GROW UP GROW OLD
HUMAN DEVELOPMENT, BIRTH TO DEATH

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Moffitt & Caspi | Genes • Environment • Health • Behavior

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Young adults with mental disorders tend to age faster & develop dementia: A life-course view of an opportunity for prevention.
PREVENTION, BEFORE ONSET OF DISEASE

Prevention Before Onset of Disease
Mental health in the early life-course is a prevention opportunity for successful population aging

People with mental disorders will age younger, faster.

They have less ability to manage their health and finances to prepare for old age.

They will have more chronic physical diseases as they age.

They will use more health care for physical diseases and incur more health-care costs.

They are more likely to develop dementia, and will have earlier dementia onset.
• Physical-health difficulties
• Mental-health difficulties
Psychiatry’s Opportunity to Prevent the Rising Burden of Age-Related Disease

Three demographic trends are colliding to form a perfect storm: the postretirement portion of the population is swelling, the human life span is lengthening, and the birth rate is dropping. The result is that the balance of young to old in the population is shifting, leaving fewer young workers to drive the economy and pay taxes to support aging citizens. These 3 trends mean more stress for the young and less support for the old, bringing 2 opportunities for the mental health field. First, an opportunity to prevent disability among young people, which would enhance their well-being and capacity to shoulder the burden of the dependent older population. Young people tend to be physically healthy but can experience behavioral problems, emotional problems, substance abuse, and cognitive impairments. These conditions respond to mental health treatments. Second, an opportunity to prevent ill health among older people, which would reduce the burden of age-related disability. Here, we argue that psychiatry is well situated to prevent disability among older people by doing something it does well: treat young people. Risk-prediction research shows that the same course is summarized by one dimension, termed $p$. The $p$ factor tops a hierarchy comprising the internalizing, externalizing, and psychotic experiences domains. Additionally, $p$ predicts pace of aging (Figure 3). Carriers of a general liability to mental disorder show accelerated biological aging toward late-life disease and early mortality.

Disability and service use are concentrated in a small segment of the population characterized by mental disorder and its risk factors. National registers reveal that a small segment of the population accounts for the bulk of services used: social welfare payments; hospital-bed nights, prescription fills, criminal convictions, and injury-related insurance claims. In the Dunedin cohort, high-rate users in one service sector tended to be high-rate users in multiple sectors. Such individuals could be accurately identified by risk predictors they had as children, particularly elevated $p$; 8 in 10 high-need/high-cost service users had psychiatric disorders by age 15 years. There is a population segment of people who share risk factors as children, have diagnosable mental disorders as young people, and show accelerated aging as

Moffitt & Caspi, JAMA-Psychiatry, 2019
The Dunedin Multidisciplinary Health and Development Study
## Dunedin Study Design

<table>
<thead>
<tr>
<th>Age</th>
<th>Year</th>
<th>Number</th>
<th>Percent*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birth</td>
<td>1972-73</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>1975-76</td>
<td>1037</td>
<td>100%</td>
</tr>
<tr>
<td>5</td>
<td>1977-78</td>
<td>991</td>
<td>96</td>
</tr>
<tr>
<td>7</td>
<td>1979-80</td>
<td>954</td>
<td>92</td>
</tr>
<tr>
<td>9</td>
<td>1981-82</td>
<td>955</td>
<td>92</td>
</tr>
<tr>
<td>11</td>
<td>1983-84</td>
<td>925</td>
<td>90</td>
</tr>
<tr>
<td>13</td>
<td>1985-86</td>
<td>850</td>
<td>82</td>
</tr>
<tr>
<td>15</td>
<td>1987-88</td>
<td>976</td>
<td>95</td>
</tr>
<tr>
<td>18</td>
<td>1990-91</td>
<td>993</td>
<td>97</td>
</tr>
<tr>
<td>21</td>
<td>1993-94</td>
<td>992</td>
<td>97</td>
</tr>
<tr>
<td>26</td>
<td>1998-99</td>
<td>980</td>
<td>96</td>
</tr>
<tr>
<td>32</td>
<td>2004-05</td>
<td>972</td>
<td>96</td>
</tr>
<tr>
<td>38</td>
<td>2010-12</td>
<td>961</td>
<td>95</td>
</tr>
<tr>
<td>45</td>
<td>2017-2019</td>
<td>938</td>
<td>94%</td>
</tr>
</tbody>
</table>

*Percent assessed, of those who were alive at each age.*
These Dunedin cohort members are 45 years old.

Composites of 10 Dunedin Study cohort members, all born 1972.

