21 study sites across the USA between Sept 1, 2016, and Sept 15, 2017. The participants were 4524 US children aged 8–11 years from 20 study sites. Exposures of interest were adherence to the physical activity, recreational screen time, and sleep duration guideline recommendations. The primary outcome was global cognition, assessed with the NIH Toolbox (National Institutes of Health, Bethesda, MD, USA), which we analysed with multivariable linear mixed-effects models to examine the relations with movement behaviour variables.

Findings Complete movement behaviour data were available for 4520 participants. The mean number of guideline recommendations met was 1.1 (SD 0.9). Overall, 2303 (51%) participants met the sleep recommendation, 1655 (37%) met screen time, and 793 (18%) met the physical activity recommendation. 3190 (71%) participants met at least one recommendation, whereas 216 (5%) of participants met all three recommendations. Global cognition was positively associated with each additional recommendation met ($\beta=1.44$, 95% CI 0.82–2.07, $p<0.0001$). Compared with meeting none of the recommendations, associations with superior global cognition were found in participants who met all three recommendations ($\beta=3.89$, 95% CI 1.43 to 6.34, $p=0.0019$), the screen time recommendation only ($\beta=4.25$, 2.50–6.01, $p<0.0001$), and both the screen time and the sleep recommendations ($\beta=5.15$, 3.56–6.74, $p<0.0001$).

Interpretation Meeting the 24 h movement recommendations was associated with superior global cognition. These findings highlight the importance of limiting recreational screen time and encouraging healthy sleep to improve cognition in children.

Lancet Child Adolesc Health 2018

Published Online

September 26, 2018

[http://dx.doi.org/10.1016/S2352-4642\(18\)30278-5](http://dx.doi.org/10.1016/S2352-4642(18)30278-5)

See Online/Comment

[http://dx.doi.org/10.1016/S2352-4642\(18\)30305-5](http://dx.doi.org/10.1016/S2352-4642(18)30305-5)

52352-4642(18)30305-5

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J D Cameron PhD,

G S Goldfield PhD,

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R L Zemek MD,

Prof M S Tremblay), and School

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University of Ottawa, Ottawa,

ON, Canada; Department of

Psychology, Carleton

University, Ottawa, ON,

Canada (K E Gunnell PhD); and

Emergency Department

Research, Children's Hospital of

4524 children(8-11 yrs)
from 21 sites of the USA
September 2016 toSeptember 2017
under study:
sleep, sports, screen media
Effects on cognitive development of children
Results: Screen media have the biggest effect
-- and it is negative



Contents lists available at [ScienceDirect](#)

Computers in Human Behavior

journal homepage: www.elsevier.com/locate/comphumbeh

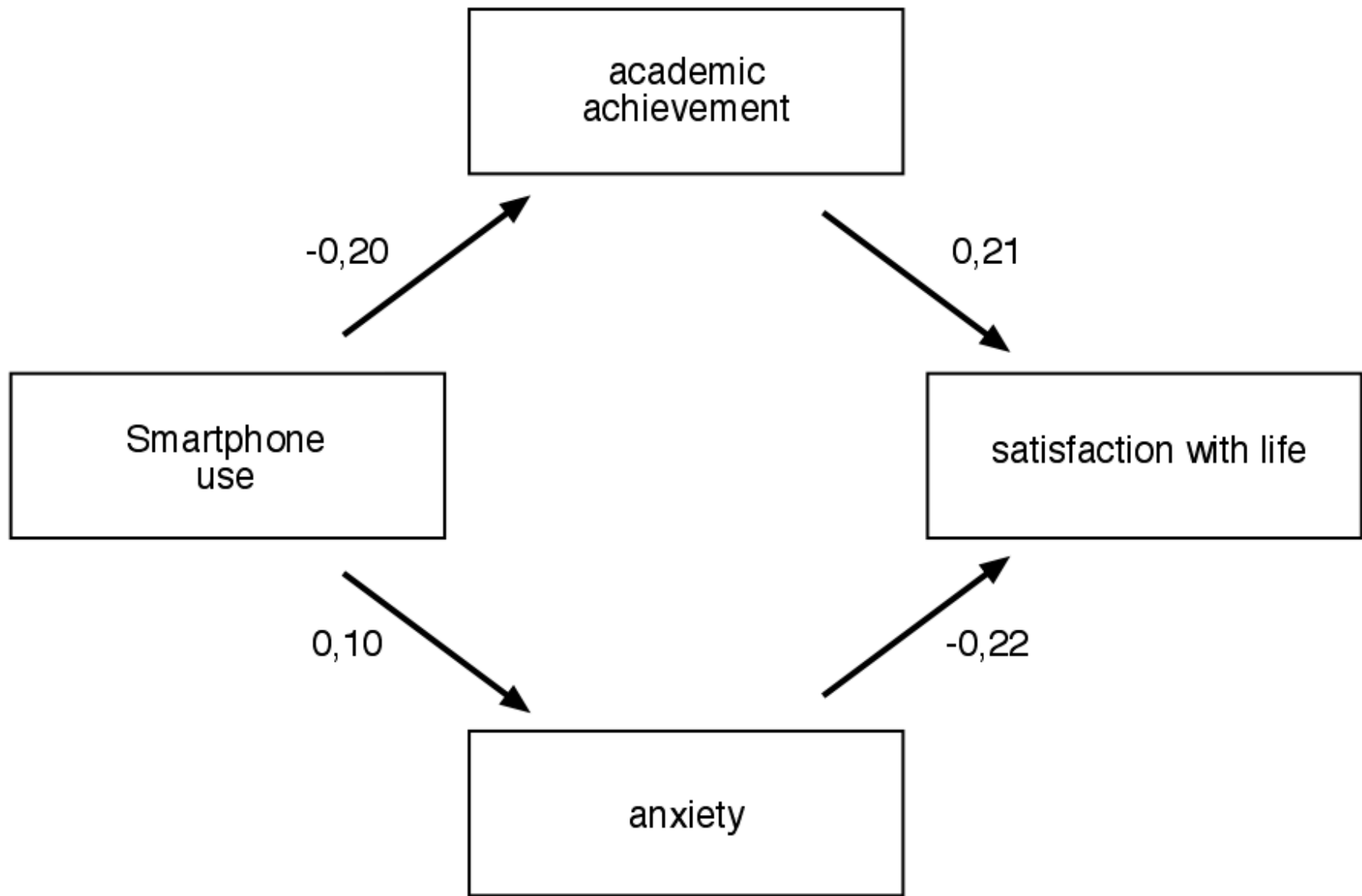


The relationship between cell phone use, academic performance, anxiety, and Satisfaction with Life in college students

Andrew Lepp^{*}, Jacob E. Barkley, Aryn C. Karpinski

Kent State University, College of Education, Health and Human Services, Kent, OH 44242-000, USA





- Decreased attention
- Decreased learning
- Decreased knowledge
- More dementia

Students are Better Off without a Laptop in the Classroom


What do you think they'll actually use it for?

