

Marked increases in psychopathology found in a 30-year cohort comparison of suicide attempters

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ABSTRACT

Background. Although several epidemiological studies have found increases in the percentages of people who have made a suicide attempt, few cohort comparisons have been conducted to determine changes within this population over time. The purpose of this investigation was to determine if there have been changes in the clinical profile of suicide attempters in recent decades.

Method. Comparisons between a sample of 258 suicide attempters evaluated between 1970 and 1973 and a second sample of 179 suicide attempters evaluated between 1999 and 2002 were made on depression, hopelessness, suicide intent, drug use, history of suicide attempts and subsequent suicide attempts.

Results. Present-day suicide attempters were found to exhibit greater levels of depression ($p=0.031$), hopelessness ($p=0.008$), suicide intent ($p<0.001$), and had much higher rates of illicit drug use ($p<0.001$). Almost twice as many of the present-day suicide attempters had histories of four or more suicide attempts ($p<0.001$), and the present-day suicide attempters made subsequent suicide attempts at close to four times the rate in the year following the index attempt ($p<0.001$).

Conclusions. The present-day suicide attempters exhibited greater levels of psychopathology on every major variable assessed. Replication is necessary and public health implications are discussed.

INTRODUCTION

Suicide attempters represent a patient population characterized by high levels of distress and severe, comorbid psychopathology (Maris *et al.* 2000). Because of the robust association between psychopathology and suicide attempt behavior and the fact that previous suicide attempts represent the single strongest risk factor for suicide (Harris & Barraclough, 1997), the epidemiology of attempted suicide is of crucial importance. While no national database of attempted suicide exists, epidemiological studies have estimated that between 1.1% and 4.6% of the general population in the USA have made a suicide attempt (Moscicki, 1995; Kessler *et al.* 1999) with even higher rates reported for

adolescents (Brenner *et al.* 2000). Furthermore, coinciding with increases in the prevalence of depressive disorders and substance abuse disorders, several lines of research have found that the percentage of people who attempt suicide has increased over the past three decades (Diekstra & Garnefski, 1995; Weissman *et al.* 1999). Based on these findings and others, several researchers have suggested that the mental health of the general population has worsened over the past several decades (e.g. Prosser & McArdle, 1996; Üstün, 1999; Schumaker, 2001).

The increase in prevalence rates and the association between attempted suicide and high levels of co-morbid psychopathology raises questions about changes in the clinical profile within the population of suicide attempters. If it is true that the increase in the prevalence of attempted suicide is associated with a general worsening of the mental health of the

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population at large, then it could also be expected that present-day suicide attempters would exhibit greater overall levels of psychopathology than suicide attempters evaluated decades ago.

Very limited information is available on changes in the clinical profile of suicide attempters over time. One report analyzed trends of individuals in the military who engaged in suicidal behavior between 1989 and 1995 (Trent, 1999). Rates of suicidal behavior remained constant but the percentage of suicide attempters who received a primary mental disorder diagnosis more than doubled, while substance use disorders alone increased from 30% to 41%. A retrospective study of 1061 suicide attempters in Spain from 1969 and 1996 found a progressive increase in psychiatric diagnoses and previous treatments (Tejedor Azpeitia *et al.* 1999). The percentage of multiple suicide attempters also more than doubled, lending credence to the notion that the suicide attempters in Spain were increasing in the overall severity of psychiatric symptoms.

This study adds to this limited database by comparing and contrasting two samples of suicide attempters evaluated in urban psychiatric settings in the same geographic location 30 years apart. There are several advantages to this cohort comparison. First, both samples were obtained using the same inclusion criterion, which was that participants must have made a recent suicide attempt and this was specifically defined as a deliberate act of self-harm with intent to die. Second, both studies had almost no exclusionary criteria. Thus, both samples were representative of patients presenting at an urban hospital following a suicide attempt. Third, both studies used essentially identical measures of depression, hopelessness, suicidal behavior, and drug and alcohol use, which allows for meaningful comparisons. Finally, both samples were followed for up to 2 years to determine the occurrence of subsequent suicidal behavior.

