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THE BROKEN HEART: FOLK MYTH OR MEDICAL FACT?

KEYWORDS: Holmes-Rahe scale, marital status and death rates, sympathetic and parasympathetic stimulation deaths, stress and cancer, school failure and premature death.

My heart is "breaking" or "broken" may be much more than a mere figure of speech or metaphor. There is abundant evidence that grief can prove deadly, especially when due to the loss of a loved one. That can be readily illustrated by visiting a synagogue or temple where members of the congregation who have passed on are listed on a memorial tablet in sequential order based on their date of death. It has long been noted how frequently the names of husbands and wives appear within a surprisingly short time span. This holds true regardless of who died first and often when there are significant differences in their ages.

This might have been anticipated from what we have learned about the relationship between stress and illness. In scales that rank the severity of stress, death of a spouse is always at the top, followed by divorce and the loss of other close personal relationships.

Adolph Meyer, Chief Psychiatrist at Johns Hopkins in the early 1900's, noted that illness in his patients was very often preceded by some stressful event. Four decades ago Holmes and Rahe were able to predict the likelihood of healthy sailors becoming sick within the next six to twelve months based on Meyer's research. This was determined by totaling the number and magnitude of stressful events they had been subjected to in the previous year. Each of the 42 items they identified was assigned a numerical value, with death of a spouse at 100 being equal to five or six of some of the others.

In addition to numerous anecdotal reports, statistics confirm that widowed individuals die at rates 3 - 10 times higher than their married counterparts from all the ten leading causes of death during the 12 months following loss of a spouse. The leading cause of mortality is coronary heart disease. This relationship was clearly recognized centuries ago, when dying of grief due to a "broken heart" was an accepted diagnosis. Divorce and marital separation are also associated with higher rates of premature death, particularly in young males.

ALSO INCLUDED IN THIS ISSUE

Despite being referred to as "the weaker sex", women seem to be more resistant to the stress of bereavement, at least as assessed by their subsequent longevity records. There are several possible reasons for this difference.

Living Together And Dying Alone

Physicians, scientists and sociologists paid surprisingly little attention to the effect of marital status on health. During my training at Johns Hopkins, I was fortunate to meet Abe Lillienfeld, a brilliant researcher who was intrigued by this subject. In 1959, a few years later, he and Art Kraus published an article in the *Journal of Chronic Diseases* showing the sharp rise in mortality following death of a spouse, especially in those under the age of 35.

The editor of this journal was Joseph Earle Moore, one of my mentors at Hopkins and a pioneer in the treatment of syphilis. He had treated Al Capone and numerous other celebrities and would occasionally share some of these experiences with us. His venereal disease clinic was one of the leading facilities of its type and he had also started a journal devoted to this subject in the 1940's. After penicillin became available, syphilis and gonorrhea ceased to be major public health problems and Moore changed its name to the *Journal of Chronic Diseases* to attract readership. He occasionally asked me to review articles submitted for publication, even after I left Hopkins. I received Abe's paper while at Walter Reed and was almost tempted to suggest that he send it to a journal with a larger circulation.

The article was stimulating because Lillienfeld and Kraus demonstrated that death rates from all causes were significantly higher in unmarried individuals and that these differences were greatest in young males. Nobody paid much attention to this until Jim Lynch's ground breaking *The Broken Heart: The Medical Consequences of Loneliness* was published in 1977 and subsequently translated into ten languages. I have borrowed the title of this segment and some statistics from this scholarly study of the adverse health consequences of chronic loneliness. It showed that such problems followed not only the death of a loved one, but divorce and the loss of any important relationship.

Listed below are the death rates of divorced and married men and women aged 15 - 64 per 100,000 population in the United States, 1959 - 1961. (Lynch's tables are subdivided into white and nonwhite and while there are interesting differences for some diseases, I have combined them to facilitate this presentation.)