By Cindi May on July 11, 2017

Logged In and Zoned Out: How Laptop Internet Use Relates to Classroom Learning

**Susan M. Ravizza, Mitchell G. Uitvlugt, and
Kimberly M. Fenn**

Department of Psychology, Michigan State University, East Lansing

Psychological Science
2017, Vol. 28(2) 171–180
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sagepub.com/journalsPermissions.nav
DOI: 10.1177/0956797616677314
www.psychologicalscience.org/PS


Abstract

Laptop computers are widely prevalent in university classrooms. Although laptops are a valuable tool, they offer access to a distracting temptation: the Internet. In the study reported here, we assessed the relationship between classroom performance and actual Internet usage for academic and nonacademic purposes. Students who were enrolled in an introductory psychology course logged into a proxy server that monitored their online activity during class. Past research relied on self-report, but the current methodology objectively measured time, frequency, and browsing history of participants' Internet usage. In addition, we assessed whether intelligence, motivation, and interest in course material could account for the relationship between Internet use and performance. **Our results showed that nonacademic Internet use was common among students who brought laptops to class and was inversely related to class performance. This relationship was upheld after we accounted for motivation, interest, and intelligence. Class-related Internet use was not associated with a benefit to classroom performance.**

No correlation between academic unse of computers and exam score

34% of course time spent with nonacademic use

Table 3. Correlations Between Cumulative Final-Exam Score and Actual Nonacademic Internet Use for the Seven Site Categories

Nonacademic Internet use	Final-exam score
Using social media	-.23*
Shopping	-.19†
Reading e-mail	-.13
Chatting	-.01
Reading news and sports	-.10
Watching videos	-.27*
Playing games	-.14

† $p < .10$. * $p < .05$.



Contents lists available at [ScienceDirect](#)

Economics of Education Review

journal homepage: www.elsevier.com/locate/econedurev

The impact of computer usage on academic performance: Evidence from a randomized trial at the United States Military Academy[☆]

Susan Payne Carter, Kyle Greenberg*, Michael S. Walker

United States Military Academy, 607 Cullum Road, West Point, NY 10996, USA

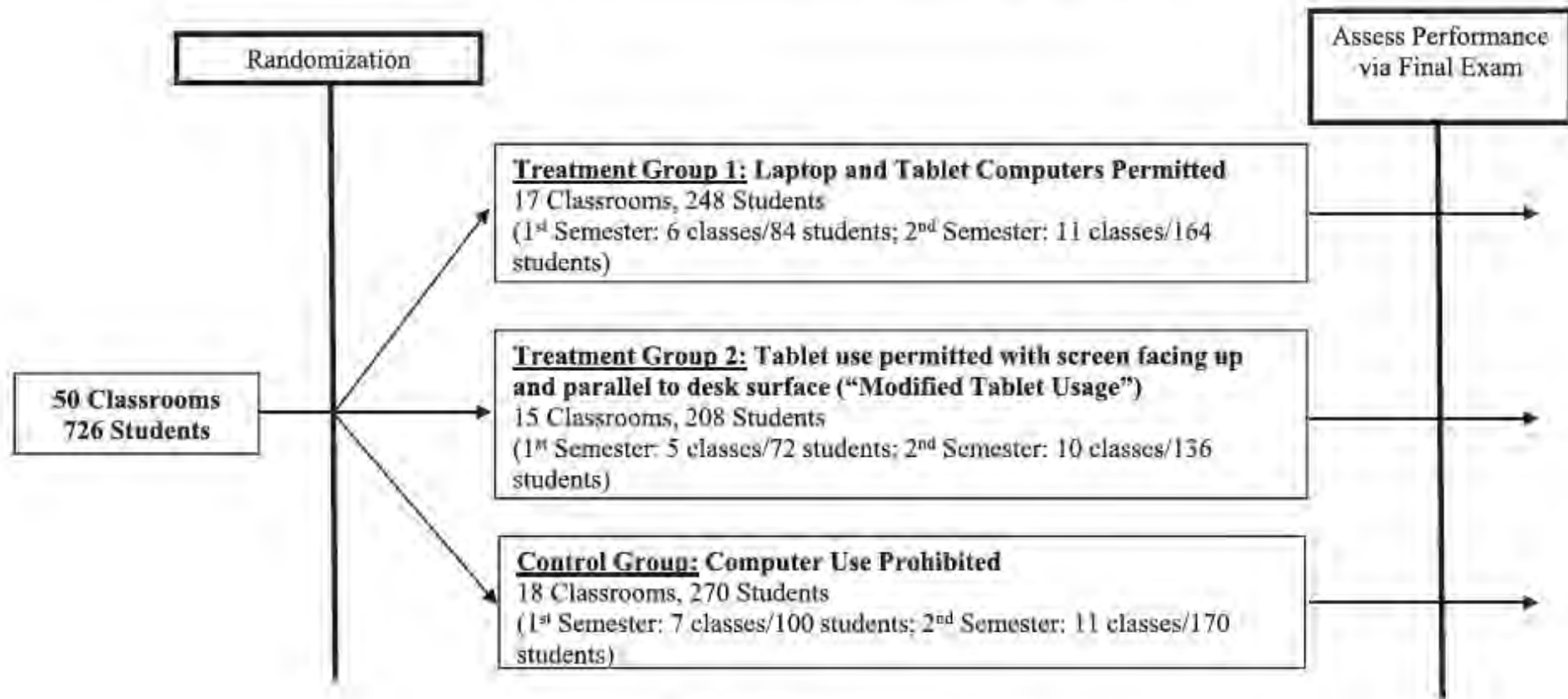


Fig. 1. Experimental design.

