Depression's got a hold of me:

Gender difference and generational trends in alcohol use and mental health among US adolescents and adults

Katherine M. Keyes
Associate Professor of Epidemiology
Columbia University
Topics to be addressed today

• Psychiatric disorders and suicidality in adolescent girls is increasing

• At the same time, alcohol and (most) other substance use in adolescence is evidencing a great decline

• What about adults? A tale of two generations

• Critical to understanding all of these trends is birth cohort effects
Psychiatric disorders and suicidality in adolescent girls are increasing
Is there an epidemic of child or adolescent depression?

E. Jane Costello,1 Alaattin Erkanli,2 and Adrian Angold1
1Department of Psychiatry and Behavioral Sciences, Duke University School of Medicine, USA; 2Department of Biostatistics and Bioinformatics, Duke University School of Medicine, USA

Background: Both the professional and the general media have recently published concerns about an ‘epidemic’ of child and adolescent depression. Reasons for this concern include (1) increases in antidepressant prescriptions, (2) retrospective recall by successive birth cohorts of adults, (3) rising adolescent suicide rates until 1990, and (4) evidence of an increase in emotional problems across three cohorts of British adolescents. Methods: Epidemiologic studies of children born between 1965 and 1996 were reviewed and a meta-analysis conducted of all studies that used structured diagnostic interviews to make formal diagnoses of depression on representative population samples of participants up to age 18. The effect of year of birth on prevalence was estimated, controlling for age, sex, sample size, taxonomy (e.g., DSM vs. ICD), measurement instrument, and time-frame of the interview (current, 3 months, 6 months, 12 months). Results: Twenty-six studies were identified, generating close to 60,000 observations on children born between 1965 and 1996 who had received at least one structured psychiatric interview capable of making a formal diagnosis of depression. Rates of depression showed no effect of year of birth. There was little effect of taxonomy, measurement instrument, or time-frame of interview. The overall prevalence estimates were: under 13, 2.8% (standard error (SE) .5%); 13–18 5.6% (SE .3%); 13–18 girls: 5.9% (SE .3%); 13–18 boys: 4.6% (SE .3%). Conclusions: When concurrent assessment rather than retrospective recall is used, there is no evidence for an increased prevalence of child or adolescent depression over the past 30 years. Public perception of an ‘epidemic’ may arise from heightened awareness of a disorder that was long under-diagnosed by clinicians. Keywords: Depression, child, adolescent, prevalence, meta-analysis, epidemic. Abbreviations: DISC: Diagnostic Interview Schedule for Children; CIDI: Composite International Diagnostic Interview; SDI: Short Depression Interview; K-SADS: Schedule for Affective Disorders and Schizophrenia, child version; CAS: Child and Adolescent Schedule; CAPA: Child and Adolescent Psychiatric Assessment; IOW: Isle of Wight interview; DAWBA: Development and Well-Being Assessment.
Is there an epidemic of child or adolescent depression?

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Major depressive episodes in adolescents and young adults 2005-2014, stratified by sex

Depressive affect among high school students, 1991 through 2016

Loneliness, self-derogation, and self-esteem among 12th grade students, 1991 through 2016

