


## Original Investigation

# Suicide Attempt in Young People

## A Signal for Long-term Health Care and Social Needs

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**IMPORTANCE** Suicidal behavior has increased since the onset of the global recession, a trend that may have long-term health and social implications.

**OBJECTIVE** To test whether suicide attempts among young people signal increased risk for later poor health and social functioning above and beyond a preexisting psychiatric disorder.

**DESIGN** We followed up a cohort of young people and assessed multiple aspects of their health and social functioning as they approached midlife. Outcomes among individuals who had self-reported a suicide attempt up through age 24 years (young suicide attempters) were compared with those who reported no attempt through age 24 years (nonattempters). Psychiatric history and social class were controlled for.

**SETTING AND PARTICIPANTS** The population-representative Dunedin Multidisciplinary Health and Development Study, which involved 1037 birth cohort members comprising 91 young suicide attempters and 946 nonattempters, 95% of whom were followed up to age 38 years.

**MAIN OUTCOMES AND MEASURES** Outcomes were selected to represent significant individual and societal costs: mental health, physical health, harm toward others, and need for support.

**RESULTS** As adults approaching midlife, young suicide attempters were significantly more likely to have persistent mental health problems (eg, depression, substance dependence, and additional suicide attempts) compared with nonattempters. They were also more likely to have physical health problems (eg, metabolic syndrome and elevated inflammation). They engaged in more violence (eg, violent crime and intimate partner abuse) and needed more social support (eg, long-term welfare receipt and unemployment). Furthermore, they reported being lonelier and less satisfied with their lives. These associations remained after adjustment for youth psychiatric diagnoses and social class.

**CONCLUSIONS AND RELEVANCE** Many young suicide attempters remain vulnerable to costly health and social problems into midlife. As rates of suicidal behavior rise with the continuing global recession, additional suicide prevention efforts and long-term monitoring and after-care services are needed.

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Since the onset of the global economic recession in 2007, suicide rates have risen across the United States and Europe.<sup>1-4</sup> This trend is consistent with evidence that economic downturns predict increases in suicide.<sup>5</sup> Completed suicides, however, are a smaller part of a deeper public health problem. Nonlethal suicide attempts greatly outnumber lethal ones: according to the Centers for Disease Control and Prevention, there are 25 suicide attempts for every completed suicide.<sup>6</sup> A rising tide of suicidal behavior in populations coping with severe recession may have long-term health and social implications. In this article, we make use of data from a New Zealand birth cohort whose country experienced escalating suicide rates just as they entered young adulthood. We followed them up into their late 30s to investigate whether youthful suicide attempt signals enduring risk for poor health and social outcomes.

Following up outcomes among young people who have attempted suicide is especially important.<sup>7</sup> The overall rate of suicide attempt among youths is 3 times higher than the rate among adults older than 30 years, and young people are more likely to survive an attempt.<sup>6,8</sup> Therefore, the lifetime population burden of any negative outcomes after a suicide attempt may be especially concentrated among young attempters.

Both population-representative and clinical samples have established that previous suicide attempt is one of the strongest predictors of future attempts as well as of completed suicide.<sup>9-17</sup> Only a few studies, however, have looked at additional outcomes following a suicide attempt. These studies have variously reported that suicide attempters appear to experience later psychiatric problems, family violence, and legal problems.<sup>18-22</sup> We investigated long-term outcomes among study members who made suicide attempts up through age 24 years (following the World Health Organization's current definition of youth<sup>23</sup>). In conducting this research, we did not assume that suicide attempts are a cause of these outcomes. Rather, we tested the hypothesis that suicide attempts represent an "early warning signal" for persistent vulnerability to poor outcomes.

## Methods

### Sample

Participants are members of the Dunedin Multidisciplinary Health and Development Study, a longitudinal investigation of health and behavior in a complete birth cohort. Study members (N = 1037; 91% of eligible births; 51.6% male) were all individuals born between April 1972 and March 1973 in Dunedin, New Zealand, who were eligible for the longitudinal study based on residence in the province at age 3 years and who participated in the first follow-up assessment at age 3 years. The cohort represents the full range of socioeconomic status in the general population of New Zealand's South Island and is primarily white. Assessments were carried out at birth and at ages 3, 5, 7, 9, 11, 13, 15, 18, 21, 26, 32, and, most recently, 38 years, when 95.4% of the 1007 study members still alive took part. At each assessment wave, study members are brought to the research unit for a full day of interviews and examinations. The

Otago Ethics Committee approved each phase of the study, and informed consent was obtained from each participant. For the present article, all analyses were limited to study members who took part in the phase 38 assessment.