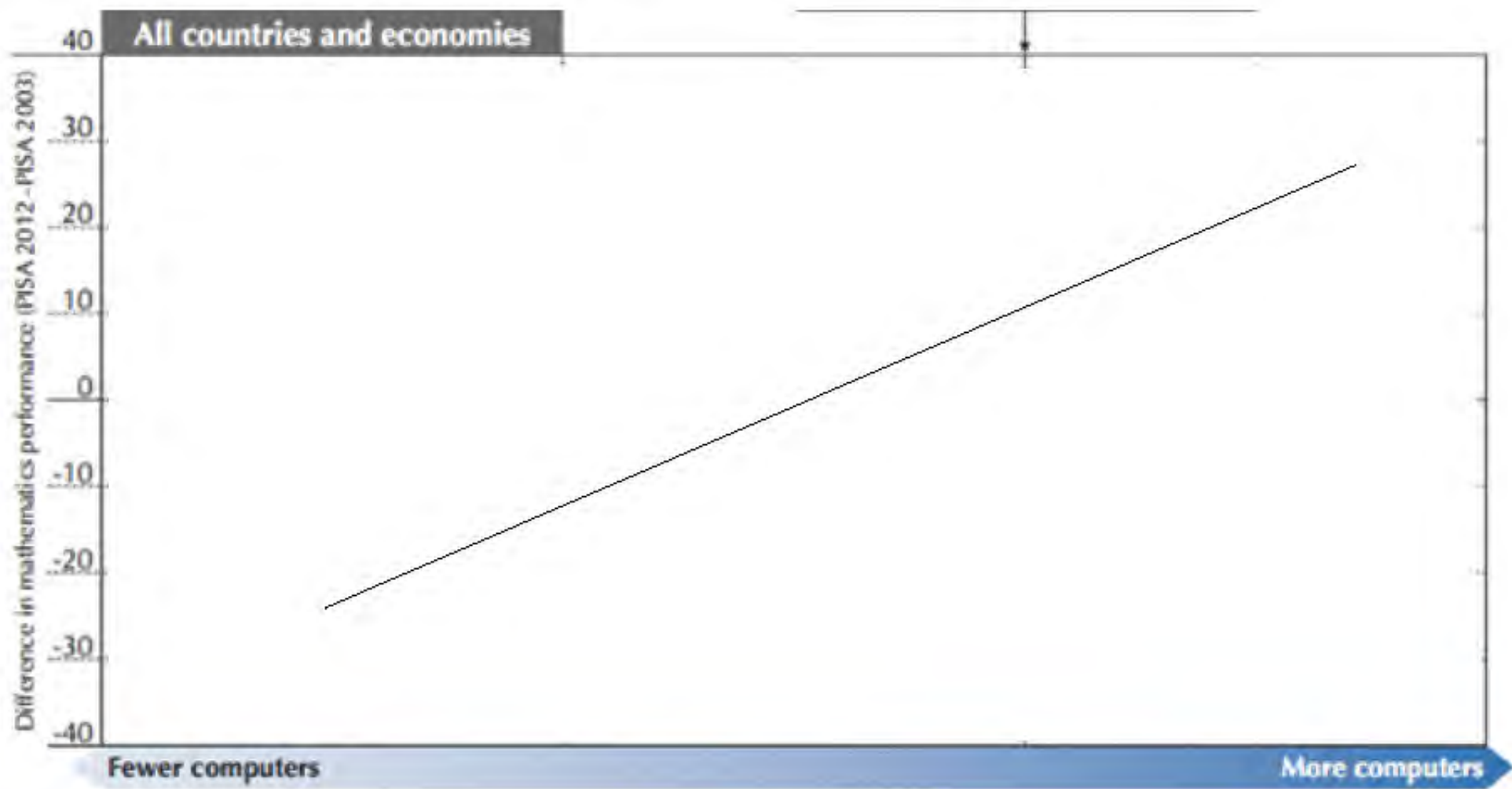


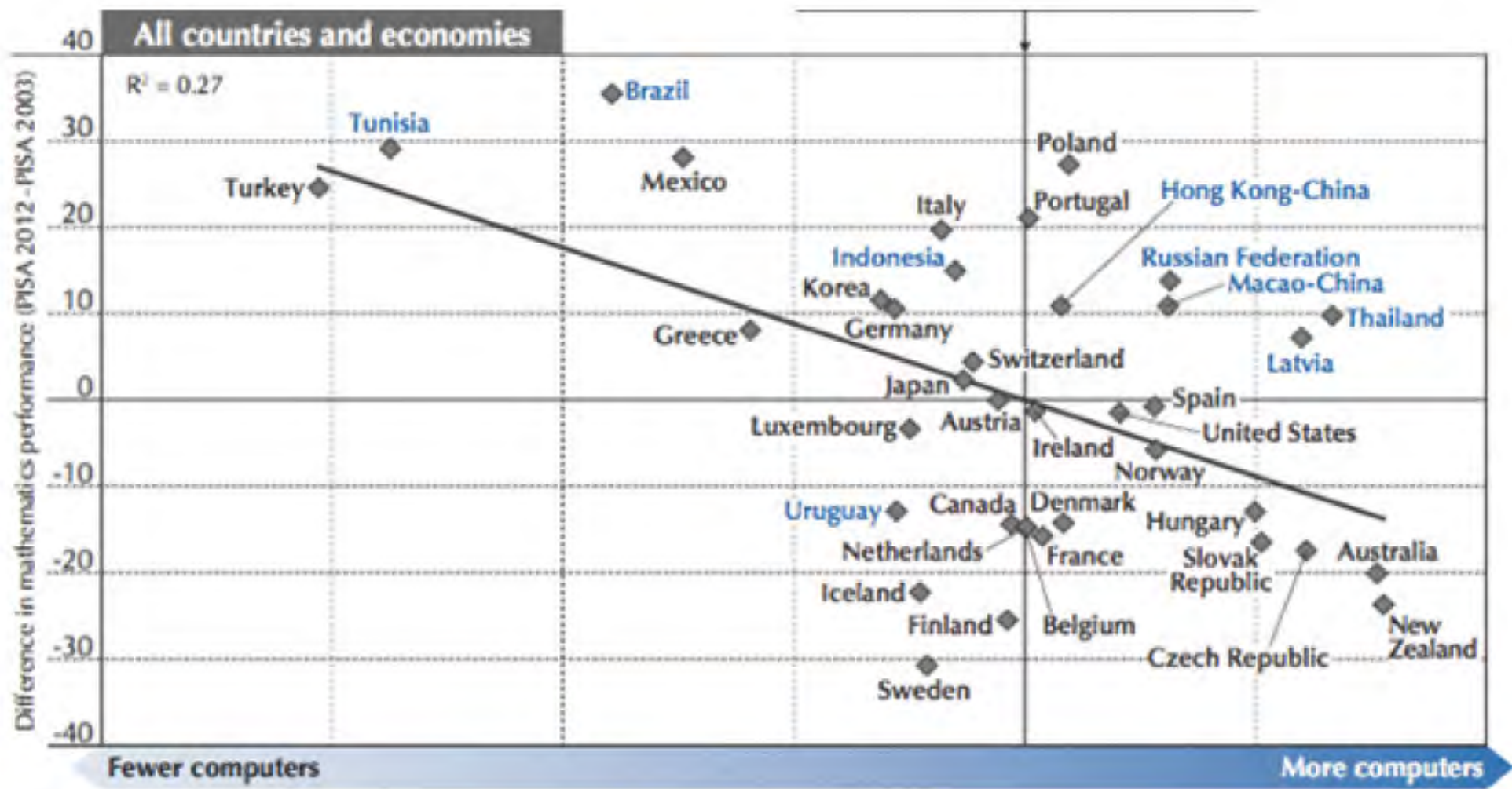
Students, Computers and Learning

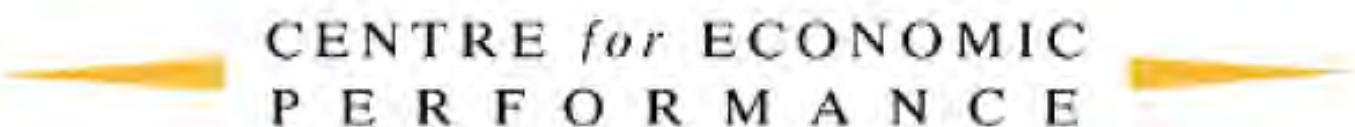
MAKING THE CONNECTION

September 2015







The logo for the Centre for Economic Performance features the text 'CENTRE for ECONOMIC PERFORMANCE' in a serif font. The word 'CENTRE' is in all caps, 'for' is in a smaller, italicized font, and 'ECONOMIC PERFORMANCE' is in all caps. The text is centered between two yellow, arrow-like shapes pointing outwards.

