MASS PSYCHOGENIC ILLNESS

A SOCIAL PSYCHOLOGICAL ANALYSIS

Edited by
Michael J. Colligan
James W. Pennebaker
Lawrence R. Murphy

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Mass Psychogenic Illness: A Social Psychological Analysis

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Edited by

Michael J. Colligan
Miami University
Oxford, Ohio

James W. Pennebaker
University of Virginia
Charlottesville, Virginia

Lawrence R. Murphy
Xavier University
Cincinnati, Ohio

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Preface

The spontaneous outbreak of illness among a group of workers is a dramatic and distressing event. Of primary concern, of course, is the immediate treatment and recovery of the affected workers and the detection and elimination of the illness source. To the extent that the cause can be readily identified and understood, anxiety surrounding the event diminishes. Once the affected individuals have a rational explanation for what happened to them, they can begin to realistically evaluate their symptoms, not only in terms of their immediate significance, but also in terms of their longrange implications.

Unfortunately not all incidents of mass illness in work settings are so easily resolved. In some cases a physical or chemical cause for the illness may not be obvious. Recurrent episodes may occur long after the initiating cause has been removed or the expressed symptoms may be too nonspecific and transient to permit diagnosis. Under these conditions the illness remains a mystery and the workplace becomes a breeding ground for anxiety, rumor, confusion, and fear. Economic pressures to resume normal operations are counteracted by genuine concerns that the environment is still pathogenic. Having exhausted all possible physical explanations for the illness episode, investigators may turn to a psychological interpretation of the outbreak, explaining it in terms of mass hysteria or mass anxiety. This conclusion is always a tenuous one, being based primarily on the absence of physical evidence rather than the presence of a clearly defined set of precipitating psychosocial conditions. This ambivalence is understandable given the long and controversial history of the mind-body issue in general, and the concept of "hysteria" in particular. Despite these semantic and theoretical pitfalls, the fact remains that the workplace is as much a psychosocial environment as it is a physical one. The effects of psychogenic stressors may be

as threatening and debilitating to a workforce as excessive noise levels or inadequate ventilation.

There is an urgent need to reexamine the old issue of mass hysteria in terms of contemporary theory and research findings. By what mechanisms do psychological properties and processes become translated into physical symptoms? What conditions promote or limit the contagion of psychogenic symptoms throughout a workforce? Are some individuals or work settings more susceptible to such illness outbreaks than others, and if so what are these critical precipitating conditions? Is it possible that predisposing psychological factors may, in and by themselves, trigger a contagion of psychogenic symptoms? To what extent do these same psychological stressors lower worker resistance to sub-standard chemical exposures, making them hypersensitive to mild irritants in the work environment? What steps can be taken to contain the spread of panic and anxiety once a mass illness outbreak has occurred? Complexity is not a viable excuse for avoiding these issues, and while we might not be in a position to apply any quick and easy solutions to these problems we can at least attempt to develop a conceptual framework for understanding them.

The present book brings together scientists from several disciplines in an attempt to answer some of these questions. Because mass psychogenic illness has rarely been systematically examined, it is necessary to explore outbreaks from a variety of perspectives, including historical, cultural, social, psychological, and even medical. Obviously, no single viewpoint can adequately explain this phenomenon. Nevertheless, it is our hope that researchers, physicians, management and workers can begin to understand which variables in the natural environment are related to the occurrence and amelioration of mass psychogenic illness.

This volume is divided into three sections. The first part is intended to give the reader a flavor of the many forms that mass psychogenic illness has taken. As the reader will learn, contagion of psychogenic illness has occurred throughout history and across cultures. The symptoms and behaviors have differed, but the psychological processes appear to be similar. The first section of the book will also point to some dramatic case studies that have been extensively researched within the United States in recent years in factory settings. These studies will point to the temporal development of an outbreak and suggest some of the complexities involved in studying mass psychogenic illness.