### Measures

In assessments carried out at ages 18, 21, 26, 32, and 38 years, suicide attempts were queried during structured interviews about self-harm and suicide<sup>24</sup> and again as a symptom of depression during structured diagnostic interviews for depression.<sup>25,26</sup> Queries invoked the following behaviors: cutting or stabbing oneself, overdosing on pills, taking poison, attempting to gas oneself, attempting to hang or strangle oneself, attempting to shoot oneself, attempting to drown, jumping from a high place, crashing a car or motorcycle on purpose, burning oneself, or "other method." Interviewers differentiated between suicide attempts and nonsuicidal self-harm; here we study incidents accompanied by self-reported intent to die. Life History Calendars<sup>27</sup> were used to ascertain the timing of suicide attempts. These sources of information were combined to create a record of study members' age at first (if any) suicide attempt. We defined young suicide attempters as those who made at least 1 suicide attempt up through age 24 years.

Of the 1037 original Dunedin study members, 91 (8.8%) reported a suicide attempt through age 24 years. Of these 91, 86 were assessed through age 38 years. (As of the phase 38 data collection, 30 [2.9%] members of the original cohort had died of any cause. Of the suicide attempters studied here, 5 [5.5%] had died.) Mean (SD) age at first suicide attempt was 17.4 (3.6) years. Young suicide attempters in the Dunedin cohort exhibited the same female preponderance observed in previous studies<sup>28,29</sup>: 52 suicide attempters were female (57.1%) and 39 were male (42.9%). Young attempters did not differ from non-attempters on a composite measure of their family social class<sup>30</sup> ( $\chi^2 = 4.27, P = .12$ ).

### Outcome Measures

Our analysis included 4 categories of outcomes that entail significant individual and societal costs. Outcomes that predict costs to the health care system are designated *mental health* (psychiatric diagnoses, treatment seeking, medication usage, hospitalization, and suicidal behaviors) and *physical health* (self-rated health and physical functioning, metabolic syndrome, inflammation, unintentional injuries, and 2 measures of "accelerated aging"). Outcomes that predict costs to the criminal justice or social services systems are designated *harm toward others* (convictions for violent crime, perpetration of intimate partner violence, and removal of a child from a study member's care). Last, outcomes that predict costs to the welfare system or index poor social well-being are designated *need for support/quality of life* (unemployment, receipt of welfare benefits, victimization from intimate partner violence, satisfaction with life, and loneliness). All measures are described in eTable 1 in the Supplement.

### Confounding Psychiatric Conditions

In studying long-term outcomes following suicide attempt, it is crucial to separate out the effect of suicide attempters' men-

tal health up to the time of the attempt. Compared with the general population, young attempters are more likely to have psychiatric disorders, which themselves are linked to a poor adult prognosis. Three of the most common psychiatric disorders among young suicide attempters are depression, anxiety, and conduct disorder (CD).<sup>16,31,32</sup> We thus controlled for history of these 3 disorders. We also considered controlling for prior substance dependence diagnosis and attention-deficit hyperactivity disorder. However, all of our young suicide attempters with prior substance dependence or attention-deficit hyperactivity disorder were already captured by our diagnoses of depression, anxiety, or CD. We did not control for psychotic illnesses because these disorders were not diagnosed until after age 24 years, past our exposure period. To assess the sensitivity of our results to this problem, we removed individuals diagnosed with schizophrenia from all analyses. Results were unaffected (ie, no statistically significant findings were lost and no new significant findings were gained, and point estimates were largely unchanged). We therefore included these individuals in all results presented here. Controlling for disorder up to the time of the suicide attempt allowed us to establish whether suicide attempters warrant additional long-term attention beyond what their psychiatric history might indicate.

Study members were repeatedly assessed with the Diagnostic Interview Schedule for Children<sup>33</sup> at ages 11, 13, and 15 years and the Diagnostic Interview Schedule beginning at age 18 years,<sup>25,26</sup> which allowed us to identify all study members who met *DSM* diagnostic criteria for depression, anxiety, and CD during the exposure period. Study members who attempted suicide in youth were coded as having met diagnostic criteria for these disorders if they met criteria before or concurrent with their first suicide attempt. Compared with the nonsuicidal study members, young suicide attempters were significantly more likely to have a history of depression (32.2% vs 44.0%,  $\chi^2 = 5.15$ ,  $P = .02$ ), anxiety (20.3% vs 34.1%,  $\chi^2 = 9.35$ ,  $P = .002$ ), and CD (20.8% vs 48.4%,  $\chi^2 = 35.16$ ,  $P < .001$ ) during the exposure period.