CENTRE *for* ECONOMIC
P E R F O R M A N C E

CEP Discussion Paper No 1350

May 2015

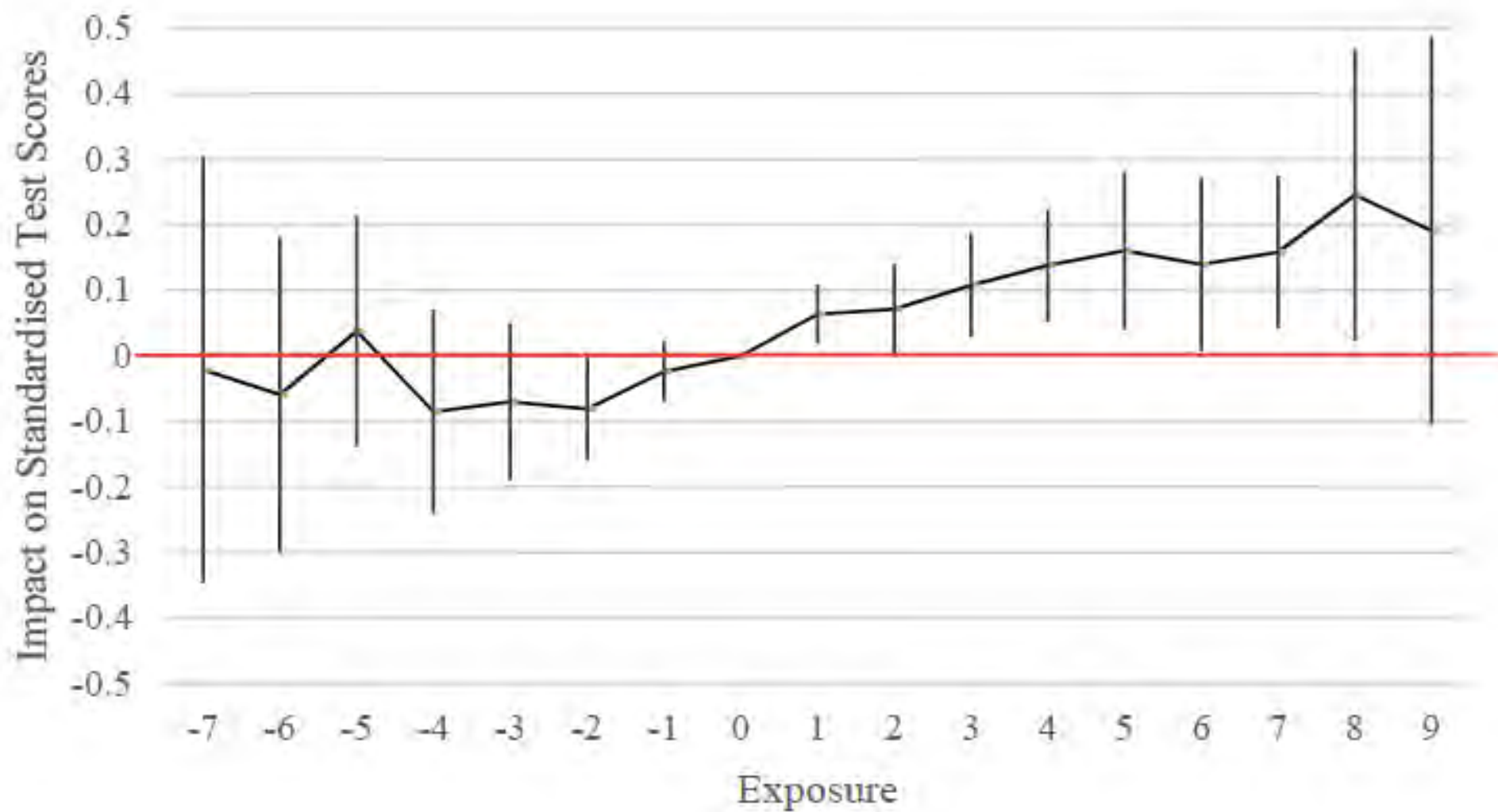
**III Communication: Technology, Distraction & Student
Performance**

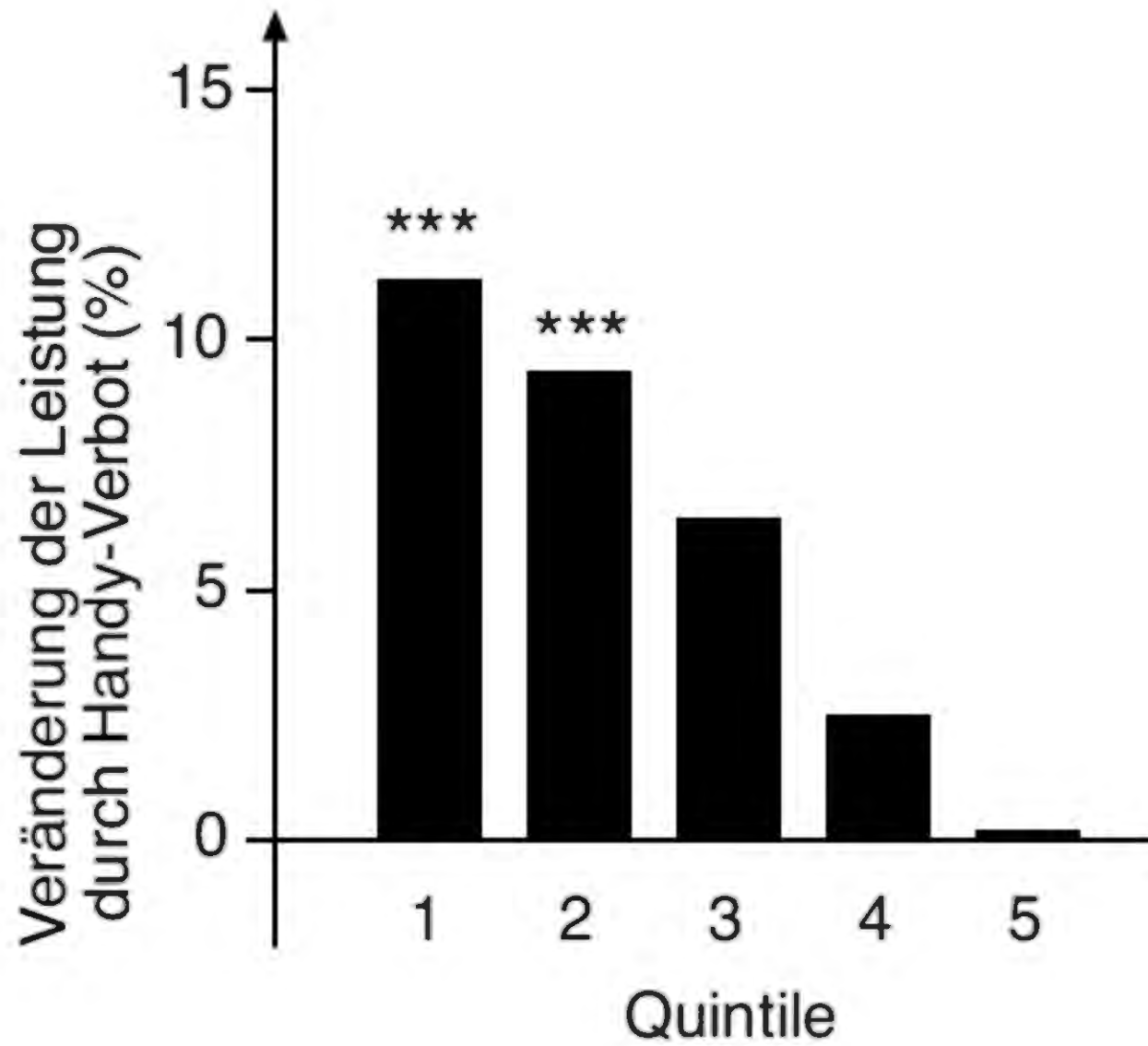
**Louis-Philippe Beland
Richard Murphy**

Table 2: Descriptive Statistics on Mobile Phone Policies

Year	Mobile Bans	High-compliance Bans	Low-compliance Bans
2000	0	0	0
2001	0	0	0
2002	3	2	1
2003	6	5	1
2004	9	7	2
2005	19	13	6
2006	29	20	9
2007	43	31	12
2008	58	38	20
2009	71	47	24
2010	85	54	31
2011	88	55	33
2012	90	56	34

Figure 2: Impact of Phone Ban by Years of Exposure





- Decreased attention
- Decreased learning
- Decreased knowledge
- **More dementia**

Google Effects on Memory: Cognitive Consequences of Having Information at Our Fingertips

Betsy Sparrow,^{1*} Jenny Liu,² Daniel M. Wegner³

¹Department of Psychology, Columbia University, 1190 Amsterdam Avenue, New York, NY 10027, USA. ²Department of Psychology, University of Wisconsin–Madison, 1202 West Johnson Street, Madison, WI 53706, USA. ³Department of Psychology, Harvard University, 33 Kirkland Street, Cambridge, MA 02138, USA.

