

An Analysis of the Effects of Suicide Prevention Facilities On Suicide Rates in the United States

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Abstract: Since the 1960s, there has been a massive effort to reduce suicide mortality in the United States through prevention centers which invite suicidal persons to phone for supportive services. In spite of virtually total lack of evidence concerning the efficacy of these services, they proliferated until, by 1973, nearly every metropolitan area in the United States had at least one. Suicide rates increased slightly throughout this time.

We studied 1968 through 1973, the years of greatest growth of

suicide prevention facilities, comparing suicide rates in counties that added these centers with counties that did not do so. An association of centers with the reduction of suicides in young white females emerged. This finding was replicated on a different set of counties for a different time span. The results are discussed in light of the fact that this group constitutes the major clients of these centers. (*Am J Public Health* 1984; 74:340-343.)

Introduction

The incidence of suicide in the United States in recent years is between 12 and 14 per 100,000 per year.^{1,2} These data derive from mortality data compiled by the National Center for Health Statistics, but it is widely believed that they represent substantial underestimates of the true incidence.³ Between the middle 1960s and the early 1970s, crisis intervention centers and more narrowly defined suicide prevention services proliferated as a response to this problem; by 1973 nearly all metropolitan centers in the United States had at least one such facility, and the majority had two or more.^{4*} Evidence for their effectiveness however, was equivocal, at best.

The first evidence for possible effectiveness of suicide prevention facilities came from the "Samaritan" movement, begun in 1953 and spread from one center in London to 144 branches across England and Ireland by 1973.⁵ Between 1963 and 1973 the suicide rate in England dropped approximately one-third while the rates published by almost all other countries were rising.⁶

Several authors presented more direct evidence. Bagley compared suicide rates in 15 Samaritan towns with those in 15 control towns and concluded that the Samaritan influence was responsible for the declining incidence of successful suicides.⁸ However, methodological flaws in matching (particularly in initial rates) detracted from the persuasiveness of the conclusion. Bagley's argument was later strengthened when he found essentially the same effect employing better controlled samples.

Holding found that advertising of the Samaritans, considered crucial to their success, increased calls to the centers, but demonstrated no relationship to rates of at-

tempted or completed suicides.⁹ Later, Barraclough, *et al*, analyzed different sets of "matched" towns with and without Samaritan facilities and failed to find differences.^{10,11} Several authors have observed that the conversion of domestic gas from a toxic to a non-toxic form in England was likely the largest factor in the declining suicide rates.¹² This contention has been challenged by Sainsbury, *et al*, who argue that a similar detoxification of domestic gas in The Netherlands was not accompanied by a reduction in suicide rates.¹³ However, gas inhalation has never been a major method of suicide in The Netherlands as it has been in the United Kingdom.^{3,14} During the period of time in which the Samaritan centers were proliferating, another confounding effect was the change from relatively low therapeutic index sedatives (barbiturates) to those with an extremely high safety margin (benzodiazepines). This change in prescribing habits of physicians may have taken place more rapidly in England than in other parts of Europe.

All in all, the initial optimism over the effectiveness of the Samaritan movement in Great Britain may have been unwarranted. Although the advent of the centers may have contributed to the declining suicide rates, the decreasing incidence of suicide coinciding with the Samaritan movement may have stimulated the optimistic proliferation of centers.

While the centers in the US usually bear a generic resemblance to those of the Samaritans, American centers are usually multipurpose crisis intervention type and generally much more willing to intervene in any way necessary to prevent a suicide, including involving the police. The American volunteer counterpart of the Samaritan maintains an impersonal, usually anonymous, posture, while the Samaritans, as their name implies, offer personal friendship, but only by invitation of the caller. Since the most often expressed reason for suicide is loneliness, it is intuitively appealing to believe that the active friendship of the Samaritans would work to reduce this major determinant.

The presumption of effectiveness (however unwarranted) that the Samaritans enjoyed did not exist in the United States. For one thing, during the time that prevention facilities were proliferating in the United States, suicide rates were rising.¹⁴ For another, the sparse direct evidence that has been presented on the effectiveness of prevention facilities is even less promising than that for the Samaritans.