### Statistical Analysis

We used generalized linear models to estimate the association between youth suicide attempt and adult outcomes. We used Poisson regression with robust standard errors to model risk ratios for dichotomous outcomes (all mental health indices, self-rated health, metabolic syndrome, conviction for violent crime, child removal by social services, and partner physical abuse). We used negative binomial or zero-inflated negative binomial regression with robust standard errors to model incident rate ratios when analyzing count data that were overdispersed (number of unintentional injuries, duration of unemployment, and duration of welfare benefits). We used ordinary least squares regression models to estimate coefficients for continuously distributed outcomes (physical functioning, inflammation, aging, loneliness, and life satisfaction).

Our first set of models examined associations between youth suicide attempt and each adult outcome, controlling for sex. We then repeated the analyses, adding controls for depression, anxiety, and CD, to test whether suicide attempt pre-

dicted later outcomes above and beyond attempters' previous psychiatric morbidity. Last, we used interaction terms to test whether there were sex differences in outcomes associated with youth suicide attempt. All statistical analyses were conducted using Stata 12.0 (StataCorp LP).

In **Tables 1, 2, and 3**, column 3 presents bivariate associations between suicide attempt and each outcome. Column 4 presents the multivariate associations between suicide attempt and each outcome, controlling for history of depression, anxiety, and CD (these covariates' regression coefficients predicting outcomes are presented in columns 5-7).

## Results

### Poor Mental Health

Approaching midlife, young suicide attempters had more mental health problems than did nonattempters (Table 1). They were 2 times more likely to have persistent episodes of major depression and had persistent problems with substance dependence. They also required more mental health-related services: they were more likely to seek help for psychiatric problems, to take psychiatric medications, and to have been hospitalized for a psychiatric condition. Suicidal behavior also remained common: more than 20% of young suicide attempters reported additional suicide attempts between ages 26 and 38 years, a 3-fold difference compared with nonattempters; young attempters were also nearly 3 times more likely to engage in subsequent nonsuicidal self-injury.

### Poor Physical Health

Young suicide attempters were in significantly worse physical health as they approached midlife (Table 2). They were more likely to rate their overall health at age 38 years as poor or fair and reported a greater number of daily functional limitations as measured by the Short Form-36 physical health scale.

These subjective reports of poorer health were corroborated by clinical indicators. Young suicide attempters were 2 times more likely than nonattempters to meet criteria for the metabolic syndrome. Furthermore, their levels of systemic inflammation, measured across multiple inflammatory biomarkers, were significantly higher. They also sustained more unintentional injuries during the follow-up period.

There were signs that suicide attempters were aging at a faster rate than nonattempters. Their covariate-adjusted mean "heart age," calculated using a composite index of the Framingham cardiovascular disease risk score, was 42.0 years—4 years older than both their chronologic age and the mean heart age of nonattempters. They also looked older than nonattempters.

### Harm Toward Others

Approaching midlife, young suicide attempters were significantly more likely than nonattempters to commit violence against others (Table 3). They were 2 times more likely to report being abusive in their intimate relationships and to be convicted for a violent crime—even when excluding those whose convictions were solely for domestic assault.

Table 1. Mental Health Outcomes: Psychiatric Diagnoses, Use of Services, and Suicidal Behavior Between Ages 26 and 38 Years<sup>a</sup>