Cause of Death (Males)	**Married**	**Divorced**
Heart Disease	318	660
Automobile Accidents	78	209
Respiratory Tract Cancers	57	140
Gastrointestinal Tract Cancers	69	136
Stroke	97	190
Suicide	27	94
Cirrhosis	23	132
Hypertension	57	110
Pneumonia	28	113
Homicide	55	159
Tuberculosis	18	84
Cause of Death (Females)	**Married**	**Divorced**
Heart Disease	111	232
Cancer of breast	40	59
Gastrointestinal Tract Cancers	45	65
Stroke	91	178
Automobile Accidents	21	72
Hypertension	57	107
Cancer of Cervix	24	47
Cirrhosis	16	38
Suicide	9	18
Fires, Explosions, etc.	5	17

The differences between married and divorced men and women are quite consistent and impressive for some diseases. These same distinctions also apply to marital separation.

The Role Of Gender And Race

The current leading causes of death have somewhat different rankings due to such things as the advent of AIDS, the increased incidence of diabetes and the rise in certain malignancies such as cancer of the lung in women. Nevertheless, the differences between individuals who are married compared to widowed or divorced and separated age matched controls persist, not only here, but all over the world.

Coronary disease (broken hearts) is still at the top of the list. Is there something about grief and loneliness that particularly predisposes to death due to heart attacks? Listed below are statistics from the same time period for coronary heart disease death rates per 100,000 population for married and unmarried males and females aged 45-85. (Rates for white and nonwhite males and females in older and younger age groups are listed separately here in order to illustrate certain intriguing differences in gender, color and age that existed four decades ago.)

CORONARY HEART DEATH RATES (AGE 45-85)

Males	White	Nonwhite	Total
Married	6,750.7	4,146.2	10,896.9
Single	9,111.6	6,233.3	15,344.9
Widowed	9709.6	7,585.8	17,295.4
Divorced	11,233.3	7,029.1	18,262.4
Females	**White**	**Nonwhite**	**Total**
Married	3,579.7	2,533.7	6,113.4
Single	4,1271.3	3,439.5	7,8710.8
Widowed	4,884.5	4,439.7	9,324.2
Divorced	4,642.3	3,452.5	8,094.8

CORONARY HEART DEATH RATES (AGE 25-44)

Males	White	Nonwhite	Total
Married	90.7	92.4	183.1
Single	133.6	191.5	325.1
Widowed	168.0	264.9	432.9
Divorced	227.2	227.1	454.3
Females	**White**	**Nonwhite**	**Total**
Married	13.6	51.1	64.7
Single	30.3	91.4	121.7
Widowed	36.9	123.2	160.1
Divorced	29.4	68.0	97.4

These statistics confirm the significantly lower death rates from coronary heart disease in married individuals compared to others in this age group regardless of gender or color. These differences appear to be greater in males than females and in whites compared to nonwhites for both sexes. As previously noted, this distinction is even more pronounced in younger individuals as illustrated in the second chart for coronary deaths per 100,000 population during this same time period for whites and nonwhites aged 25 - 44.

Although the death rates are obviously much lower in this younger age group, the differences between married males and those who are widowed or divorced not only persist but are greater. The same holds true for females. However, young nonwhite males and females (primarily Afro-Americans during this time period) are now at greater risk than whites. Similar differences in death rates for married and unmarried males and females have been found in all industrialized countries where such statistics are available.

A variety of explanations have been proposed for these intriguing differences but it is hazardous to extrapolate from epidemiologic data to individual situations. The sudden death of an alcoholic, wife-beating, child abuser would be perceived quite differently by a young surviving spouse compared to the widow who has lost her best friend after fifty years of a loving relationship. Since statistics would not detect this or distinguish between close and disruptive marriages, the adverse effects of marital loss might be much greater than suggested by epidemiological surveys.

The common denominator appears to be chronic loneliness due to diminution of meaningful human contact, superimposed on the stress of having to adapt to abrupt changes in lifestyle and daily activities. In most cases, such changes would likely be more severe for widowers, who may suddenly have to learn to shop, cook, clean and perform other routine household tasks usually taken for granted. This may partially account for their higher death rates compared to widows.