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Lester compared the suicide rates prior to 1967 and after 1969 in eight cities that had added centers by 1969 with eight control cities.¹⁵ Only small and statistically insignificant differences were found in favor of the cities with the added centers, and regression to the mean could have affected results since cities with initially higher rates added centers. Negative findings, however, are generally unimpressive in studies with such limited sample size and duration. Furthermore, cities which are concerned about suicide may be more likely to record ambiguous deaths as suicides.^{1,2,16}

Weiner compared Los Angeles and San Francisco (with centers) to San Bernardino and San Diego (without centers).¹⁷ He reported no significant differences. However, Los Angeles is legendary for both its historic suicide rate and the vigor of the response to it. Litman and Farberow support the effectiveness of the suicide prevention centers in Los Angeles by arguing that rate reductions were temporally related to the advent of the centers,¹⁸ but cite no control population.

Other studies of the effectiveness of suicide prevention centers in the United States are limited to impressionistic analyses or studies of process entirely lacking external validation.¹⁹

By its nature, research on suicide is correlational. There are many determinants, and, therefore, many potentially confounding variables. As a result, there are serious problems of comparability between areas and times, with high error variance, necessitating analyses of very large data sets in order to detect small or moderate effects which may, nevertheless, be of sufficient magnitude to be of importance. In addition to the inherent problems of suicide prevention research, a further problem has been the lack of easily accessible records of prevention services. While national organizations and lists of facilities exist, they are substantially inaccurate. Thus the issue of efficacy has remained insufficiently tested. From published data, it does not seem possible to conclude that suicide risk is reduced by the presence of suicide prevention facilities, nor does it appear safe to conclude that risk is not reduced. Despite this uncertainty, many people continue to invest more than money alone on both sides of the telephone. No doubt virtually all suicide prevention centers in the United States serve other human needs. Relief of loneliness may be among the most important. Perhaps it is for this reason, or perhaps it is the intuitive faith of the worker in his or her effectiveness, but something is maintaining this widespread, but unproved service. In view of this continued money and effort, a more vigorous attempt to analyze the effectiveness is clearly demanded.

Materials and Methods

A six-year sample (1968–1973) of mortality data from micro-data computer tapes purchased from the National Center for Health Statistics was utilized for the analyses. Suicide data were extracted from these data tapes for 226 central city counties in all standard metropolitan statistical areas (SMSAs) in the contiguous United States except for those of New England and Virginia.** The years 1968–1973

** New England and Virginia data were not used due to different mortality recording practices (by township rather than county), which rendered them not comparable to those from the rest of the country. Data for 1972 constituted only a 50 per cent sample and were, therefore, doubled to obtain estimated of suicide rates.

were chosen for analysis because prior to 1968, most metropolitan areas did not have services; subsequent to 1973, virtually all had services.⁴

Total and race/sex/age subgroup population counts were obtained from the 1960 and 1970 censuses; total population estimates for intercensal years from the Census Bureau. Subgroup estimates were obtained by straight line interpolations for years prior to 1970 and by assuming proportions the same as 1970 for years after 1970.

Classifying these SMSAs with respect to the availability of suicide prevention services proved difficult. We began with existing lists of services compiled by national umbrella organizations for suicide and crisis facilities. In 1976 through 1977, we attempted to contact all listed services by mail, phone, or in person. We also attempted to verify the purported absence of such services in those areas for which none were listed. We contacted social service agencies, health care agencies, police departments, and phone companies for services listed during those years. The published lists of services proved less than accurate. Approximately half of the lists contained potentially serious errors. Many centers had apparently moved or were no longer in existence. Some of these left no trail that we were able to discover through extensive contacts with agencies with whom they should have interacted. Many of the areas for which no agencies were listed, indeed did have such services. It became quite clear that communication among suicide prevention facilities even in the same town was far from optimal. Even phone listings were inconsistent through those years, with listings under different categories that were not always obvious.

We finally classified all target counties by number and type of center by utilizing any lead to accurate information we could obtain. We contacted currently existing suicide prevention centers, crisis intervention centers, mental health centers, family counseling services, and, in the absence of any other contacts, we phoned or visited emergency health facilities or emergency police services. We obtained information from personal contacts rather than trusting lists of any sort. We attempted to verify the presence or absence of any type of facility that offered counseling, intervention, or assistance in suicidal emergencies for each of our target years (1967–1973).

The following specific actions were taken in order to maximize accuracy:

- All available lists were cross-referenced on the assumption that the chief source of error is mistakenly classifying a county as not having any type of preventive facility.
- Phone listings were consulted in all counties.
- All identified facilities were sent a questionnaire to confirm continued existence, start-up dates, and services offered.
- An attempt was made to contact, by telephone, centers not responding to written queries.
- Attempts were made to contact at least two mental health centers in all cities still identified as not having a facility of any kind.
- Personal spot checks were made of several metropolitan area central city counties in Ohio and Louisiana and of centers inscribed in the Southeastern Association of Crisis Intervention Centers to test the accuracy of written and telephoned responses.