Outcome	No. (%)	Model 2: Multivariate RR (95% CI) Controlling for History of Depression, Anxiety, and CD <sup>b,c</sup>				
		Model 1: Bivariate RR (95% CI) <sup>b</sup>	Suicide Attempt	Suicide Attempt	History of Depression	History of Anxiety
Persistent major depression						
Nonattempters	110 (12.6)	1.0	1.0			
Suicide attempters	26 (30.2)	<b>2.3 (1.6 to 3.3)</b>	<b>2.0 (1.4 to 2.9)</b>	2.6 (1.8 to 3.6)	1.8 (1.3 to 2.5)	0.9 (0.6 to 1.3)
Persistent GAD						
Nonattempters	48 (5.5)	1.0	1.0			
Suicide attempters	10 (11.6)	<b>2.2 (1.1 to 4.1)</b>	1.8 (0.9 to 3.5)	2.2 (1.3 to 3.6)	2.1 (1.3 to 3.5)	0.9 (0.5 to 1.6)
Persistent substance dependence						
Nonattempters	81 (8.8)	1.0	1.0			
Suicide attempters	26 (30.2)	<b>3.9 (2.7 to 5.6)</b>	<b>2.6 (1.7 to 3.8)</b>	1.6 (1.1 to 2.4)	1.0 (0.7 to 1.5)	2.4 (1.6 to 3.6)
Help sought for a mental health problem						
Nonattempters	361 (41.4)	1.0	1.0			
Suicide attempters	56 (65.1)	<b>1.5 (1.3 to 1.8)</b>	<b>1.3 (1.1 to 1.6)</b>	1.6 (1.4 to 1.9)	1.2 (1.0 to 1.4)	1.2 (1.1 to 1.5)
Any psychiatric medication usage						
Nonattempters	214 (24.6)	1.0	1.0			
Suicide attempters	41 (47.7)	<b>1.8 (1.4 to 2.4)</b>	<b>1.6 (1.2 to 2.1)</b>	2.1 (1.7 to 2.6)	1.3 (1.0 to 1.6)	1.2 (0.9 to 1.5)
Hospitalized for a psychiatric condition						
Nonattempters	35 (3.9)	1.0	1.0			
Suicide attempters	16 (18.6)	<b>5.1 (2.9 to 8.8)</b>	<b>2.9 (1.6 to 5.1)</b>	1.8 (1.0 to 3.3)	2.0 (1.1 to 3.5)	2.7 (1.5 to 4.9)
Attempted suicide						
Nonattempters	38 (4.1)	1.0	1.0			
Suicide attempters	19 (22.1)	<b>5.5 (3.3 to 9.3)</b>	<b>3.2 (1.8 to 5.7)</b>	1.6 (0.9 to 2.8)	2.3 (1.4 to 3.9)	2.6 (1.5 to 4.5)
Nonsuicidal self-injury						
Nonattempters	26 (3.0)	1.0	1.0			
Suicide attempters	9 (10.7)	<b>3.4 (1.6 to 7.0)</b>	<b>2.8 (1.2 to 6.4)</b>	1.6 (0.8 to 3.2)	1.4 (0.7 to 2.9)	1.5 (0.6 to 3.3)

Abbreviations: CD, conduct disorder; GAD, generalized anxiety disorder; RR, risk ratio.

<sup>a</sup> Statistically significant ( $P < .05$ ) associations indicated in bold text (for suicide attempt exposure only).

<sup>b</sup> All regression models also controlled for sex.

<sup>c</sup> Estimates in model 2 are derived from the following basic multivariate model:  $g(Y) = B_1 + B_2(\text{suicide attempt}) + B_3(\text{sex}) + B_4(\text{depression}) + B_5(\text{anxiety}) + B_6(\text{CD})$ .

Social services removed a child from the home of 13 study members (1.3%) for protection from abuse or neglect. Five of these study-member parents had attempted suicide in their youth. After controlling for covariates, this association was attenuated and became marginally significant, most likely because of this outcome’s very low base rate.

### Need for Support/Quality of Life

Young suicide attempters were in need of more support during adulthood (Table 3). This is reflected in life histories characterized by greater unemployment and dependence on welfare benefits. If they became unemployed, suicide attempters reported being unemployed for approximately 6 months longer than nonattempters during the follow-up period. If they used government welfare benefits, suicide attempters were likely to rely on these benefits for a significantly longer period (adjusted for covariates, mean durations of welfare receipt were 68.2 vs 29.1 months). In their personal lives, young suicide attempters were 2 times more likely to be physically victimized by their romantic partners, and approaching midlife, they reported suffering from loneliness and were less satisfied with their lives.

### Sex Differences

Of all the analyses we conducted, 2 outcomes for young suicide attempters—physical functioning (Short Form-36) and metabolic syndrome—appeared to differ by sex. Both observed associations were significantly stronger among female attempters. However, these sex interactions could be due to chance and should await replication.

### Control for Socioeconomic Background

Last, we conducted a sensitivity analysis, adding a covariate for study members’ family social class to all models reported in Tables 1 through 3. Point estimates for some outcomes were very slightly attenuated, but statistical inference was unaltered in all cases (ie, no statistically significant findings were lost and no new significant findings were gained).