COMMENTARY

Ambient intelligence

1581



LETTERS

DAVID B. DANIEL^{1*} AND DANIEL T. WILLINGHAM²

¹Department of Psychology, James Madison University, Harrisonburg, VA 22801, USA. ²Department of Psychology, University of Virginia, Charlottesville, VA 22904, USA.

SCIENCE VOL 335 30 MARCH 2012

Electronic Textbooks: Why the Rush?

THE RACE TO REPLACE TRADITIONAL TEXTBOOKS WITH ELECTRONIC VERSIONS IS ON. ALTHOUGH electronic textbooks have been most carefully tested in university students, the Obama Administration is advocating their use in elementary and secondary schools. In February,

Brains don't do downloads!

Research Article



The Pen Is Mightier Than the Keyboard: Advantages of Longhand Over Laptop Note Taking



Pam A. Mueller¹ and Daniel M. Oppenheimer²

¹Princeton University and ²University of California, Los Angeles

Psychological Science

1–10

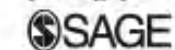
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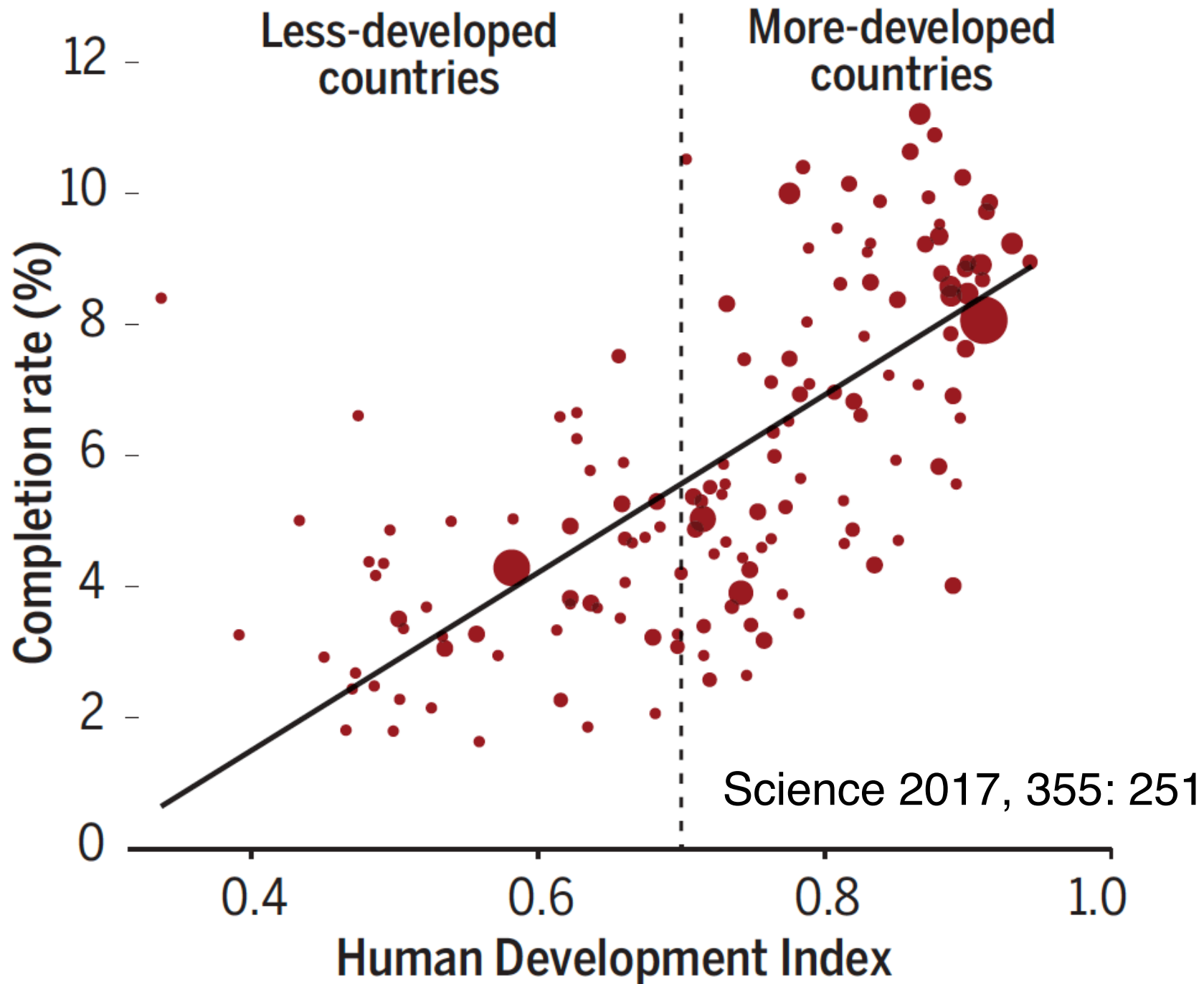
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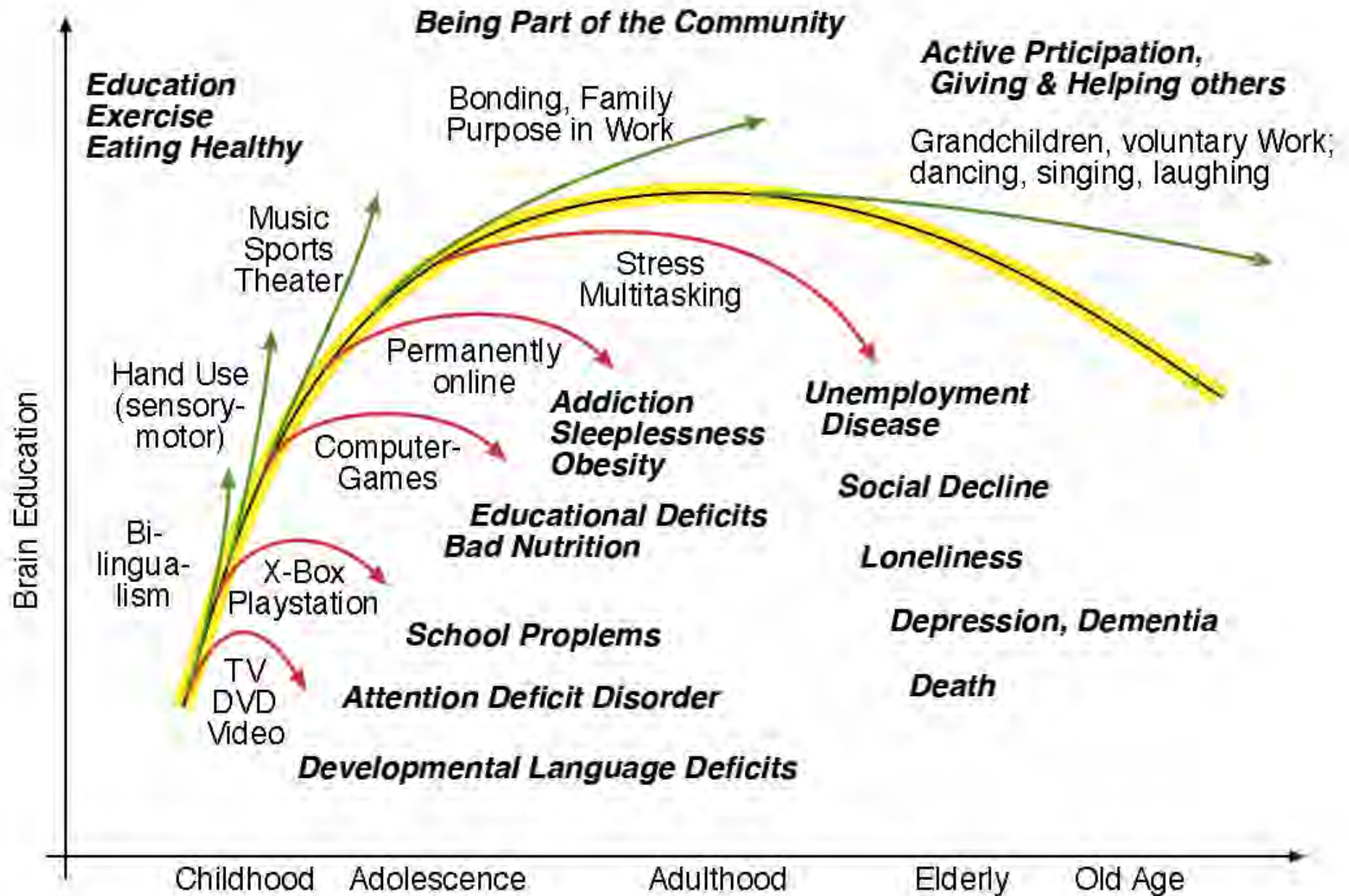
DOI: 10.1177/0956797614524581