# Suicidal behavior among US adolescents, 1991-2016

<table>
<thead>
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<tr>
<td>Seriously considered attempting suicide (during the 12 months before the survey)</td>
<td>29.0</td>
<td>24.1</td>
<td>24.1</td>
<td>20.5</td>
<td>19.3</td>
<td>19.0</td>
<td>16.9</td>
<td>16.9</td>
<td>14.5</td>
<td>13.8</td>
<td>15.8</td>
<td>17.0</td>
<td>17.7</td>
<td>Decreased 1991–2015</td>
<td>Decreased 1991–2009 Increased 2009–2015</td>
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<td>Made a plan about how they would attempt suicide (during the 12 months before the survey)</td>
<td>18.6</td>
<td>19.0</td>
<td>17.7</td>
<td>15.7</td>
<td>14.5</td>
<td>14.8</td>
<td>16.5</td>
<td>13.0</td>
<td>11.3</td>
<td>10.9</td>
<td>12.8</td>
<td>13.6</td>
<td>14.6</td>
<td>Decreased 1991–2015</td>
<td>Decreased 1991–2009 Increased 2009–2015</td>
</tr>
<tr>
<td>Attempted suicide (one or more times during the 12 months before the survey)</td>
<td>7.3</td>
<td>8.6</td>
<td>8.7</td>
<td>7.7</td>
<td>8.3</td>
<td>8.8</td>
<td>8.5</td>
<td>8.4</td>
<td>6.9</td>
<td>6.3</td>
<td>7.8</td>
<td>8.0</td>
<td>8.6</td>
<td>Decreased 1991–2015</td>
<td>No change</td>
</tr>
<tr>
<td>Attempted suicide that resulted in an injury, poisoning, or overdose that had to be treated by a doctor or nurse (during the 12 months before the survey)</td>
<td>1.7</td>
<td>2.7</td>
<td>2.8</td>
<td>2.6</td>
<td>2.6</td>
<td>2.6</td>
<td>2.9</td>
<td>2.3</td>
<td>2.0</td>
<td>1.9</td>
<td>2.4</td>
<td>2.7</td>
<td>2.8</td>
<td>No change 1991–2015</td>
<td>No change</td>
</tr>
</tbody>
</table>

Youth Risk Behavior Survey.
Girls and women

Boys and men

Why? Some hypotheses
Have Smartphones Destroyed a Generation?

More comfortable online than out partying, post-Millennials are safer, physically, than adolescents have ever been. But they're on the brink of a mental-health crisis.

Table 3 | Comparison specification results

<table>
<thead>
<tr>
<th>Comparison specifications</th>
<th>YRBS</th>
<th>MTF</th>
<th>MCS</th>
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<tbody>
<tr>
<td>Negatives</td>
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<tr>
<td>Binge-drinking</td>
<td>x2.95</td>
<td>x8.10</td>
<td>x1.02</td>
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<td>Marijuana</td>
<td>x2.70</td>
<td>x10.09</td>
<td>x1.14</td>
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<td>Bullying</td>
<td>x4.33</td>
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<td>x4.92</td>
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<tr>
<td>Getting into fights</td>
<td>x3.65</td>
<td>x15.58</td>
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<td>Cigarettes</td>
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<td></td>
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<td>Being arrested</td>
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<td>Neutral</td>
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<tr>
<td>Perceived weight</td>
<td>x1.02</td>
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<td>Factors</td>
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<tr>
<td>Potatoes</td>
<td>x0.86</td>
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<td>Asthma</td>
<td>x1.34</td>
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<td>Milk</td>
<td>x0.28*</td>
<td></td>
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<tr>
<td>Going to movies</td>
<td></td>
<td>x11.51*</td>
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<td>Religion</td>
<td></td>
<td>x16.29*</td>
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<tr>
<td>Music</td>
<td></td>
<td>x32.68</td>
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<td>Homework</td>
<td></td>
<td>x3.57*</td>
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<tr>
<td>Cycling</td>
<td></td>
<td></td>
<td>x1.88*</td>
</tr>
<tr>
<td>Height</td>
<td></td>
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<td>x1.53*</td>
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<td>Glasses</td>
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<td>x1.45</td>
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<td>Handedness</td>
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<td>x0.10</td>
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<tr>
<td>Positive</td>
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<td>Fruit</td>
<td>x0.11</td>
<td>x9.49*</td>
<td>x1.32*</td>
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<tr>
<td>Vegetables</td>
<td>x0.27</td>
<td>x20.63*</td>
<td>x1.52*</td>
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<tr>
<td>Sleep</td>
<td>x3.06*</td>
<td>x44.33*</td>
<td>x1.65*</td>
</tr>
<tr>
<td>Breakfast</td>
<td>x2.37*</td>
<td>30.55*</td>
<td>x3.32*</td>
</tr>
</tbody>
</table>

Fig. 2 | Results of SCA for MTF. Specification curve analysis showing the range of possible results for a simple cross-sectional regression of digital technology use on adolescent well-being. Each point on the x axis represents a different combination of analytical decisions, which are displayed in the ‘dashboard’ at the bottom of the graph. The resulting standardized regression coefficient is shown at the top of the graph; the error bars visualize the standard error. Red represents non-significant outcomes while black represents significant outcomes. To ease interpretation, the dotted line indicates the median standardized regression coefficient found in the SCA: $\hat{\beta} = -0.005$ (partial $p < 0.001$, median $n = 78,267$, median standard error = 0.003).
The digital divide and amplification of health disparities

Smartphones are bad for some teens, not all

Young people who are already struggling offline might experience greater negative effects of life online, writes Candice Odgers.