Each composite is created from 10 faces with Psychomorph.
These cohort members are 45 years old too

Fastest-aging 10
Dunedin Study
Cohort women
and men

Elliott, Caspi... and Moffitt, *Nature Aging*, 2021
>.80 SD apart on lifetime mental-health history

Fastest-aging
20% of Dunedin Study cohort members

Slowest-aging
20% of cohort members
DISORDERS ASSESSED IN THE DUNEDIN STUDY AT AGES 11, 13, 15, 18, 21, 26, 32, 38, AND 45:

<table>
<thead>
<tr>
<th>Externalizing</th>
<th>Internalizing</th>
<th>Thought Disorders</th>
</tr>
</thead>
<tbody>
<tr>
<td>• ADHD</td>
<td>• Depression</td>
<td>• Schizophrenia</td>
</tr>
<tr>
<td>• Conduct disorder</td>
<td>• General Anxiety</td>
<td>• Mania</td>
</tr>
<tr>
<td>• Alcohol dependence</td>
<td>• Phobias</td>
<td>• OCD</td>
</tr>
<tr>
<td>• Cannabis dependence</td>
<td>• Panic</td>
<td></td>
</tr>
<tr>
<td>• Tobacco dependence</td>
<td>• PTSD</td>
<td></td>
</tr>
<tr>
<td>• Other Drugs</td>
<td>• Eating disorders</td>
<td></td>
</tr>
</tbody>
</table>

Age of onset, number of disorders, yrs duration
Geroscience’s Operational Definition of Aging

Gradual, progressive, coordinated deterioration of physiological integrity across multiple bodily systems
19 biomarkers track coordinated physiological deterioration: age 26, 32, 38, 45 years

- Gum health, Tooth decay
- Leukocyte count, C-Reactive Protein
- Cardiorespiratory Fitness
- Creatinine, Urea Nitrogen
- BMI, Waist-hip ratio
- Mean arterial pressure
- FEV1, FEV1/FVC
- Total Cholesterol, HDL, Triglycerides, Lipoprotein(a), ApoB100/ApoA1
- HbA1C
- Leptin
Biomarker Panel: Correlated Worsening in Physiological Integrity from Age 26 to 45
People who have a history of mental disorders are **aging faster** in midlife.

**Clinical tests of aging**

- Biological pace of aging
- Hearing problems
- Vision problems
- Balance problems
- Motor problems
- Cognitive problems

N = 1,037

Wertz et al. (2021). *JAMA Psychiatry.*
Financial knowledge: Dunedin cohort members with the greatest mental disorder history understood the least financial knowledge.
Measuring practical financial knowledge

Open-ended questions (inter-rater reliability = .95)

What is the advantage to starting retirement savings when a person is young?

Why do some people spread out investments and savings in different types of schemes?

How does the inflation rate affect the money you keep in a savings account?

Why do some people take fewer financial risks as they get older?

Richmond-Rakerd, Caspi, Moffitt PNAS 2021
Basic health knowledge: Dunedin cohort members with the greatest mental disorder history knew the least.

More health knowledge

More Mental Health History ----→

Q1 (69.2 to 86.5)  Q2 (86.5 to 95.0)  Q3 (95.0 to 102.9)  Q4 (102.9 to 111.7)  Q5 (111.9 to 151.0)

Health Literacy (z-scored)
New Zealand’s Whole population administrative registers
STUDY POPULATION FROM NZ-IDI REGISTERS

- Born: 1928-78
- N = 2,349,897
- Observed medical records: 1988-2018, 30 years,
- Encounters are dated, include billing info
- Age period covered 10 to 90 years

Richmond-Rakerd, Caspi...Moffitt, *JAMA Network Open*, 2020
# Mental disorders in the NZ medical record

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Substance use disorders</td>
<td></td>
</tr>
<tr>
<td>Psychotic disorders</td>
<td></td>
</tr>
<tr>
<td>Mood disorders</td>
<td></td>
</tr>
<tr>
<td>Neurotic disorders</td>
<td></td>
</tr>
<tr>
<td>Physiological-disturbance disorders</td>
<td></td>
</tr>
<tr>
<td>Personality disorders</td>
<td></td>
</tr>
<tr>
<td>Developmental disorders</td>
<td></td>
</tr>
<tr>
<td>Behavioral disorders</td>
<td></td>
</tr>
<tr>
<td>Unspecified disorders</td>
<td></td>
</tr>
<tr>
<td>Self-harm</td>
<td></td>
</tr>
</tbody>
</table>

Index disorder: First mental-health admission during the 30-yr period
Individuals diagnosed with a mental disorder developed excess of every different type of physical disease.
Prevalence of Alzheimer's dementia is 4 times higher in people who had mental disorder in the past 30 years (1.7 million NZ citizens)

Richmond-Rakerd, Moffitt et al. 2022, *JAMA-Psychiatry*
Mental disorders forecast premature death: mortality in the NZ population

RR = 3.23 (3.14-3.33)

Percent deceased during observation period

Reference group

No Condition (N = 885,558) 8%
Only Mental Disorder (N = 35,454) 23%
Only Physical Disease (N = 253,155) 25%
Both (N = 17,829) 32%
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