The Broken Heart and Sudden Death

Several studies have emphasized the increased mortality of survivors within the first six months following the death of a spouse. In one report, three out of four such deaths were due to coronary

atherosclerosis. Since this process takes years to develop, it seems likely that the terminal event in many may have been ventricular fibrillation or other disruptive heart rhythm. Elderly people with coronary disease would be at particular risk but sudden death also occurs in young, healthy individuals following the loss of a loved one, severe fright, or any extreme excitement. In one report, an 18 year-old bride dropped dead on her wedding day due to the intense stimulation of the event.

It has also been seen following loss due to separation. Lynch cites the case of 21-year old schizophrenic twins who began to deteriorate. They were hospitalized on several occasions but became progressively worse. At age 32, they were institutionalized for more intensive care but refused to eat and were essentially non-communicative. When their starvation became serious they were placed in different wards because it seemed that they were reinforcing each other's negative attitude. The events following the first evening of their separation were reported as follows:

> Statements by the nursing and attendant staff showed that during the evening they had been under constant observation. Both patients were ambulatory and went to bed as usual. At 10:20 PM, 11:30 PM, and midnight both patients were observed in routine checks. Both were sleeping and examination of their respiratory movements showed nothing unusual. At 12:45 AM twin A was found dead. An immediate investigation was made as to the condition of her twin and she was also found to have died. It was considered from immediate examination of the bodies that both deaths were recent. Twin A's death was unobserved, but another patient shared the room with twin B. Apparently, a short time before their deaths were discovered, twin B had stood looking out of the window of her dormitory at the window of the room where her sister was a patient. She then sank to the floor and her body was found in this position. The patient who shared her room was accustomed to peculiar behavior in other patients and felt there was no cause for alarm in this unusual incident.

It does not seem possible that twin B could have known of her sister's death nor is it clear who died first. In both instances, the cause of death seems most likely to have been a fatal disturbance in heart rhythm precipitated by the stress of sudden separation.

There are numerous anecdotes about individuals who died shortly after learning of the death of a loved one due to an accident or some unexpected tragic event. Lynch recounts the research of George Engel, a pioneer in psychosocial medicine, who analyzed newspaper reports of 170 instances of sudden death over a six-year period. In over 100, he was able to document some close antecedent stressful event that seemed to be responsible, in the following order of frequency:

1. The collapse or death of someone close.
2. A two week period of acute grief.
3. Threat of the loss of someone close.
4. Loss of status and self-esteem.
5. Mourning the anniversary of a death.

Included in these were several teenagers who died suddenly after learning of the death of a close relative. There was also the case of 39 year-old closely attached twins who died within a week of each other from unknown causes. Death on the anniversary of the loss of someone close was particularly pertinent. After his own twin brother died, Engel was monitored very closely by physicians at the University of Rochester for the next few months and on each anniversary of his twin's death.

Lynch also cited Stewart Wolf's University of Oklahoma study of 65 patients with a documented history of a heart attack and 65 matched healthy controls. All subjects were interviewed, examined, and received psychological testing to rate levels of depression and degree of social support. Based on their psychological profiles, he made a prediction as to who would be among the first ten to die from a cardiac event, without any knowledge of their previous history or physical findings. All ten patients, selected solely by psychological criteria, were among the first 23 heart attack deaths in the following four years. Numerous other compelling examples of the lethal effects of loneliness are cited in this scholarly book.

Voodoo And Other Predictable Deaths

In addition to "homeostasis" and "fight or flight", Walter Cannon also coined the term "voodoo death". It was the title of a 1942 article describing people in primitive cultures who died shortly after being subjected to a curse or following the violation of some taboo. He had collected reports of numerous instances of such mysterious deaths from all over the world. A Brazilian man condemned and sentenced by a medicine man died a few hours later for no apparent reason. A young African tribesman unknowingly ate the forbidden wild hen and when subsequently informed of this unintended violation, was overcome by fear, started to shake, and died within 24 hours. In New Zealand, a Maori woman ate fruit that she only later learned had come from a tabooed site and was found dead the next morning. Also included was Basedow's 1925 description of the deadly effects of bone pointing in Australian aborigines as follows:

> The man who discovers that he is being "boned" is a pitiable sight. He stands aghast, with his eyes staring at the treacherous pointer, and with his hands lifted as though to ward off the lethal medium, which he imagines is pouring into his body. His cheeks blanch and his eyes become glassy and the expression of his face becomes horribly distorted. He attempts to shriek but usually the sound chokes in his throat, and all that one might see is froth at the mouth. He sways backwards and soon falls to the ground, and after a short time appears to be in a swoon: but, soon after he writhes as if in mortal agony, and, covering his face with his hands, begins to moan. After a while he becomes very composed and crawls to his wurley [hut]. From this time onward he sickens and frets, refusing to eat and keeping aloof from the daily affairs of the tribe. Unless help is forthcoming in the shape of a counter-charm administered by the hands of the *Nangarri*, or medicine man, his death is only a matter of a comparatively short time.

Cannon painstakingly investigated numerous reports from other primitive societies in Hawaii, Haiti, Trinidad and Guyana. He verified at least thirty before becoming convinced that such "death by prescription" was valid. Since these cultures had few links, what was the common denominator?

In his "Voodoo Death" article, he wrote:

> .... the phenomenon is characteristically noted among aborigines - among human beings so primitive, so superstitious, so ignorant, that they feel themselves bewildered strangers in an hostile world. Instead of knowledge, they have fertile and unrestricted imaginations which fill their environment with all manner of evil spirits capable of affecting their lives disastrously.

Cannon concluded that three components were required for such deaths:

1. **The victim and all family and friends must believe that the ability and power of the hexer is genuine and will indeed cause death.**
2. **All previously known victims of the hexing must have died, unless it was removed.**
3. **Every person known to the victim must behave toward him as if he will die. This meant leaving him alone and isolated, even from family and friends.**

If these three criteria were met, death was inevitable. The Australian aborigines withheld social as well as physical support, including food and water, from those whose death seemed a foregone conclusion. Relatives also began mourning rituals, reinforcing that belief in the patient, the tribe and in the mourners themselves. The psychologist William James had previously emphasized "**the catastrophic emotional effect we all would suffer if everyone around us suddenly acted as if we had ceased to exist**."

Cannon believed that death was due to the continuous outpouring of adrenaline in response to constant stress. Doomed individuals would thus be expected to exhibit fast and shallow respirations, a rapid pulse, and the heart would beat faster and faster until it finally went into a state of constant contraction and failed. He hoped that anyone witnessing a victim in the throes of a hex could record such measurements to confirm his theory.

Stewart Wolf did observe such a death in a 30 year-old man in New Guinea a few years later that failed to support this sequence of events. Curt Richter subsequently came to quite a different conclusion based on studies at Johns Hopkins with tame and wild rats that had been subjected to inescapable stress.

Helplessness, Hopelessness And Whiskers

Richter was concerned that the progressive inbreeding of his laboratory rats had now made them too weak to serve as experimental models for his research on spontaneous activity and biological clocks. To evaluate this, he developed an endurance test by placing them in a circular tank of water equipped with a whirlpool device that forced them to constantly swim in order to survive. **Most could swim for several days but he was puzzled as to why some died in 5-10 minutes.**

As part of an earlier study, he had trimmed the nose whiskers (*vibrissae*) of rats to reduce cross contamination between cups containing different foods that were being evaluated. Richter recalled that shortly after this, many rats began to behave in a strange manner and some had also mysteriously died a few hours later for no apparent reason. He wondered if whisker trimming might affect their endurance in water and clipped the whiskers of 12 before placing them in the tank. Three died within a few minutes and the rest lasted only 40 to 60 hours, in contrast to their previous three or four days.

He then studied a few dozen wild rats, most of which he had personally trapped on the streets of Baltimore. These animals tend to be fierce, aggressive and suspicious. They constantly search for some means of escape and react very strongly to any type of restraint. Although much stronger than laboratory rats, they usually lasted only 15 minutes after immersion in the tank. When he trimmed their whiskers they all died after only a few minutes.