Odgers, C. Nature, 2018
What about risk factors for adolescent mental health? Historically, alcohol use has been such a risk factor. We would expect, then, that alcohol use should be increasing as well.

But alcohol use in adolescence is evidencing a great decline, but differentially by gender.
Daily use of alcohol in past 30 days

Past two-week binge drinking


Frequent binge drinking is also on the decline
Why is alcohol use decreasing?
Prevention through policy

Note. Noncompliant advertisements were those placed in magazines with an underage audience composition in excess of 30% (before June 2011) or 28.4% (thereafter). Overexposing ads were those placed in magazines in which per capita exposure among those aged 12–20 y exceeded per capita exposure among those aged ≥ 21 y. These are mutually exclusive categories.

Source: Nielsen (New York, NY) and CFK Mediamark Research & Intelligence LLC (New York, NY).

FIGURE 1—Total Youth Advertising Impressions by Exposure Category, 2001–2011

Cohort-specific disapproval predicts binge drinking (N=967,562)

Declines in alcohol use are part of a broader decline in many kinds of problem behaviors, but the declines are more apparent among boys.
Past month cigarette use, 12th grade, 1975-2017

Evenings out per week, by grade, 1991 through 2015

Extending adolescence and shifting life strategies

Learning to Stand Alone: The Contemporary American Transition to Adulthood in Cultural and Historical Context

Jeffrey Jensen Arnett
University of Maryland, College Park, Md., USA

What's Going on with Young People Today? The Long and Twisting Path to Adulthood

Richard A. Settersten Jr. and Barbara Ray

Emerging Adulthood
A Theory of Development From the Late Teens Through the Twenties

Jeffrey Jensen Arnett
University of Maryland College Park

Passages to Adulthood: Linking Demographic Change and Human Development
Le passage à l'âge adulte : le changement démographique en relation avec le développement humain

Richard A. Settersten, Jr.
What about marijuana use?
Frequent marijuana use is increasing

Why isn’t marijuana use decreasing?
Shifting medical marijuana laws are not associated with state-specific adolescent marijuana use.
The influence of cigarette smoking and alcohol

Prevalence of marijuana use stratified by cigarette and alcohol use


**FIGURE 2**—Relative Percent Change in Prevalence of Smoking in 8th Grade and Subsequent Marijuana and Cocaine Use in 12th Grade 5 Years Later Among Two Groups of Birth Cohorts in Periods When Smoking Prevalence Increased (1991–1996) and Then Decreased (1996–2008): United States

Note. Percent change = difference between first and last year prevalence in each group divided by first year prevalence.
What about adults? A tale of two generations
Depression increasing among low-SES American adults: gender differences understudied

Fig. 1. Difference (2011 to 2014 survey wave minus 1995 to 1996 survey wave) in predicted values, non-Latino whites. Note: based on predicted values shown in Table 2 (from models shown in Table 1). We subtract the predicted value for the survey wave fielded in 1995 to 1996 from the predicted value for the survey wave fielded in 2011 to 2014 to obtain the change (over time) in each outcome.