## Discussion

The results of this study provide evidence that young suicide attempters, approaching midlife, are at substantially increased risk for a wide array of negative health and social out-

Table 2. Physical Health Outcomes: Physical Functioning, Metabolic Syndrome, Inflammation, Injuries, and Signs of Aging at Age 38 Years<sup>a</sup>

Outcome	No. [%] or Mean (SD)	Model 1: Bivariate B or RR (95% CI) <sup>b</sup>		Model 2: Multivariate B or RR (95% CI) Controlling for History of Depression, Anxiety, and CD <sup>b,c</sup>		
		Suicide Attempt	Suicide Attempt	History of Depression	History of Anxiety	History of CD
Poor or fair self-rated health						
Nonattempters	54 [6.2]	1.0 <sup>d</sup>	1.0 <sup>d</sup>			
Suicide attempters	14 [16.5]	<b>2.9 (1.7 to 5.0)</b>	<b>2.5 (1.3 to 4.5)</b>	1.1 (0.6 to 1.8)	1.1 (0.6 to 2.1)	1.7 (1.0 to 2.9)
Physical functioning scale (SF-36)						
Nonattempters	93.5 (13.7)	90.0 <sup>e</sup>	91.8 <sup>e</sup>			
Suicide attempters	87.7 (17.5)	<b>-5.5 (-8.7 to -2.4)</b>	<b>-4.8 (-7.8 to -1.8)</b>	-4.1 (-5.9 to -2.2)	-0.6 (-2.7 to 1.5)	-1.9 (-4.0 to 0.2)
Metabolic syndrome (3+ markers)						
Nonattempters	122 [14.9]	1.0 <sup>d</sup>	1.0 <sup>d</sup>			
Suicide attempters	22 [26.5]	<b>2.0 (1.3 to 2.9)</b>	<b>1.9 (1.3 to 2.9)</b>	1.1 (0.8 to 1.5)	1.1 (0.8 to 1.7)	1.0 (0.7 to 1.5)
Inflammation factor score						
Nonattempters	-0.03 (0.9)	0.5 <sup>e</sup>	0.4 <sup>e</sup>			
Suicide attempters	0.3 (0.9)	<b>0.3 (0.1 to 0.5)</b>	<b>0.2 (0.04 to 0.5)</b>	0.02 (-0.1 to 0.2)	0.1 (-0.03 to 0.3)	0.01 (-0.1 to 0.2)
Unintentional injuries <sup>f</sup>						
Nonattempters	5.7 (5.2)	1.0 <sup>d</sup>	1.0 <sup>d</sup>			
Suicide attempters	8.9 (8.1)	<b>1.5 (1.2 to 1.9)</b>	<b>1.3 (1.1 to 1.7)</b>	1.1 (0.9 to 1.2)	1.2 (1.0 to 1.4)	1.3 (1.1 to 1.5)
Framingham "heart age" score						
Nonattempters	38.2 (7.8)	28.3 <sup>e</sup>	28.1 <sup>e</sup>			
Suicide attempters	42.0 (9.8)	<b>4.7 (3.1 to 6.4)</b>	<b>4.2 (2.5 to 5.8)</b>	0.3 (-0.8 to 1.3)	0.8 (-0.3 to 2.0)	1.6 (0.5 to 2.8)
Perceived age range						
Nonattempters	5.3 (1.0)	5.1 <sup>e</sup>	5.1 <sup>e</sup>			
Suicide attempters	5.8 (1.1)	<b>0.5 (0.3 to 0.7)</b>	<b>0.4 (0.2 to 0.6)</b>	-0.1 (-0.2 to 0.1)	0.2 (0.01 to 0.3)	0.3 (0.1 to 0.4)

Abbreviations: CD, conduct disorder; RR, risk ratio; SF-36, Short Form-36 physical health scale.

<sup>a</sup> Statistically significant ( $P < .05$ ) associations indicated in bold text (for suicide attempt exposure only).

<sup>b</sup> All regression models also controlled for sex.

<sup>c</sup> Estimates in model 2 are derived from the following basic multivariate model:  $g(Y) = B_1 + B_2(\text{suicide attempt}) + B_3(\text{sex}) + B_4(\text{depression}) + B_5(\text{anxiety}) + B_6(\text{CD})$ .

<sup>d</sup> Risk ratio.

<sup>e</sup> Bivariate or multivariate B.