The second section of the book deals with some of the methodological problems associated with mass psychogenic illness. The researcher in this field faces several difficulties, such as whether to look at the phenomenon on an individual or organizational level. Inherent biases and linguistic pitfalls associated with adopting either a management or worker perspective can easily compromise the researcher's efforts no matter how well-intentioned they may be. Within this section, the reader will learn where many of the potential problems lie and how to avoid them.

The final section of the book addresses many of the theoretical underpinnings

of mass psychogenic illness. Because the phenomenon essentially occurs on a group level among individuals, explanations must take into account psychological stressors, physiological changes, perceptions of body and environment, friendship networks, and a host of other critical dimensions. Within this section, then, each author analyses the phenomenon with a unique perspective. Consequently, each approach supplements other approaches. The converging viewpoints will aid individuals who are interested in either the theoretical or applied problems to better understand the many facets of mass psychogenic illness. Although our theories concerning mass psychogenic illness are nascent, they provide a beginning framework by which we can learn to prevent and control outbreaks of psychogenic illness.

We must emphasize that although this book deals specifically with mass psychogenic illness, it has direct implications for a variety of social and psychological phenomena. Readers with interests in community psychology, psychosomatics, group behavior, or even business and management will find most of the chapters useful and relevant. Finally, our focus on the psychodynamics of mass illness episodes does not imply a disregard for the physical and chemical hazards that potentially exist in the workplace. Rather, our aim is to complement many of the traditional evaluative processes in the investigation of a mass illness outbreak.

The current volume grew out of a symposium sponsored by the National Institute for Occupational Safety and Health (NIOSH) dealing with the diagnosis and amelioration of mass psychogenic illness. In an effort to supplement many of the viewpoints advanced at the conference, additional chapters were prepared by several of the authors. We wish to thank Elliott Harris for his continual help on this project. Finally, we are indebted to NIOSH for their financial support of the original symposium.

Michael J. Colligan
James W. Pennebaker

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Mass Psychogenic Illness: A Social Psychological Analysis

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OVERVIEW OF MASS PSYCHOGENIC ILLNESS: HYSTERIA REVISITED?

The notion that psychosocial factors may play an important role in the etiology of certain episodes of mass illness is hardly new. Reports of such incidents are threaded throughout the history of civilization, providing a reflection of the sociocultural and philosophical currents of the times. It was Hippocrates, writing in about 400 B.C., who first introduced the term "hysteria", derived from the Greek word "hysterikos" meaning "womb," to explain the appearance of a wide range of symptoms (e.g., convulsions, twitching, muscle spasms, headache, abdominal cramps) in unmarried Greek women. It was the contention of Hippocrates that sexual abstinance was an unnatural state, agitating the womb and causing it to wander throughout the body in search of satisfaction. The meanderings of the womb produced discomfort in the affected regions, and resulted in an overall excited state in the victim (Veith, 1965). Presumably this affliction could spread to other women in the vicinity of the victim, creating an epidemic reaction or "mass hysteria."

With the advent of the dark ages and the pervasive concern with religiosity and righteousness, outbreaks of mass psychogenic episodes became more frequent. During this time, it was commonly believed that such afflictions resulted from the demonic possession of unworthy souls. Perhaps the best known example of such episodes is the St. Vitus Dance epidemics that swept through Europe in the fifteenth and sixteenth centuries. Martin (1923) attributes the origin of this phenomenon to a popular mid-evil fable involving an event rumored to have occurred in a church-side graveyard in the German countryside on Christmas night in 1021. A group of pagens, consisting of both men and women, had met to

celebrate Christmas in a sacriligous night of song and dance when their revelry disturbed the services of the parish priest in the nearby church. His appeals to them to stop proved unsuccessful. In his anger, the priest placed a curse on them that they should dance without rest for a full year. The rumor goes that the wretched souls had danced themselves into the ground up to their knees before two bishops happened by, and, sympathetic to their pleas, removed the curse. Nevertheless, the ordeal had been so traumatic as to leave them trembling and spasmatic for the rest of their lives. In appearance, it was said that their uncoordinated gait resembled that of the beloved St. Vitus who had apparently suffered from neuropathy. At any rate, the curse of St. Vitus became a popular malediction which was levied against enemy and sinner during the dark ages. It was widely believed that the guilty would be physically punished for their shortcomings. Not surprisingly, this prophecy was fulfilled and mass outbreaks of uncontrolled dancing, hopping, and jumping were periodically reported throughout the countryside.