METHOD

Sample and procedures

Samples of suicide attempters were recruited from Philadelphia General Hospital (PGH) between 1970 and 1973 and from the Hospital of

the University of Pennsylvania (HUP) between 1999 and 2002. Individuals from both samples were eligible for inclusion in the present analyses if the participant (1) had presented to an urban emergency room shortly following a suicide attempt, (2) was at least 18 years of age at the time of the attempt, and (3) if some effort was made to follow-up with the patient to determine the occurrence of subsequent suicide attempts. A suicide attempt was defined as 'self-injurious behavior with intent to die' in both studies. Participants were included in the present analysis if there was an objective indication of suicidal intent as indicated by a score of a 1 or 2 on either item no. 12 (seriousness of intent) or item no. 13 (desire to die) on the Suicide Intent Scale (see below). The procedures for recruitment were slightly different for the two samples and are described separately below.

The PGH sample

Admissions to PGH were routinely screened for suicide attempters and within 24–48 h of admission eligible patients were approached to participate in a longitudinal study of suicidal behavior. There were no specific exclusionary criteria. Written consent was obtained and a doctoral level clinician then conducted a detailed interview and completed various relevant semi-structured questionnaires. Next, a research assistant independently administered the self-rating scales and standardized assessment instruments.

In total, 297 suicide attempters were evaluated between 1970 and 1973 and were followed for subsequent suicide attempts. Twenty-five of the 297 patients scored a 0 on both items nos 12 and 13 and thus were not included in any analyses. Another 6 patients were missing all self-report data and 8 patients were under 18 years of age and thus were eliminated, leaving a total sample of 258 patients.

To determine the occurrence of subsequent suicide attempts, patients were contacted monthly for the first 6 months and then every 4 months by telephone. If the patient was inaccessible, friends and family were used as informants. When contacted, patients were asked if they had made a suicide attempt or if they had been hospitalized for any reason. Follow-up contact was made with 241 patients (93%); the length of follow-up ranged from 15 days to

870 days. The mean time until either a subsequent suicide attempt or last contact was 362 days.

PGH served as the primary admission site for indigent psychiatric populations and closed in 1976. It was located approximately half a mile away from HUP. Almost 40% of the PGH sample was initially referred from HUP, and these individuals were not significantly different from suicide attempters referred from other local hospitals on any of the major clinical indices. The PGH patients were part of a larger sample of suicide attempters that was followed for 5–10 years after the index attempt to determine eventual completed suicide. These data have been reported elsewhere (Beck & Steer, 1989).

The HUP sample

Participants in the HUP sample were part of a treatment outcome study designed to evaluate the effectiveness of a brief cognitive therapy intervention for reducing subsequent suicide attempts. The exclusion criteria were: (1) under 16 years of age; (2) unable to understand study procedures and provide informed consent; (3) unable to participate because of a significant medical impairment that would limit participation (such as organic brain damage); and (4) unable to provide at least one contact person to enhance the likelihood that they could be tracked for follow-up assessments.

Eligible patients were identified by screening for suicide attempters in the psychiatric emergency evaluation center. Unlike the PGH sample, not all the HUP sample patients were admitted as in-patients to the hospital; 15% of the HUP sample were referred home and were initially contacted by phone. Eligible patients were provided a description of the study and written informed consent was obtained. A trained doctoral level diagnostician conducted an intake assessment, for which the participant was paid \$50. After the baseline intake was completed, patients were randomly assigned to either an Enriched Care (EC) condition or a Cognitive Therapy plus Enriched Care (CT+EC) condition. The EC consisted of treatment as usual plus assignment to a Bachelor's level case manager who attempted to maintain contact with the patient and provided some supportive listening and mental health referrals. CT

consisted of 10+ sessions with a doctoral level psychologist specifically focused on helping the patient develop more adaptive ways of coping with distress.