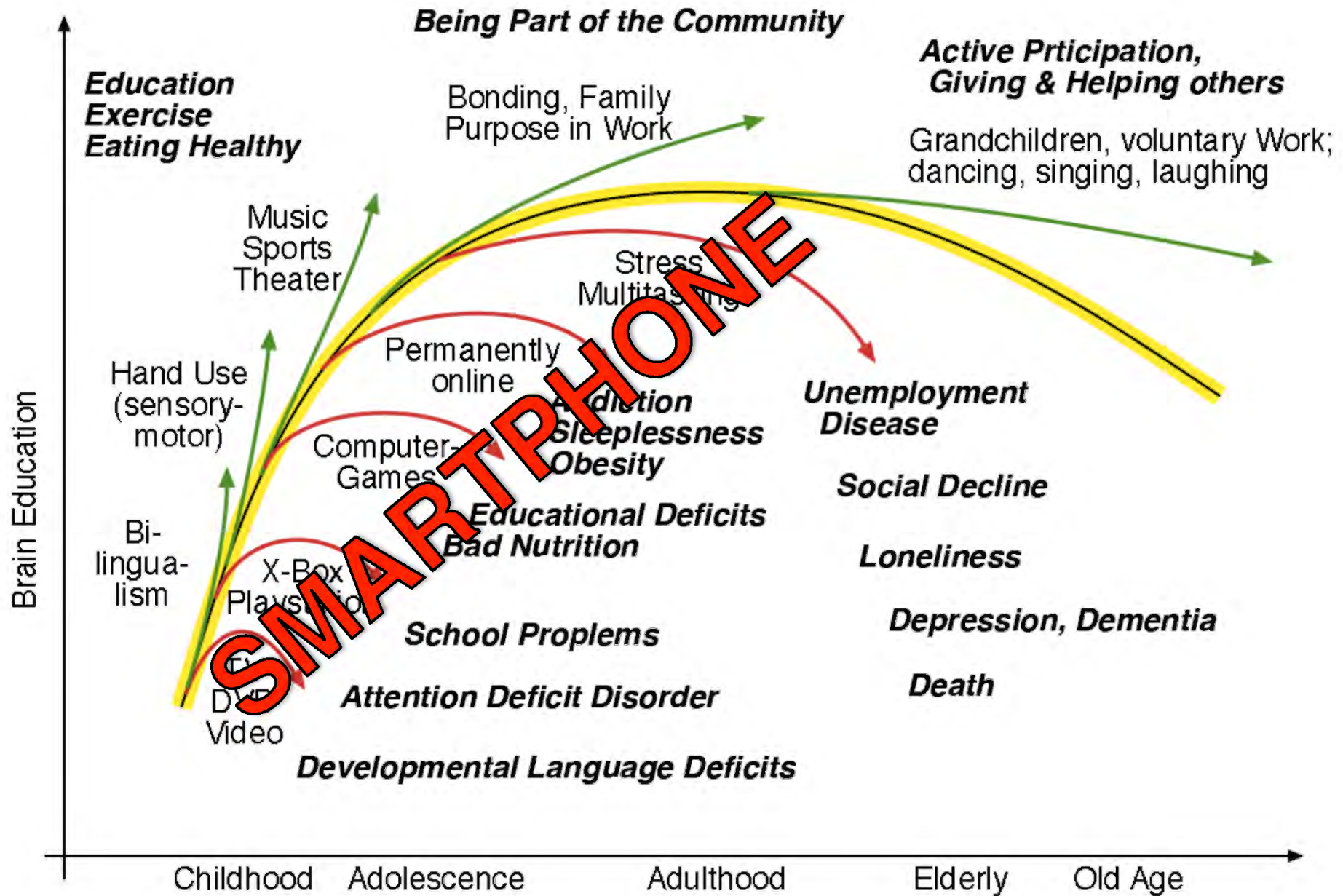
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Morbus Google







Health: Risks and Side Effects (mind)

- Addiction
- Aggression
- Anxiety
- Depression
- decreased empathy
- decreased life satisfaction

Increases in Depressive Symptoms, Suicide-Related Outcomes, and Suicide Rates Among U.S. Adolescents After 2010 and Links to Increased New Media Screen Time