After slight attrition of counties whose status we could not verify fully, we were finally able to include 226 central

TABLE 1—Race/Sex/Age Adjusted Suicide Mortality Rates per 100,000 Population by County Size, 1968–1973

County Population		Year					
		1968	1969	1970	1971	1972*	1973
1,000,000+	mean	13.8	17.5	17.3	18.0	18.4	17.0
	s.e.	1.9	4.1	3.0	3.8	3.6	3.0
	N	20	21	21	22	22	22
500,000–999,999	mean	16.7	17.1	18.3	18.5	20.1	19.2
	s.e.	3.0	2.7	3.3	3.4	4.0	3.2
	N	31	30	31	31	31	31
250,000–499,999	mean	11.8	11.7	12.0	12.1	12.2	13.2
	s.e.	0.6	0.5	0.6	0.5	0.6	0.6
	N	51	53	52	52	54	54
100,000–249,999	mean	11.0	11.4	12.0	12.4	12.1	12.3
	s.e.	0.5	0.4	0.4	0.5	0.7	0.5
	N	96	93	94	93	93	93
50,000–99,999	mean	11.4	11.0	10.0	10.0	13.7	12.9
	s.e.	0.8	1.1	1.0	0.8	1.3	1.0
	N	28	29	28	28	26	26
TOTAL	mean	12.3	12.7	13.1	13.4	14.0	14.0
	s.e.	0.5	0.6	0.6	0.7	0.8	0.6
	N	226	226	226	226	226	226

*Based on 50% sample.

city counties in our sample with a high degree of confidence in our data.

To assess the effects of providing suicide prevention services where none has previously existed, 25 counties were identified which had no crisis centers in 1968–1969, but began one or more in 1970 and retained them in 1971–1972. As a control group, 50 counties were found which had the same number of crisis centers throughout 1968–1972 (whether none, one, or more). Mean race/sex/age specific suicide mortality rates were calculated for each county for the 1968–1969 period and the 1971–1972 period. These two mean rates were differenced and entered into an analysis of covariance with the main effect being crisis center status (change vs no change) and county population in 1970 and beginning suicide rates being the covariates. Initial mean rates were used as a covariate even though they did not differ significantly between the two crisis center status groups for any subgroup as assessed by two independent t-tests. This ensured the elimination of any possible direct effect of beginning rates on the difference scores.

The analysis was replicated using 31 counties which had no crisis centers in 1969–1970, but established one or more in 1971 and maintained them in 1972–1973. The control group consisted of 46 counties which had the same number of crisis centers throughout 1969–1973. Rates for 1969–1970 were compared to 1972–1973 rates using the same methodology stated above.

The necessity of using counties as the unit of analysis resulted in problems of large variability. This was partially alleviated by averaging rates over two years and by subtracting one two-year average from another. The use of two-year averages also helped compensate for the fact that crisis centers could have been added at any time during the target years (1970 and 1971) in the two "change" groups; a fact which could have a variable effect on the year immediately following the addition. Possible differences in county demographics were controlled by analyzing race/sex/age subgroups and using total county population as a covariate. Due to smaller population sizes, the results for Blacks were still highly variable and are not reported here.

Results

The results are summarized in the three Tables. Table 1 displays the race, sex, and age-adjusted suicide mortality rates per 100,000 population by county size and year from 1968 through 1973. Adjustments were made by the direct method, using 1960 census data. Small, nonsignificant changes are seen.

Table 2 shows the 1968–1969 and 1971–1972 mean race/sex/age-specific suicide mortality rates for the 25 counties that initiated crisis centers in 1970 and for the 50 counties that kept the same number of centers in 1968–1972. The probability values arise from the analyses of covariance F-ratio tests. Only young White females demonstrate a significant ($p = .005$) difference in the two sets of counties. Those counties that initiated crisis centers showed a 55 per cent decline in the mean suicide mortality rate, while those that maintained the status quo had about an 85 per cent increase.

A similar result is demonstrated in Table 3 when comparing 1969–1970 rates to 1972–1973. Again only young White females show a significant ($p = .05$) effect. Counties which initiated crisis centers had a decline of one-third in mortality rates while the other group experienced over a one-third increase.