In 13th century Italy, a particular form of St. Vitus Dance involving spasms, uncontrolled vocalizations, and dancing till exhaustion was thought to be caused by the bite of a spider, the tarantula. It was not uncommon for a victim of "tarantism" to rush naked from his or her home to dance and shout in the streets. Often the victim would be joined by neighbors until, by some counts, as many as 500 individuals were similarly affected (Martin, 1923). Once bitten, the victims believed their systems to be permanently poisoned, so that they were subject to relapses for the rest of their lives.

The dynamics and triggering factors of the St. Vitus Dance episodes have recurred throughout history and have been implicated in mass outbreaks of illness, halucinations, and a variety of behaviors described in the first chapter of this section. The "spells" and trance states reported by the victims of recent mass illness outbreaks in Singapore described by Dr. Phoon in Chapter 2 are reminiscent of the bizarre symptoms characterizing the St. Vitus Dance epidemics. An objective review of past cases can do much to enhance our understanding of the role of psychosocial factors in the etiology of illness. Incidents such as these have been recorded for centuries among a variety of cultures within factories, schools, convents, and other social organizations. Not only have these outbreaks spanned time and culture, but the symptoms and the behaviors associated with them have differed tremendously. Where one culture may typically have mass illness episodes characterized by symptoms of nausea, headaches and dizziness, other cultures may have outbreaks wherein the affected individuals display common halucinations or violent behaviors. As the following chapters will suggest, the differences in the symptoms can partially be explained by the prevailing cultural, religious, and scientific beliefs held by the society. Despite these large differences, a number of remarkable similarities appear to underly their occurrence. For example, most incidences occur among individuals in stressful environments who have friends who have also been affected. Although the triggering event

may differ from outbreak to outbreak, the general pattern of the contagion of symptoms is similar. Clearly, the similarities among the outbreaks are as intriguing as the differences between them.

Finally, although our appreciation and understanding of mass psychogenic illness can be enhanced by an historical perspective, we should not feel constrained by the assumptions of our predecessors. The term "hysteria" has become so laden with surplus meaning and controversy that one frequently confuses this label with the phenomenon itself, and in rejecting the former, one loses sight of the latter. One of the primary aims of this volume is to reexamine outbreaks of "mass hysteria" in terms of current social psychological theory and knowledge.

The first section of the book is intended to acquaint the reader with the basic phenomenon of mass psychogenic illness. Each chapter offers a unique view of documented cases. The first chapter, written by Dr. Kerckhoff, gives an indepth account of one particular case that occurred in 1962 in a textile mill. In his account of the classic June Bug outbreak, the evolving psychological and sociological processes within a typical case are carefully documented. Dr. Phoon's chapter presents several case studies that have occurred within various factories in Singapore. His account offers a startling example of cultural and subcultural influences on incidents of mass illness episodes. The final chapter, by Drs. Colligan and Murphy, summarizes several outbreaks of mass illness within factories in the United States. The authors point to several common situational and personality factors implicated in the contagion of illness.

It must be noted that the reader interested in additional case studies will find numerous examples in several of the later chapters related to the theoretical issues surrounding mass psychogenic illness (Section 3 of the book). For example, Dr. Sirois lists a large number of hysteria outbreaks that have occurred over the centuries as they relate to his psychodynamic orientation (chapter 13). In addition, Dr. Stahl—in chapter 11—chronicles an interesting illness outbreak that occurred in a computer center. Shorter references to other such cases are discussed in virtually all of the remaining chapters.