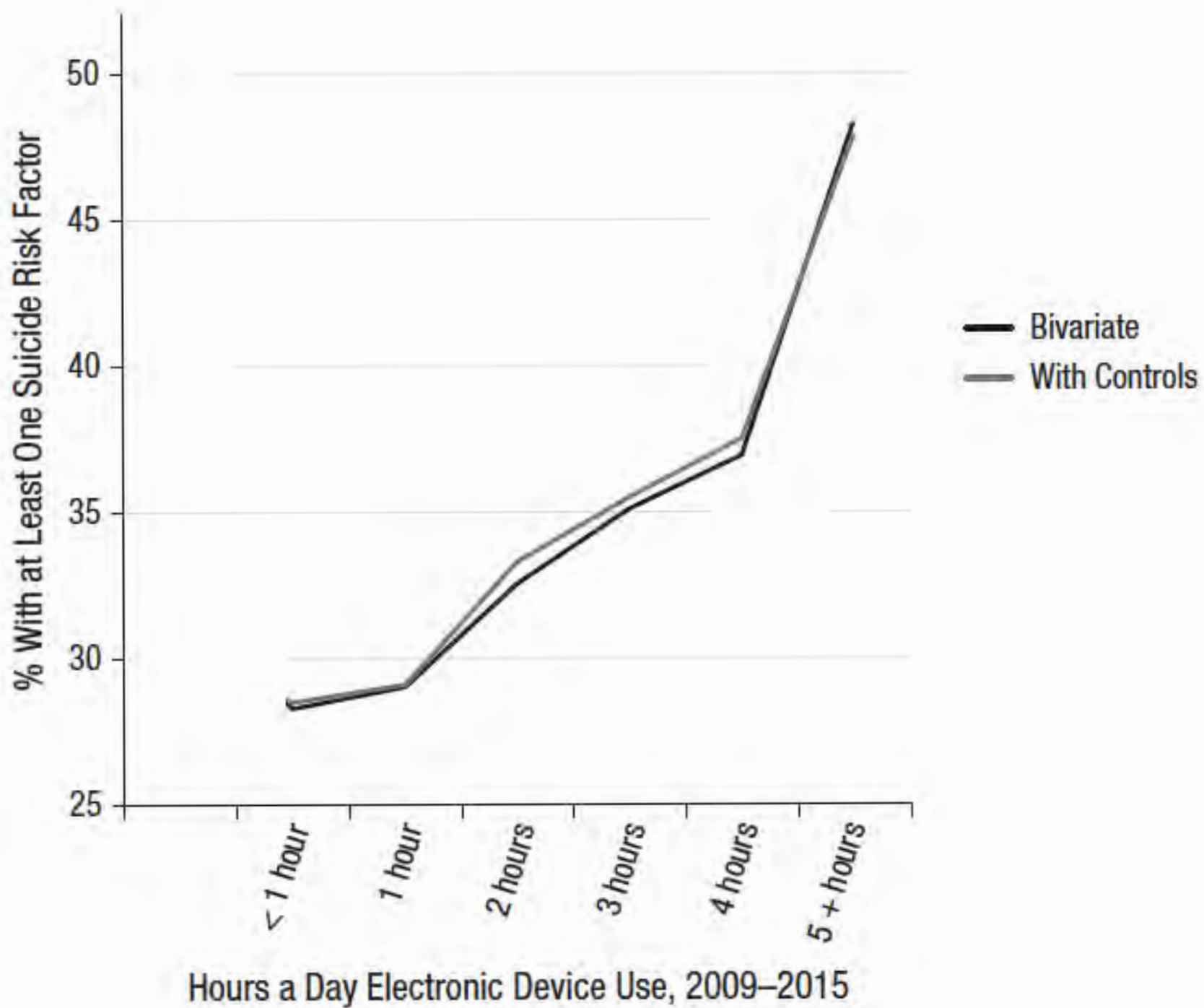
**Jean M. Twenge¹, Thomas E. Joiner², Megan L. Rogers², and
Gabrielle N. Martin¹**

¹San Diego State University and ²Florida State University

Psychological Science,
November 2017

Abstract

In two nationally representative surveys of U.S. adolescents in grades 8 through 12 ($N = 506,820$) and national statistics on suicide deaths for those ages 13 to 18, adolescents' depressive symptoms, suicide-related outcomes, and suicide rates increased between 2010 and 2015, especially among females. Adolescents who spent more time on new media (including social media and electronic devices such as smartphones) were more likely to report mental health issues, and adolescents who spent more time on nonscreen activities (in-person social interaction, sports/exercise, homework, print media, and attending religious services) were less likely. Since 2010, iGen adolescents have spent more time on new media screen activities and less time on nonscreen activities, which may account for the increases in depression and suicide. In contrast, cyclical economic factors such as unemployment and the Dow Jones Index were not linked to depressive symptoms or suicide rates when matched by year.



Risks and Side Effects (Society)

- Decreased Empathy, Trust and Solidarity
- Decreased level of general Education
- Decreased time spent in Nature
- Increased Loneliness and Anonymity
- Decreased Truth
- Increased Radicalization
- Decreased Privacy
- Endangered Democracy

RESEARCH

SOCIAL SCIENCE

The spread of true and false news online

Soroush Vosoughi,¹ Deb Roy,¹ Sinan Aral^{2*}

We investigated the differential diffusion of all of the verified true and false news stories distributed on Twitter from 2006 to 2017. The data comprise ~126,000 stories tweeted by ~3 million people more than 4.5 million times. We classified news as true or false using

Science **359**, 1146–1151 (2018) 9 March 2018

The New York Times

<https://nyti.ms/2GeTMa6>

Sunday Review

CONTRIBUTING OP-ED WRITER

YouTube, the Great Radicalizer

Zeynep Tufekci MARCH 10, 2018

A 61-million-person experiment in social influence and political mobilization

Robert M. Bond¹, Christopher J. Fariss¹, Jason J. Jones², Adam D. I. Kramer³, Cameron Marlow³, Jaime E. Settle¹ & James H. Fowler^{1,4}

Human behaviour is thought to spread through face-to-face social networks, but it is difficult to identify social influence effects in observational studies^{9–13}, and it is unknown whether online social networks operate in the same way^{14–19}. Here we report results from a randomized controlled trial of political mobilization messages delivered to 61 million Facebook users during the 2010 US congressional elections. The results show that the messages directly influenced political self-expression, information seeking and real-world voting behaviour of millions of people. Furthermore, the messages not only influenced the users who received them but also the users' friends, and friends of friends. The effect of social trans-

Experimental evidence of massive-scale emotional contagion through social networks

Adam D. I. Kramer^{a,1}, Jamie E. Guillory^{b,2}, and Jeffrey T. Hancock^{b,c}

We show, via a massive ($N = 689,003$) experiment on Facebook, that emotional states can be transferred to others via emotional contagion, leading people to experience the same emotions without their awareness. We provide experimental evidence that emotional contagion occurs without direct interaction between people (exposure to a friend expressing an emotion is sufficient), and in the complete absence of nonverbal cues.

PNAS | June 17, 2014 | vol. 111

Computer-based personality judgments are more accurate than those made by humans

Wu Youyou^{a,1,2}, Michal Kosinski^{b,1}, and David Stillwell^a

^aDepartment of Psychology, University of Cambridge, Cambridge CB2 3EB, United Kingdom; and ^bDepartment of Computer Science, Stanford University, Stanford, CA 94305

This study compares the accuracy of personality judgment—a ubiquitous and important social-cognitive activity—between computer models and humans. Using several criteria, we show that computers' judgments of people's personalities based on their digital footprints are more accurate and valid than judgments made by their close others or acquaintances (friends, family, spouse, colleagues, etc.). Our findings highlight that people's personalities can be predicted automatically and without involving human social-cognitive skills.