<sup>f</sup> Model was analyzed using zero-inflated negative binomial regression. Risk ratio corresponds to incident rate ratio for unintentional injury count; mean (SD) estimates exclude study members with zero injuries. Model also controlled for time spent in New Zealand during ages 26 to 38 years since only New Zealand residents are eligible to receive injury insurance benefits.

comes. Young suicide attempters have higher rates of multiple serious mental health problems, as indicated by diagnosed disorder, treatment seeking, hospitalization, and additional suicidal behavior. Moreover, while still in their 30s, young attempters already have more physical health problems than their peers—evidenced in their higher rates of metabolic disorder, systemic inflammation, and early signs of aging. They are also more likely to engage in violence, experience long-term unemployment and welfare dependence, and report high levels of loneliness and dissatisfaction with their lives. Notably, these associations persist even after controlling for suicide attempters' history of psychiatric disorder.

This poor prognosis represents not only a toll on suicide attempters and their families but also a significant economic burden on health care, welfare, and criminal justice systems. Young suicide attempters account for a far higher proportion of the study outcomes than their absolute numbers would predict. Although they made up just 8.8% of our cohort, by midlife they comprised 15.3% of those with metabolic syndrome, 21.7% of those with persistent psychiatric disorders, and 34.6% of those who were convicted for violent crime (Figure).

Methodological advantages of this study include its use of a representative birth cohort with good retention, a follow-up period of more than 13 years, and statistical controls for psychiatric diagnoses among young suicide attempters. The analysis was also strengthened by our inclusion of all self-reported suicide attempts rather than just attempts that received medical attention, and of a comprehensive set of outcome variables that allowed us to characterize young suicide attempters across multiple domains of functioning as they entered midlife.

This study had several limitations. First, we did not have detailed information on the circumstances of or method used for every attempt (overdose on pills, attempted hanging, etc). It is therefore possible that not all the suicide attempts reported by study members would be considered medically serious attempts. However, previous studies have found that a minority of suicide attempts among young people receive medical attention and that studies using only hospitalized samples both underestimate the rate of suicide attempts and potentially provide biased estimates of effect because medically treated cases are a nonrandom sample of all suicide attempters.<sup>34</sup> We found that 8.8% of the cohort had made a suicide attempt by age 24 years, which is consistent with evi-



**Table 3. Harm Toward Others and Need for Support/Quality of Life Between Ages 26 and 38 Years<sup>a</sup>**

Outcome	No. [%] or Mean (SD)	Model 1: Bivariate B or RR (95% CI) <sup>b</sup>	Model 2: Multivariate B or RR (95% CI) Controlling for History of Depression, Anxiety, and CD <sup>b,c</sup>			
		Suicide Attempt	Suicide Attempt	History of Depression	History of Anxiety	History of CD
Harm toward others: Violent convictions, intimate partner physical abuse, and child protective services						
Convicted for violent crime <sup>c</sup>						
Nonattempters	34 [3.9]	1.0 <sup>d</sup>	1.0 <sup>d</sup>			
Suicide attempters	17 [19.8]	<b>4.9 (2.8 to 8.3)</b>	<b>2.5 (1.4 to 4.4)</b>	1.5 (0.9 to 2.8)	0.9 (0.5 to 1.7)	5.0 (2.5 to 9.7)
Persistent perpetration: partner abuse						
Nonattempters	64 [7.0]	1.0 <sup>d</sup>	1.0 <sup>d</sup>			
Suicide attempters	16 [18.6]	<b>2.5 (1.5 to 4.2)</b>	<b>2.0 (1.2 to 3.5)</b>	1.4 (0.9 to 2.1)	0.8 (0.5 to 1.3)	1.9 (1.2 to 3.1)
Had child removed by social services						
Nonattempters	8 [0.9]	1.0 <sup>d</sup>	1.0 <sup>d</sup>			
Suicide attempters	5 [5.9]	<b>6.3 (2.0 to 20.0)</b>	<b>2.9 (0.9 to 9.5)</b>	2.4 (0.8 to 7.9)	1.5 (0.5 to 4.6)	8.2 (2.2 to 29.9)
Need for support/quality of life: Unemployment, welfare receipt, victimization from intimate partner abuse, loneliness, and life satisfaction						
Duration of unemployment, mo <sup>e,f</sup>						
Nonattempters	6.9 (11.2)	1.0 <sup>d</sup>	1.0 <sup>d</sup>			
Suicide attempters	12.8 (19.2)	<b>2.5 (1.3 to 4.8)</b>	<b>2.4 (1.1 to 4.9)</b>	2.0 (1.2 to 3.4)	0.9 (0.5 to 1.5)	1.5 (1.0 to 2.5)
Duration of welfare benefits, mo <sup>e,f</sup>						
Nonattempters	31.1 (42.2)	1.0 <sup>d</sup>	1.0 <sup>d</sup>			
Suicide attempters	69.3 (55.4)	<b>2.2 (1.6 to 2.9)</b>	<b>1.9 (1.4 to 2.6)</b>	1.0 (0.8 to 1.4)	1.3 (0.9 to 1.8)	1.6 (1.3 to 2.1)
Persistent victimization: partner abuse						
Nonattempters	87 [9.5]	1.0 <sup>d</sup>	1.0 <sup>d</sup>			
Suicide attempters	19 [22.1]	<b>2.6 (1.7 to 4.0)</b>	<b>2.1 (1.3 to 3.3)</b>	1.4 (0.9 to 2.0)	0.9 (0.6 to 1.4)	1.7 (1.1 to 2.5)
Loneliness, age 38 y						
Nonattempters	1.5 (2.1)	1.7 <sup>g</sup>	1.3 <sup>g</sup>			
Suicide attempters	2.5 (2.6)	<b>1.0 (0.5 to 1.5)</b>	<b>0.8 (0.3 to 1.3)</b>	0.6 (0.3 to 0.9)	0.4 (0.02 to 0.7)	0.2 (-0.1 to 0.6)
Life satisfaction, age 38 y						
Nonattempters	13.9 (3.9)	15.1 <sup>g</sup>	15.8 <sup>g</sup>			
Suicide attempters	11.1 (4.5)	<b>-2.9 (-3.8 to -2.0)</b>	<b>-2.4 (-3.3 to -1.5)</b>	-1.1 (-1.6 to -0.5)	-0.6 (-1.3 to 0.01)	-0.9 (-1.3 to -0.3)