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1 Analyzing a Case of Mass Psychogenic Illness

Alan C. Kerckhoff
Duke University

What follows is a brief account of a study of mass psychogenic illness which was originally published in book form under the title *The June Bug*. Most of what is presented here is in the form of excerpts from that volume, chosen so as to encompass many of the more important elements in the event itself and in our analysis of it. Further details may be found in the book.[1]

Given the nature of such cases, we knew nothing about the event until its report by the mass media. It was thus practically over before we even made contact with the company where it occurred. As so often happens, therefore, we were necessarily dealing with the problem of trying to understand the case after it was over, based on what few records existed and on interview data that could be collected later on. It is always possible to interpret the results, therefore, as of questionable validity. For instance, though we found that persons affected in this case were different in significant ways from those who were not affected, one might argue that the differences were *due to* different kinds of participation in the event rather than *explanations of* that participation. Although we are persuaded that our results form a reasonable explanation of participation, significant methodological issues remain.

THE "BUG" AND THE EPIDEMIC

Word first reached the public on the 6 o'clock news. The report was brief, and an air of mystery was already evident:

[1] *The June Bug: A Study of Hysterical Contagion*, by Alan C. Kerckhoff and Kurt W. Back, 1968, New York: Appleton-Century-Crofts. I am grateful to Kurt Back and to Prentice-Hall, Inc., current holders of the copyright, for permission to publish these portions of the book.

> Officials of Montana Mills shut down their Strongsville plant this afternoon because of a mysterious sickness.
>
> According to a report just in from Strongsville General Hospital, at least ten women and one man were admitted for treatment. Reports describe symptoms as severe nausea and a breaking out over the body.
>
> Indications are that some kind of insect was in a shipment of cloth that arrived from England at the plant today. And at the moment the bug is blamed for the outbreak of sickness.

Later that night, on the 11 o'clock news, further details were supplied. Some of them varied from the original report, but the melodramatic tone remained:

> During the past three weeks a number of the 200 employees have been stricken with a mysterious illness, apparently caused by an insect bite. Today about ten women and one man were stricken. Several were admitted to the hospital for treatment and observation. Company officials say they are fumigating the building.
>
> The plant is scheduled to reopen tomorrow morning at six o'clock.
>
> This station learned tonight from a company employee that the small insect attacks the skin, the bites leaving a wound similar to a gnat bite. In about twenty minutes the victim is struck with severe nausea. The company doctor informed us tonight that an entomologist is studying the problem. A report is expected later this week.

It was a Wednesday night in June, 1962.... Before it ended, the story became considerably more complex and the cast of players grew markedly. Some feeling for the event and the reactions to it can be derived from a brief sampling of the reports of the various news media over the next few days:

Thursday—... Hiram L. Lamont, plant personnel director, said a number of women reported to work today, when the plant resumed operations, in a highly nervous state. At least six were treated by the company physician and sent home.

Dr. C. H. Foreman, Strongsville County Health Officer, reports tonight, however, that there is nothing present in the community to get excited about.... The predominating symptom according to physicians and company officials is anxiety.... Dr. Foreman says the doctors have ruled out a virus—since none have fever—and food poisoning. All are in good condition.

Friday—Two experts from the U.S. Public Health Service Communicable Disease Center arrived today in Strongsville to assist local health officials trying to determine the cause of the sudden outbreak of sickness which has hit employees of Montana Mills.... Also on the premises were several plant officials, representatives of the plant's insurance company, two State College entomologists, representatives of the Strongsville Exterminating Company, and an engineer from the State Board of Health....

Nine persons remained hospitalized last night and two more have been treated in the hospital emergency room. There were unconfirmed reports this morning

that at least four more persons have been hospitalized. About fifty persons have been affected. . . .