Richter reasoned that **trimming the snout hairs destroyed the rat's most important means of contact with its environment**. This was sufficiently severe to cause death, similar to the hex victim deprived of all social contact. Other influences included "the restraint involved in holding the wild rats, thus suddenly and finally abolishing all hope of escape; and the confinement in the glass jar, further eliminating all chance of escape and at the same time threatening them with immediate drowning." Some died while being held firmly to prevent escape prior to immersion and others when dumped directly into the tank from their cages.

To confirm Cannon's hypothesis that death was due to intense sympathetic nervous system stimulation, he devised a crude ECG to monitor cardiac events and was surprised to find that sudden death was preceded by a reduction of heart rate. He also observed a slowing of respiration and lowering of body temperature just prior to death, implying parasympathetic rather than sympathetic stimulation. At autopsy, the heart was distended with blood, suggesting a diastolic terminal event rather than the sympathetic systolic contraction Cannon had postulated. He confirmed this by injecting rats with atropine, a parasympathetic blocking drug, and found it could prevent sudden death in the swim test.

The rats died because without their whiskers to supply information [in hostile environments] they felt helpless and hopeless, which stimulated parasympathetic activity. To test this, he allowed several to sink to the bottom of the tank, quickly retrieved them from otherwise certain drowning, placed them on a table until they recovered, and then put them back in the tank. After this routine had been repeated several times, the wild rats no longer died following immersion and could swim for hours, simply because they had learned that their situation was really not hopeless after all. Similarly, when freed from the hex, those condemned have also been observed to "recover instantaneously, even after appearing more dead than alive."

Like the wild rats, voodoo victims perish because of overwhelming feelings of helplessness and hopelessness. Richter believed that death was due to parasympathetic rebound and hyperactivity following the initial fright, rather than the persistence of "fight or flight" responses proposed by Cannon. Jim Lynch later repeated some of these studies at Johns Hopkins using Richter's original equipment. He found that the slow heart rate

was due to the "dive reflex", which is designed to conserve oxygen, and that the terminal event was anoxia from drowning. Nevertheless, it would appear that excess stimulation of either the sympathetic or parasympathetic nervous system can be fatal for humans.

Why Loneliness And Depression Are Deadly

Apart from the stress of severe fright or intense excitement, sudden death appears inversely related to the degree of civilization or domestication. It is seen primarily in primitive peoples and is more readily induced in captured wild rats than those bred in the laboratory. If the hex can be removed or rats repeatedly retrieved from the tank also learn that the situation is not hopeless, sudden death can be avoided.

After decades of research and writing about links between stress and cancer, I am convinced that similar emotions influence deaths from malignancies. **Feelings of hopelessness and helplessness and loss of *raison d'être* due to loneliness and depression can clearly increase susceptibility to certain cancers as well as accelerate their course.** Cancer death rates in the year following loss of a spouse are also much higher in survivors than in married controls.

For some, cancer has been a death sentence much like the voodoo hex. As Karl Menninger noted, "the very word 'cancer' is said to kill some patients who would not have succumbed as rapidly to the malignancy from which they suffer." The 1966 Freedom of Information Act singled out cancer as the only disease exempt from disclosure and "moon children" has replaced "Cancer" in many horoscope charts for this reason. Further confirmation comes from autopsy studies showing only minute malignant lesions that could never have caused death.

Conversely, there is good evidence that having a hopeful and optimistic attitude or fighting spirit improves survival. Laboratory researchers have come to similar conclusions. Feisty breast cancer patients who refuse to accept defeat live longer, as do rodents with experimental malignancies who spontaneously develop combative behaviors.

We are just beginning to appreciate how depression and loneliness contribute to many other disorders and how they can be prevented or reduced by providing social support. This accounts for the success of self-help groups like Alcoholics Anonymous, "ostomy" and other clubs, where people with similar problems meet on a regular basis to share experiences and provide advice, encouragement, and other support.

The stress of loneliness and depression can cause a lowering of immune system defenses and an increase in cortisol that reduces resistance to cancer, viral and other infections ranging from AIDS, herpes and the common cold to tuberculosis. Depression has also been shown to be a risk factor for initial and recurrent heart attacks, but may be mediated by different mechanisms. Unlike sudden and dramatic voodoo death, contemporary loneliness and depression due to lack of social contact are slow, insidious killers. However, they are just as lethal in the end and much more common.