In total, 292 eligible participants were identified between 1999 and 2002, and 112 participants (38%) refused participation, leaving a total of 180 patients. There were no significant differences between the refusers and participants in gender or age, yet study refusers were significantly more likely to be Caucasian than African American or from other ethnic backgrounds (41.5% v. 21.2% v. 30.7%, $\chi^2 = 11.35$, $df = 2$, $p = 0.0034$). Data will be reported solely on the study participants because only very limited data are available on study refusers in the HUP sample and data from refusers in the PGH sample were not collected.

Attempts were made to follow all 180 patients and all patients were over 18 years of age. One patient scored a 0 on items 12 and 13 of the SIS and was eliminated from subsequent analyses, leaving the HUP sample size at 179 patients; 90 patients were randomly assigned to the EC condition, 89 to the CT+EC condition.

Participants were followed for up to 2 years, and assessments were conducted at 1, 3, 6, 12, 18 and 24 months following the baseline interview. At each assessment patients were evaluated for having made a suicide attempt. Some follow-up contact was made with 153 patients (85%) and the length of follow-up ranged from 8 days to 693 days. The mean time until either a subsequent suicide attempt or until last contact was 219 days, which is approximately 60% of the PGH sample.

Measures

Age, sex, marital status and race/ethnicity were assessed in both samples. Educational attainment was coded to differentiate those who did not complete high school, those who completed high school but did not go to college, and those who attended at least some college. Employment was coded as a dichotomous variable and participants were considered employed if they were currently engaging in any work for which they were getting paid.

Both samples were given the Beck Hopelessness Scale (BHS; Beck & Steer, 1988), which consists of 20 true–false statements designed to

assess the extent of positive and negative beliefs about the future and the Suicide Intent Scale (SIS; Beck *et al.* 1974), which is an 18-item clinician-rated assessment of the individual's wish to die (e.g. expectation of fatality, precautions made against discovery). The total score is obtained by summing the first 15 items. History of suicidal behavior in both samples was assessed with a non-summed item of the SIS, and participants were classified as single attempters, multiple attempters (having made 2 or 3 attempts), or chronic multiple attempters (having made 4 or more attempts). Depression was measured using Beck Depression Inventory-I (BDI-I; Beck *et al.* 1988) in the PGH sample and the Beck Depression Inventory-II (BDI-II; Beck *et al.* 1996) in the HUP sample. BDI-I Scores from the PGH sample were converted into BDI-II scale scores according to the conversion scale in the BDI-II manual.

Problems with alcohol or drugs in both samples were assessed with the following clinician-administered questions: 'Has your use of alcohol ever caused problems for you?' and 'Has your use of prescription or illicit drugs ever caused problems for you?' Lifetime substance use was assessed with the question: 'Have you ever in your life used (listed substance)?'

The presence or absence of psychiatric symptoms in the PGH sample was based on the clinical interview. Assessments of psychiatric symptoms in the HUP sample were based on standardized screening questions from the Structured Clinical Interview for DSM-IV (SCID; First *et al.* 1995). Responses to the questions are scored as 'yes', 'no' or 'unsure'. Unsure responses were coded as 'no'.

Analysis procedures

The primary goal of the present investigation was to compare and contrast the PGH and the HUP sample on three broad variable domains: (1) socio-demographic characteristics (e.g. age, gender, ethnicity, education level); (2) psychopathology (e.g. depression, suicide intent, substance use, past history of suicidal behavior); and (3) subsequent suicide attempts. Comparisons between dichotomous variables were conducted using χ^2 analyses. Comparisons between continuous variables were evaluated using a multivariate analysis of covariance (MANCOVA), with significant demographic

differences between the cohorts serving as the covariates, followed by individual *post-hoc* ANCOVAs.