Abbreviations: See Table 2.

<sup>a</sup> Statistically significant ( $P < .05$ ) associations indicated in bold text (for suicide attempt exposure only).

<sup>b</sup> All regression models also controlled for sex.

<sup>c</sup> Estimates in model 2 are derived from the following basic multivariate model:  $g(Y) = B_1 + B_2(\text{suicide attempt}) + B_3(\text{sex}) + B_4(\text{depression}) + B_5(\text{anxiety}) + B_6(\text{CD})$ .

<sup>d</sup> Risk ratio.

<sup>e</sup> Model also controlled for time spent in New Zealand or Australia during ages 26 to 38 years.

<sup>f</sup> Models used negative binomial regression (unemployment) or zero-inflated negative binomial regression (welfare benefits). Risk ratios correspond to incident rate ratios for count of months unemployed or on welfare benefits; mean (SD) estimates exclude individuals with zero months of unemployment or welfare benefits.

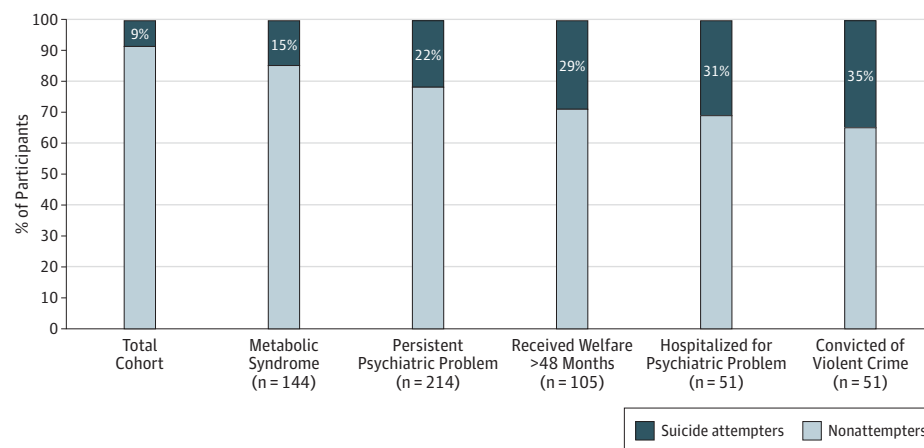
<sup>g</sup> Bivariate or multivariate B.

dence from another 1970's New Zealand birth cohort reporting that 5.4% of participants had attempted suicide by age 18 years.<sup>19</sup> Second, the outcomes we examined were right-censored at age 38 years, the most recent Dunedin study assessment; future research should investigate whether these associations persist into older adulthood.