Major depressive episodes in adolescents and adults 2005-2017, stratified by sex
Suicide in the United States, 1999-2014

Girls and women

Boys and men

Total per capita ethanol consumption, United States, 1935–2015

Survival probability

Time (years)

Changes in binge drinking by gender from 2005-2012 in the US

Gender-Specific Prevalence (%) of Binge Drinking, NSDUH 2002 to 2012

Gender-Specific Prevalence (%) of Binge Drinking, meta-analytic estimate across six national datasets

Critical to understanding both of these trends is birth cohort effects
Glen Elder: Children of the Great Depression

- Our birth cohort brings ‘interdependent lives’
- Socialization across the life course
  - Timing
  - Context
  - Agency
  - Competition
  - Constraints
  - Opportunities

What history has taught us

Cohort effects are elusive yet important to uncover changes in etiologically important exposures

- Mortality rates
- Peptic ulcer
- Most forms of cancer
- Tuberculosis
- Smoking-related diseases
- Obesity
Death rates in Great Britain and Sweden, 1845-1925

Cohort effects in substance use and mental health: gender differences
Table 3
Comparisons from two cohort studies

The Lundby Study in Sweden
Average annual incidence rates: depression

<table>
<thead>
<tr>
<th>Age categories</th>
<th>Males</th>
<th>Females</th>
<th>Males</th>
<th>Females</th>
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<tbody>
<tr>
<td>20-29</td>
<td>0.05</td>
<td>0.41</td>
<td>0.52</td>
<td>0.48</td>
</tr>
<tr>
<td>30-39</td>
<td>0.00</td>
<td>0.38</td>
<td>0.42</td>
<td>0.56</td>
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The Midtown Manhattan Study in U.S.
Current mental morbidity rates

<table>
<thead>
<tr>
<th>Age categories</th>
<th>Males</th>
<th>Females</th>
<th>Males</th>
<th>Females</th>
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</thead>
<tbody>
<tr>
<td>40-49</td>
<td>9</td>
<td>21</td>
<td>9</td>
<td>8</td>
</tr>
<tr>
<td>50-59</td>
<td>15</td>
<td>26</td>
<td>9</td>
<td>11</td>
</tr>
</tbody>
</table>

Fig. 2. Comparisons from two cross-sectional survey studies.
Cohort effects in alcohol use: millennial women at highest risk, but not approximating males

Notes: The reference group for the cohort coefficients is the mean influence of all cohorts combined, and the reference group for the period and age cohorts are the mean influence of all periods and ages combined, respectively. For example, a cohort effect of 0.29 indicates that individuals in that birth cohort had odds of past-month heavy episodic drinking that were 34% higher ($1.34 = e^{0.29}$) than the odds of all cohorts combined.
Birth Cohort Effects and Gender Differences in Alcohol Epidemiology: A Review and Synthesis

Katherine M. Keyes, Guchua Li, and Deborah S. Hasin

Background: Alcohol consumption has demonstrated substantial temporal trends, with some evidence suggesting strong birth cohort effects. The identification of at-risk birth cohorts can inform the interpretation of alcohol trends across age, time, and demographic characteristics such as gender. The present literature review has 2 objectives. First, we conduct a cross-national review of the literature on birth cohort differences in alcohol consumption, disorder, and mortality. Second, we determine the consistency of evidence for birth cohort effects on gender differences.

Methods: A search was conducted and key data on population characteristics, presence and direction of cohort effects, and interactions with gender compiled. Thirty-one articles were included.

Results: Evidence suggests that younger birth cohorts in North America, especially those born after World War II, are more likely than older cohorts to engage in heavy episodic drinking and develop alcohol disorders, but this cohort effect is not found in Australia and western Europe. Cross-nationally, substantial evidence indicates that women in younger cohorts are at especially high risk for heavy episodic drinking and alcohol disorders.

Discussion: Younger birth cohorts in North America and Europe are engaging in more episodic and problem drinking. The gender gap in alcohol problems is narrowing in many countries, suggesting shifting social norms surrounding gender and alcohol consumption. These trends suggest that public health efforts to specifically target heavy drinking in women are necessary.

Key Words: Alcohol Dependence, Gender, Gender Differences, Cohort Effects, Age-Period-Cohort, Cross-Cultural.
What is the continuity between declining adolescent rates of alcohol use and rising adult rates?
Lower adolescent rates portend faster acceleration though adulthood

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NIDA: R01 DA001411 (PI: Miech)

Columbia University Center for Injury Epidemiology and Prevention

Columbia University  Department of Epidemiology

Society and Health Research Center at Universidad Mayor, Santiago, Chile