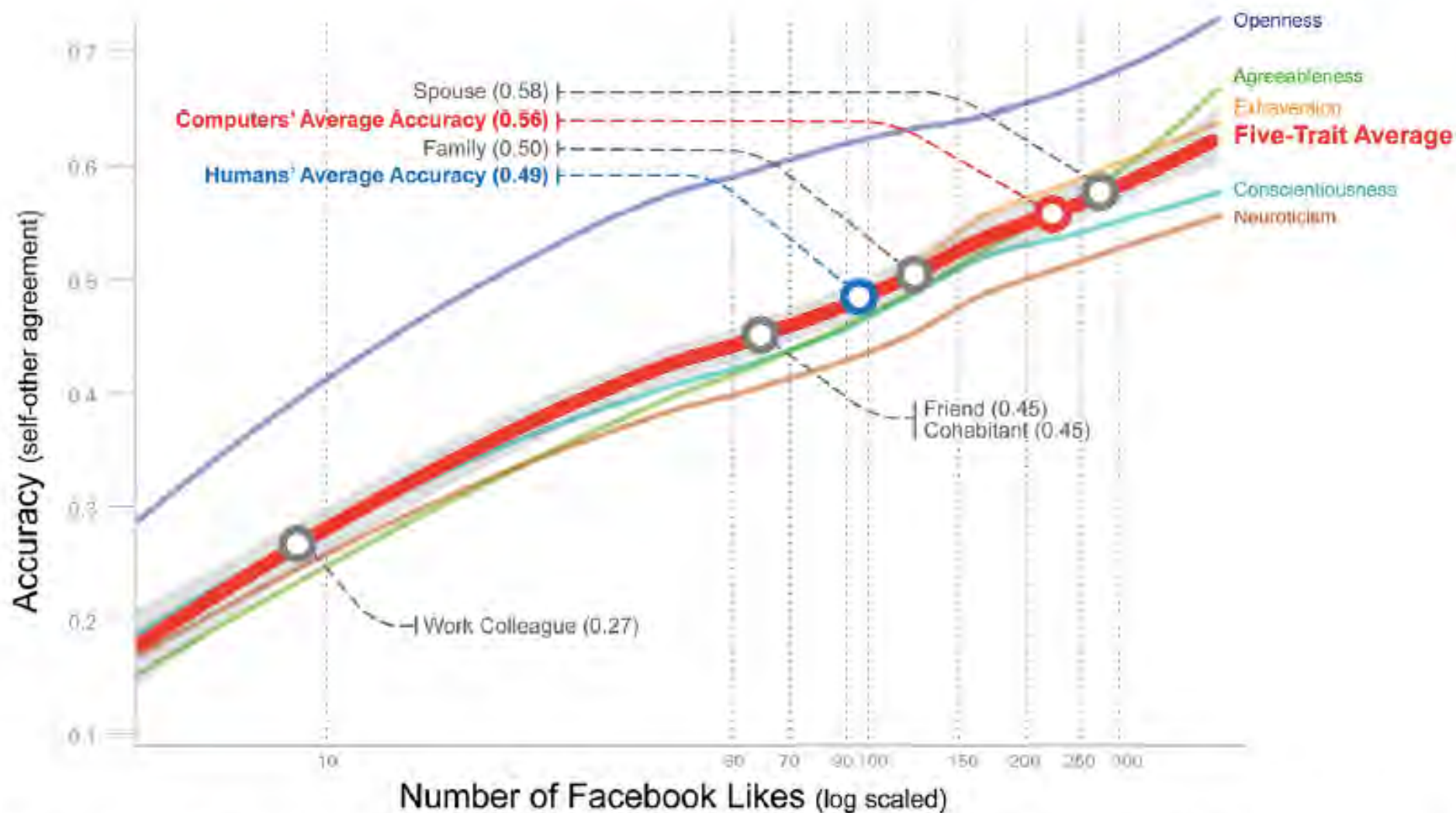


Fig. 2. Computer-based personality judgment accuracy (y axis), plotted against the number of Likes available for prediction (x axis). The red line represents the average accuracy (correlation) of computers' judgment across the five personality traits. The five-trait average accuracy of human judgments is positioned onto the computer accuracy curve. For example, the accuracy of an average human individual ($r = 0.49$) is matched by that of the computer models based on around 90–100 Likes. The computer accuracy curves are smoothed using a LOWESS approach. The gray ribbon represents the 95% CI. Accuracy was averaged using Fisher's r -to- z transformation.

Psychological targeting as an effective approach to digital mass persuasion

S. C. Matz^{a,1}, M. Kosinski^{b,2}, G. Nave^c, and D. J. Stillwell^{d,2}

^aColumbia Business School, Columbia University, New York City, NY 10027; ^bGraduate School of Business, Stanford University, Stanford, CA 94305; ^cWharton School of Business, University of Pennsylvania, Philadelphia, PA 19104; and ^dCambridge Judge Business School, University of Cambridge, Cambridge, CB2 3EB, United Kingdom

PNAS 2017

A

High Extraversion



Dance like no one's watching
(but they totally are)

Low Extraversion



Beauty doesn't have to shout

B

High Openness



Aristoteles? The Seychelles? Unleash your creativity and challenge your imagination with an unlimited number of crossword puzzles!

Low Openness



Settle in with an all-time favorite! The crossword puzzle that has challenged players for generations.

Fig. 1. Examples of ads aimed at audiences characterized by high and low extraversion (A) as well as high and low openness (B). Fig. 1A, *Left* courtesy

Psychological targeting as an effective approach to digital mass persuasion

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PNAS 2017

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footprints, such as their Facebook Likes or Tweets. Capitalizing on this form of psychological assessment from digital footprints, we test the effects of psychological persuasion on people's actual behavior in an ecologically valid setting. In three field experiments that reached over 3.5 million individuals with psychologically tailored advertising, we find that matching the content of persuasive appeals to individuals' psychological characteristics significantly altered their behavior as measured by clicks and purchases. Persuasive appeals that were matched to people's extraversion or openness-to-experience level resulted in up to 40% more clicks and up to 50% more purchases than their mismatching or unpersonalized counterparts. Our findings suggest that the application of psychological

The Washington Post

Politics

Democratic Party sues Russia, Trump campaign and WikiLeaks alleging 2016 campaign conspiracy

Risks and Side Effects (body)

- bad body posture
- Overweight
- Diabetes (Stroke, heart attack)
- Hypertension (Stroke, heart attack)
- Short sightedness
- Sleep disorders
- Stress (Infections, cancer)
- high-risk behavior (road accidents, STMs)

Risks and Side Effects (mind)

- Addiction
- Aggression
- Anxiety
- Depression & Suicide
- decreased empathy
- decreased life satisfaction

Risks and Side Effects: Education

- Decreased attention
- Decreased learning
- Decreased knowledge
- More dementia

Risks and Side Effects (Society)

- Decreased Empathy, Trust and Solidarity
- Decreased level of general Education
- Decreased time spent in Nature
- Increased Loneliness and Anonymity
- Decreased Truth
- Increased Radicalization
- Decreased Privacy
- Endangered Democracy

To sum up

- Digital IT comes with serious Risks & Side Effects regarding Mind, Body & Society
- There has not been any serious Assessment of these Risks & Side Effects
- We are constantly brainwashed by the most powerful lobby on Earth: Hype & Fake News
- The damage is most serious during brain development

Therefore

- We must not sacrifice the health and the education of our children – our most precious resource, i.e., our future – to profit interests of the richest companies on Earth.
- If we do, we act irresponsibly.
- Digital IT is a great tool that should serve all of us, not just a handful of Billionaires.
- Please, TAKE NOTE – THANKS!