In order to compare the PGH and HUP samples on time until subsequent suicide attempt while controlling for censoring effects, a Kaplan–Meier survival analysis was used to generate survival curves. Finally, a multivariate stepwise Cox regression analysis evaluated the unique contribution of the cohort effect on subsequent suicide attempts. In this analysis, relevant predictor variables were entered on step 1, and cohort type was entered on step 2.

RESULTS

Sociodemographic characteristics

Table 1 provides data comparing the PGH and HUP samples on sociodemographic variables. The HUP sample was older, more likely to be single or divorced rather than married or separated, and had a higher percentage of individuals with minority ethnic or racial status. The HUP sample reported higher levels of educational attainment, and were significantly more likely to be employed. Nonetheless, it should be noted that the HUP sample was economically disadvantaged: 80% of the participants reported household incomes of \$20 000 or less. No data were available on the incomes of the PGH sample, although it is clear that this sample was also impoverished.

Psychopathology, substance use and history of suicide attempts

Table 2 depicts data comparing the samples on measures of psychopathology, substance use, and history of suicide attempts. To determine differences between the samples on four continuous dependent variables of the BDI, the BHS, the SIS and the Lethality Scale, an overall MANCOVA was conducted, with age and ethnicity serving as covariates, as they were found to be significantly different between the groups. Age was a significant covariate [$F(4, 420) = 2.97$, $p = 0.02$], but ethnicity was not [$F(4, 420) = 1.38$, $p = 0.24$]. An overall main effect for cohort was found to be significant [$F(4, 420) = 4.87$, $p < 0.01$] and thus was followed up by individual ANCOVAs on each of the four dependent measures. *Post-hoc* comparisons revealed that the HUP sample

Table 1. Cohort comparison on demographic characteristics

	PGH sample (n=258)		HUP sample (n=179)		Analysis	
	Mean	S.D.	Mean	S.D.	t	p
Continuous variables						
Age	30.79	10.92	34.41	9.94	3.54	<0.001
Dichotomous variables	n	%	n	%	χ^2	p
Gender (female)	148	57.4	104	58.4	0.049	n.s.
Ethnicity					29.79	<0.0001
Caucasian	133	51.6	52	29.1		
African-American	121	46.9	111	62.0		
Other	4	1.6	16	8.9		
Marital status					37.55	<0.0001
Married	46	17.9	18	10.5		
Separated	71	27.6	13	7.6		
Widowed	9	3.5	13	7.6		
Divorced	14	5.6	16	9.4		
Single	117	45.5	111	64.9		
Education					17.80	<0.0001
Dropped out of high school	145	56.4	65	38.5		
Graduated high school	78	30.4	58	34.3		
Some college	34	13.2	46	27.2		
Employment status					4.10	0.043
Unemp/disabled/retired	187	72.8	104	63.4		
Employed/student	70	27.2	60	36.6		

PGH, Philadelphia General Hospital; HUP, Hospital of the University of Pennsylvania.

exhibited significantly greater levels of self-reported depression and hopelessness and had more suicidal intent. The medical lethality of the attempts was statistically equivalent.

χ^2 analyses on the presence or absence of various psychiatric symptoms revealed that the HUP sample exhibited greater frequencies of past mania and depression, current psychosis, and specific phobias. Conversely, current depressed mood was noted more frequently in the PGH sample, although it was virtually ubiquitous in both groups. The overall picture is that the HUP sample presented with substantially more psychiatric symptoms and was more likely to report histories of previous episodes of depression and mania.

Almost three times as many participants in the HUP sample reported problems with drug use. Further, a 10-fold increase was observed in the number of patients who reported a lifetime history of cocaine use. Lifetime marijuana usage and heroin usage also increased markedly. The percentage of HUP patients who reported problems with alcohol was also significantly higher. In short, the HUP sample exhibited dramatically greater amounts of substance use and misuse than the PGH sample.

The suicide attempt histories of the participants in both groups were also compared and the HUP sample had almost twice as many chronic multiple attempters than the PGH sample.