TABLE 2—Suicide Mortality Rates per 100,000 Population by Crisis Center Status (1968–1972)

Race/Sex/ Age Group	Change in Status (N=25)			No Change in Status (N=50)			p*
	1968–69 Mean Rate	1971–72 Mean Rate	S.E. of Difference	1968–69 Mean Rate	1971–72 Mean Rate	S.E. of Difference	
WM 0–24	5.9	6.0	1.0	5.1	6.3	0.8	N.S.
25–44	22.7	30.1	3.8	24.9	25.3	2.1	N.S.
45–64	38.7	40.6	4.7	44.0	39.4	2.4	N.S.
65+	48.5	52.8	8.6	42.0	48.3	3.9	N.S.
WF 0–24	2.0	0.9	0.5	1.3	2.4	0.4	.005**
25–44	12.2	14.2	1.3	12.0	12.2	1.7	N.S.
45–64	14.3	17.5	2.5	15.0	19.5	1.7	N.S.
65+	8.1	7.7	2.3	6.4	8.9	1.7	N.S.

*p-value from analysis of covariance on difference scores using 1970 county population and initial suicide rates as covariates. N.S. = not significant.

**Even applying the conservative Bonferroni correction for multiple tests, this result remains significant since it exceeds the .006 level.²⁰

TABLE 3—Suicide Mortality Rates per 100,000 Population by Crisis Center Status (1969–1973)

Race/Sex/Age Group	Change in Status (N = 31)			No Change in Status (N = 46)			p*
	1969–70 Mean Rate	1972–73 Mean Rate	S.E. of Difference	1969–70 Mean Rate	1972–73 Mean Rate	S.E. of Difference	
WM 0–24	4.9	6.5	0.7	5.8	8.6	0.9	N.S.
25–44	20.8	22.1	2.2	23.8	26.9	2.4	N.S.
45–64	33.1	30.9	3.2	41.7	41.0	3.1	N.S.
65+	38.2	40.6	6.4	46.6	47.4	6.5	N.S.
WF 0–24	2.1	1.4	0.5	1.7	2.3	0.4	.05
25–44	9.2	10.2	1.5	13.3	12.5	1.5	N.S.
45–64	11.6	13.9	2.2	15.5	19.3	1.6	N.S.
65+	9.0	7.5	2.2	7.0	8.2	2.0	N.S.

*p-value from analysis of covariance on difference scores using 1970 county population and initial suicide rates as covariates. N.S. = not significant.

Increases and declines in mortality rates are seen in other subgroups, but they fail to reach significance due to the high degree of between county variability. White females aged 65 and older show the same pattern as young White females in that the mean rates declined in counties starting a crisis center compared to control counties where mean rates increased.

Examination of the counties in the four critical groups (groups changing status in 1970 and 1971 and control groups) disclosed no differences consistent across both samples in region, functional type ("blue collar" - industrial, "white collar" - service, etc.), income levels, or any other social or economic variable we could compare that might have been relevant. Unemployment data (which have displayed inconsistent relationships to suicide), comparable across counties were not available for those years. Percentage of single adults (36.44 to 37.06 per cent) showed no pattern which could reasonably be expected to account for the results. In any case, the most critical single variable, initial suicide rates, were not significantly different and were treated as a covariate to remove any potential confound, however slight.

Discussion

Young White females are, by far, the most frequent callers to crisis or suicide prevention centers. Any effect of these centers should be most visible on this population. The replicated finding that suicide mortality is reduced in this group by the addition of a suicide prevention facility cannot be explained readily by any combination of potentially confounding variables. Nor, as in previous studies, are the findings limited to a few counties in a limited geographical region.

The reduction found (approximately 1.75/100,000) may be an underestimate of the true impact of prevention services, since the most probable confounding variable (an increased recording tendency) may attenuate measurement of a reduction. Assuming universal availability of services—a situation which now virtually obtains in this country—and assuming that the measured reduction (averaging 1.745/100,000) is accurate, using the 1980 census data for 0–24 year old White females, we can estimate the not inconsiderable saving of 637 lives per year. This estimate is very rough and may be an underestimate. In any case, the data of this study suggest that some number of lives are saved in this group by the facilities already in place. Evidence of a reliable effect, of whatever size, suggests that future research can

now attempt to analyze the factors that are responsible for this reduction and extend the principles to other populations which, while not reached by prevention centers, are at greater risk for suicide.

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