What is most alarming is the rate at which such problems are increasing because of progressively higher rates of divorce and separation, disruptive and dysfunctional family relationships, decreasing births, erosion of the extended family and religion as sources of support and the trend for women to now outlive men by almost 10 years. Loneliness will surely escalate in the 21st century because there will be more elderly and many others without spouses and/or children.

How did we get into this mess and is there some solution? Media influences are partly to blame. The nuclear or extended family of both parents, children and a grandparent or other relative living together has traditionally been the hub of emotional support. That has steadily been replaced on television by single families consisting of a divorced parent living with their children (Grace Under Fire, Sybil, Tony Danza Show) or blended arrangements in which two single parents get together (Brady Bunch, Step by Step, Sister Sister). Such **stepfamilies require adapting to new roles and relationships that often hinder working together as a close and cohesive support unit.**

As Jim Lynch explains in his latest book, *A Cry Unheard*, educational failure is a major contributor to loneliness. **School dropouts lack language and communication skills, which results in low socioeconomic status and a surprisingly increased incidence of premature death decades later. Read on to learn more about this.**

BOOK REVIEW

A Cry Unheard: New Insights into the Medical Consequences of Loneliness.
James J. Lynch, Bancroft Press, Baltimore, 2000. 345 pages (plus 237 ENDNOTES and References) $26.95

Jim Lynch is a dear friend I have enjoyed collaborating with for over a quarter of a century. Having had the additional privilege of critiquing the original and subsequent versions of this book, it is difficult not to be biased, but am certain I would be just as enthusiastic in the absence of these rewarding associations. This work probably started out as an update of *The Broken Heart*, to provide information that had accumulated since 1976 confirming the lethal effects of loneliness. The original manuscript was about 100 or more pages longer and had a somewhat different focus. In certain respects, it also expanded on the role of human dialogue Lynch had elucidated in his 1985 *The Language of the Heart*. However, the main message was the stunning revelation of why educational failure leads to a form of loneliness that can be a long-term time bomb. **School dropouts** suffer from the loss of companionship from classmates but **are particularly prone to subsequent social isolation because they lack the language and communication skills needed to make new friends**. As a result, they have significantly higher premature death rates decades later, particularly from heart disease. Educational failure is much more likely in children of unwed mothers or who live in single parent households. The rise in these and other contributors to school dropouts are illustrated by numerous graphs and tables.

(Very recent and other statistics not cited furnish further support. The March 2001 census report reveals that **between 1990 and 2000, unmarried partners increased 72 percent, single dads rose 62 percent and there are 7.6 million single moms, up 25 percent. Unmarried birth rates have doubled for white women since 1980 and almost one in three U.S. births are now to single women. Over seventy-five percent of births in our nation's capital are illegitimate!** So were almost half of 1995 Mississippi births where single white women over 20 had 12 times as many babies as in 1960. Illegitimacy rates were still five times higher for African Americans. Hispanics are expected to surpass blacks as the largest minority group within four years and will comprise a quarter of our population by 2050. Forty-two percent of Hispanic births are to single mothers and these children often have serious language problems. In one report, **the proportion of Hispanics with less than a 5th grade education was over 14 times higher than for others**, which explains their alarmingly high rates of unemployment and poverty, particularly for Mexicans.)

Half of marriages now end in divorce that also put more than a million children at increased risk for loneliness. One in four households has only one person and loneliness will increase as this grows to 31 million people living alone in 2010. Other contributors are diminished face-to-face dialogue and personal contact because of technological "advances" that lead people to believe "they can literally speak 'from no-place to no-body"'. The book's third section shows how difficulties in communication can cause alarming but unappreciated spikes in blood pressure that lead to coronary disease, and how the power of physical touch and contact can counteract these effects of "toxic talk". The fourth and final section focuses on "healing dialogue" so that the reader can learn to reduce risk of premature death from "communicative disease". It also describes how this disorder causes school failure, and steps the educational system should take to correct and prevent this growing tragedy. - Stay tuned for more

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