Subsequent suicide attempts during follow-up

The Kaplan–Meier survival curves for the two groups are presented in Fig. 1. As shown, the HUP sample of suicide attempters made subsequent suicide attempts at a rate far greater than those in the PGH sample. Despite the fact that the follow-up time for the HUP sample was only 60% of that of the PGH sample, the percentage of individuals in the HUP sample that reattempted was more than twice that of the PGH sample (27.9% v. 12.8%). Direct examination of the survival curves, which controls for differences in time of follow-up reveals an even greater contrast. For example, at 1 year following the index attempt, the subsequent suicide attempt rate for the PGH sample was 10%, whereas it was approximately 40% for the HUP sample. Thus, the HUP sample of suicide attempters was making repeated attempts at approximately 4 times the rate of the PGH sample in the year following the index attempt.

Table 2. Cohort comparison on indices of psychopathology

Continuous variables	PGH sample (n=258)		HUP sample (n=179)		Analysis	
	Mean	S.E.	Mean	S.E.	F	p
Beck Depression Inventory (BDI)-II*†	28.67	0.880	31.30	1.067	2.98	0.031
Beck Hopelessness Scale*	9.43	0.387	11.50	0.469	3.95	0.008
Suicide Intent Scale*	14.05	0.317	15.84	0.384	8.30	<0.001
Lethality Scale*	3.14	0.151	3.43	0.183	1.27	0.303
Dichotomous variables	n	%	n	%	χ^2	p
Symptoms of psychopathology (yes/no)‡						
Current depressed mood	218	99.1	171	95.5	5.16	0.023
Previous depressive episodes	164	74.9	160	89.9	14.73	<0.0001
Current mania	53	24.1	36	20.1	0.902	n.s.
Previous manic episodes	5	1.9	45	25.1	48.12	<0.0001
Hallucinations	70	32.0	80	44.9	7.04	0.008
Specific phobia	48	22.1	78	44.1	21.59	<0.0001
Paranoia	101	45.9	68	38.6	2.11	n.s.
Substance use§						
Problems with alcohol	85	33.5	77	43.0	4.01	0.043
Problems with drug use	51	19.9	100	55.9	60.01	<0.0001
Lifetime use of cocaine	17	6.9	120	70.6	183.86	<0.0001
Lifetime use of marijuana	73	30.0	135	78.9	96.03	<0.0001
Lifetime use of heroin	33	13.4	48	28.2	14.24	<0.0001
Lifetime use of LSD	34	13.9	33	19.4	2.27	n.s.
No. of previous suicide attempts					18.69	<0.0001
None	92	36.8	44	24.6		
One or two	100	40.0	59	33.0		
Three or more	58	23.2	76	42.5		

PGH, Philadelphia General Hospital; HUP, Hospital of the University of Pennsylvania.

* Adjusted means are presented.

† The BDI-I scores in the PGH sample were converted into BDI-II scores.

‡ Note PGH sample (n=220).

§ Note PGH sample (n=240).

A step-wise Cox regression analysis was performed to determine if the differences between the HUP and PGH samples in the subsequent suicide attempt rate could be accounted for by the differences in demographic variables, psychopathology, history of suicide behavior, and drug use. In step 1, ethnicity, age and gender, problems with drug use, problems with alcohol use, scores from the BDI-II, BHS, SIS and Lethality, and past history of suicidal behavior were entered. In step 2, study condition was entered. The omnibus test of the first step was significant (Wald $\chi^2=61.50$, $df=11$, $p<0.001$). Two variables contributed unique variance to the equation, which were past history of suicide attempts (Wald $\chi^2=14.36$, $df=1$, $p<0.001$) and BDI-II scores (Wald $\chi^2=10.48$, $df=1$, $p=0.001$). Cohort was dichotomously represented (PGH v. HUP) and made a significant additional contribution when entered on the second step (Wald $\chi^2=12.79$, $df=1$, $p<0.001$). Thus the cohort difference in subsequent suicide

attempt rate could not be fully accounted for in terms of the greater levels of psychopathology, prior suicide attempts, and drug use exhibited by the HUP sample.