Third, our findings are specific to a cohort of individuals born in Dunedin, New Zealand, in the early 1970s. However, during the years when this cohort grew from adolescents to young adults, New Zealand witnessed circumstances that re-

semble those encountered by young people today (see eFigure 1 in the Supplement). From the 1940s to 1986, the unemployment rate in New Zealand remained below 5%, and young people could expect an easy transition from education into paid work.<sup>35</sup> Between 1986 and 1993—when members of the cohort were reaching adolescence, leaving high school, and entering the labor force—the country experienced economic upheaval (deregulation, struggle to enter new international markets, and a share-market crash), which resulted in extremely high unemployment rates. Among all 15- to 24-year-

Figure. More Than Their Share: Selected Outcomes in Midlife for Young Suicide Attempters and Nonattempters



The far left bar shows the proportion of the entire Dunedin cohort that made a suicide attempt up through age 24 years. All other bars show, of the cohort members with each outcome, what proportion were young suicide attempters. "Persistent psychiatric problem" indicates 2 or more diagnoses with depression, generalized anxiety disorder, or substance dependence between ages 26 and 38 years. All other outcomes are as described in eTable 1 in the Supplement.

olds in 1993, unemployment was 18%,<sup>36,37</sup> similar to current levels in the United States and Europe.<sup>38</sup> Simultaneously, between 1986 and 1993, suicide rates among 15- to 24-year-olds increased 50% and continued to rise to a high of 27 per 100 000 in 1996, after which they began to decline.<sup>39</sup> Given the economic and suicidal-behavior context of our cohort's experiences, the findings we report may be particularly relevant and timely for clinicians today, who are treating a rising number of patients who have attempted suicide.

Our analysis does not assume that suicide attempts are a cause of later poor health and social functioning. Rather, we tested the "signal value" of suicide attempts for clinicians as a predictor of risk for poor outcomes over and above psychiatric disorder. The results of this study, however, raise interesting questions about what causal pathways may link young people's suicide attempts to later poor outcomes. First, suicide attempt may simply be a proxy measure for greater severity of mental illness. A second possibility relates to the high rates of mental health care-seeking and psychiatric medication use we observed in young suicide attempters. Suicide attempt could result in attempters becoming engaged with the mental health care system and later receiving more treatment.<sup>19</sup> Third, we observed that young attempters were more likely to engage in further suicidal behavior (nonsuicidal self-injury and suicide attempts) as adults. This could be explained by the interpersonal theory of suicide, which predicts that risk for future suicidal behavior is elevated through repeated practice and exposure to self-harm, through which the individual habituates to the physical pain and fear involved.<sup>40,41</sup> Fourth, we also observed poor physical health among attempters (net of social class background). This may be explained by suicide attempters' lifestyles and their high rates of persistent psychiatric disorder, which involve ongoing self-neglect. Fifth, suicide attempters had elevated levels of loneliness and dissatisfac-

tion with life. This could be explained if they were subjected to stigma as a result of their attempts, leading to long-lasting social isolation and mistreatment.<sup>42,43</sup>

These potential explanations are not mutually exclusive, and each explanation almost certainly applies to a different outcome (eg, mental health care seeking vs physical health vs quality of life). Future research in larger samples should work to identify the pathways through which suicide attempt conveys increased risk and to determine any factors that confer differential risk or promote resilience to poor outcomes among suicide attempters.

Our results suggest that young suicide attempters may warrant long-term follow-up and supportive care in the years after their attempt(s). A large national study of adolescents in the United States reported that most suicidal adolescents in fact receive some sort of mental health services before the onset of their suicidal behavior, highlighting the difficulty of preventing attempts.<sup>31</sup> However, evidence from randomized interventions and observational studies suggests that supportive care programs among previous attempters can prevent later suicide deaths.<sup>44,45</sup> Although our finding that suicide attempters had worse mental health and more subsequent attempts was expected, our study also underscores the necessity of attending to a broader range of outcomes in this at-risk population. Young suicide attempters' higher levels of metabolic syndrome and inflammation will likely increase their susceptibility to cardiovascular disease and other illnesses across the lifespan.<sup>46,47</sup> Furthermore, although only a minority engaged in harmful behavior toward others, at the population level this places families and others at risk.<sup>18,21,22</sup> High rates of suicidal behavior are likely to persist with the ongoing global recession. In an era of economic stress and scarce financial resources, young suicide attempters may be an important target for intervention and secondary prevention services.

## ARTICLE INFORMATION

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