CONCLUSIONS

This report compared two samples of suicide attempters evaluated 30 years apart and found that the present-day suicide attempters exhibited more pathology on every major variable examined. The HUP sample exhibited significantly higher levels of self-reported depression and hopelessness, and a greater percentage of HUP patients presented with psychotic symptoms, specific phobias and previous episodes of depression and mania. The HUP sample was also found to exhibit much greater levels of substance abuse as indicated by: (1) a three-fold increase in general problems with drug use; (2) a 10-fold increase in the percentage of individuals reporting lifetime use of cocaine; (3) a

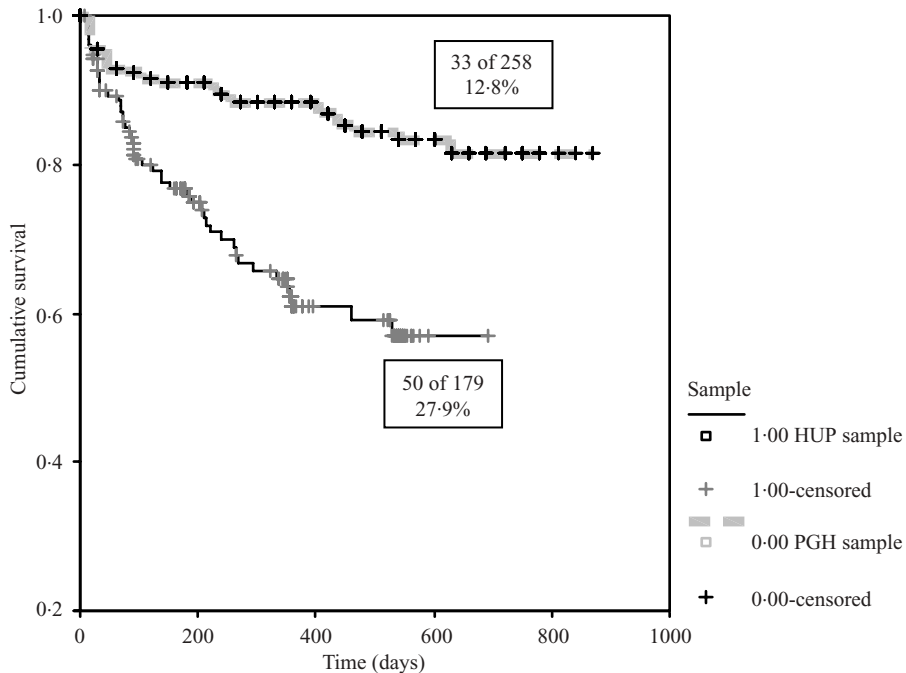


FIG. 1. Kaplan-Meier survival curves comparing the Philadelphia General Hospital (PGH) sample to the Hospital of the University of Pennsylvania (HUP) sample on time until subsequent attempt (log rank statistic = 27.69, $p < 0.0001$).

greater than two-fold increase in lifetime use of both marijuana and heroin, and (4) a significantly greater percentage of individuals reporting problems with alcohol. Finally, the HUP sample had greater levels of suicide intent and an almost two-fold increase in the percentage of patients who had made 4 or more suicide attempts in their lives. Perhaps most striking and unexpected was the finding that the HUP sample made subsequent suicide attempts at almost four times the rate as the PGH sample in the year following the index attempt. These differences were observed despite the fact that half the HUP sample received a treatment that preliminary results show reduces subsequent attempts by approximately 50% (Beck *et al.* 2002). The PGH sample had received no such additional treatment. Thus, the true difference between the cohorts in the subsequent repeat attempt rate is likely even greater.

Several demographic differences were also noted. Interestingly, the HUP sample evidenced greater levels of education and a higher percentage of participants reporting at least some employment. This is likely due in part to the fact

that PGH served a primarily indigent population. The fact that the PGH sample demonstrated even lower levels of employment is particularly striking in relationship to the fact that the HUP sample consistently showed greater levels of psychopathology. There were also notable changes in ethnicity and the HUP sample included a substantially larger proportion of minorities. Several authors have noted an increase in suicidal behavior in minority populations (Rutledge, 1990) and these data lend tentative support for this notion, although it is possible that differences are in part the result of the slightly different catchment areas. Another important demographic difference was that the HUP sample was older than the PGH sample. One possible explanation for this is that there was a substantial increase in suicide attempt behavior from the late 1950s to the 1980s, which might offer a partial explanation as to why the suicide attempters were younger in the 1970s than today.

The primary limitations of the current study involve differences between the two samples in recruitment, assessment and follow-up that

might produce artificial findings. Perhaps the largest difference between the samples was in the recruitment processes. The HUP sample was recruited for participation in a large treatment outcome trial and 38% of the eligible patients refused to participate. The PGH sample was asked to participate in an evaluation and some follow-up contact and no information is available on how many eligible patients refused. Some research has suggested that eligible patients who agree to participate in outcome research exhibit greater levels of psychopathology than those who refuse (Shadish *et al.* 2000). Further, we did find some evidence for participation bias in that a greater percentage of Caucasians refused participation than those from minority groups. Another difference between the samples involved the clinician assessment of the presence of psychiatric symptoms. It is possible that the more systematic inquiry conducted on the HUP sample resulted in more sensitive testing of the presence or absence of psychiatric symptoms. If so, this might partially account for the higher percentages of HUP patients being documented as exhibiting various psychiatric symptoms. It is also important to note that the two samples were obtained from different locations. However, because the two hospitals were located close together and 40% of the PGH sample was initially referred from HUP and these patients were no different from patients referred from other places on the major clinical variables assessed, it seems unlikely that the location difference was substantial. Despite these study limitations, the most parsimonious conclusion ultimately seems to be that the differences between the samples are largely the result of genuine increases in the overall psychopathology in the local population of suicide attempters.

Perhaps the key question raised by this report is whether these results reflect a specific change in the nature of the local population or reflect a general national trend. As such, replication of this study in different localities is necessary. Although researchers may not have access to samples of suicide attempters with as much overlap as observed in these two cohorts, information should be available allowing for cohort comparisons in prevalence of substance use problems, percentage of chronic, multiple suicide attempters and the frequency of

subsequent suicidal behaviors the year following the index attempt.

If it is temporarily assumed to be true that the clinical profile of suicide attempters has increased in overall severity in the past 30 years, the question is raised as to why. It is certainly likely that part of the explanation is linked to the dramatic increases in illicit drug usage, as numerous studies have demonstrated connections between drug usage and suicidality (Dhossche *et al.* 2000). However, increased drug usage does not appear to be the only factor because drug use was not a unique predictor of subsequent suicide attempts. Furthermore, cohort membership was a strong, unique predictor above and beyond past histories of suicide attempts, depressive symptoms and drug usage, which suggests that other variables have resulted in increases in the repetitiveness of suicidal behavior. Other possible explanations include decreases in the effectiveness of mental health care delivery, decreases in the levels of social cohesion in the community, and increases in the levels of violence, impulsivity and the acceptability of engaging in self-destructive acts.

Given the high psychological and economic costs associated with attempted suicide, it is difficult to overstate the public health significance of these findings. If a suicide attempt is conceptualized as a marker of severe psychopathology, then the current comparison between the PGH and HUP samples can be construed as a comparison between severely disturbed individuals in the population 30 years apart. When viewed in this light, the conclusion is that the individuals exhibiting the greatest levels of psychopathology have become substantially worse off over the past 30 years. At a more specific level, these findings suggest the possibility that there have been increases in the frequency of suicidal acts among suicide attempters and suggest the need for national epidemiological surveys on the prevalence of chronic multiple suicide attempters, as well as treatments specifically designed for this population.

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