Dr. Foreman said that the cause of the illness is still unknown. The two Public Health Service doctors are returning to the Communicable Disease Center tonight with several specimens found today. The specimens are identified as small insects about the size of a mite.

Baffled physicians are pursuing a theory of mass hysteria in the search for a cause of the mysterious sickness. . . .

Saturday—Today Dr. C. H. Foreman and the experts from the U.S. Public Health Service conferred on the findings of the laboratory tests on several insects taken from the Montana Mills plant to be analyzed at the Communicable Disease Center. . . .

The physicians have advised the company to fill the building with a residual spray that would kill off the bird mite. Officials said they would take this precaution over the weekend. But the investigation continues, say the experts, because nothing specific has been found as yet.

There was one more case of the unknown sickness at the plant today.

Sunday—Nervous disorder, publicity and lastly a bug's bite caused the outbreak of a "very real" and mysterious sickness at Montana Mills. That's the opinion of physicians who carried out extensive investigations. The illness was characterized by nervousness, nausea, weakness, numbness and insect bites.

They summarized it like this: The sickness was definitely real but related to overtones of anxiety and nervousness. They hesitated to use the word "hysteria." The least important factor was the bite of an insect. . . .

Monday—Business was back to normal at Strongsville's Montana Mills plant today. The elusive bug apparently is a thing of the past. And, according to all the experts the rashes and other ailments which caused the trouble can be traced to a bug all right—but a mental one rather than one which crawls or flies. . . .

In any event, as one exterminator put it: "Whatever has been here ain't here now."

A SCHEMATIC OVERVIEW

Montana Mills is a rather large plant employing 965 workers. A subsidiary of a large northern concern, it was relatively new in the area, the sprawling one-story building being only 2 years old. It is an unusual company in that it carries out all operations from spinning raw fibers into thread to the manufacture and distribution of finished women's clothing. Thus, there are several different departments separated in the various parts of the one large building. . . .

The distribution of the workers by sex, department, and shift is significant for our purposes. . . . The plant works three shifts. The vast majority of the workers (728) worked on the first shift (8:30 A.M. to 4:30 P.M.) at the time of the

incident. Of those on the first shift, only about one-fifth were men, whereas the majority (59%) of those on the second and third shifts were men. This difference was largely due to the fact that the dressmaking operations were carried out only during the first shift, and these operations were carried out by women. . . .

Finally, it must be noted that June is a month of peak production in this plant. Given the seasonal nature of the basic product, women's clothing, time is of the essence, and June is a crucial month in the production of the fall line. Because of this, much overtime was worked by those in the dressmaking departments. . . . In a business which consistently faced peaks and valleys, then, the epidemic occurred at a peak of production.

It is difficult to specify when the epidemic began. As some of the news releases indicated, workers had complained of insect bites for several weeks before the first group of serious cases brought the situation to the attention of the newsmen. In fact, sections of the plant in the dressmaking departments had been sprayed three times with Malathion the week prior to the outbreak. In spite of this, the complaints continued. Most of the complaints in this earlier period, however, did not lead to medical attention. Somewhat arbitrarily, therefore, we have followed the lead of the medical investigators in using the period from the Friday prior to the Wednesday outbreak through the Monday following that Wednesday as the period of investigation. This is a period of 11 days which includes two weekends.

Within this 11-day period 62 plant employees were known to have been seen by physicians either at the plant or outside. Of these persons, 57 visited the physicians specifically because of bites and associated symptomatology. Most of the other 5 had other assorted complaints which, while not specifically defined as due to insect bites, could be defined as associated with the epidemic. These included nervousness, a burning on the calf, fainting, numbness in an extremity, feeling "like a balloon ready to burst," and an inability to turn the head. Since the epidemic was presumably a function of factors other than insect bites, all of these 62 cases must be considered "affected cases," even though some errors of classification seem almost certain.

Of the 62 cases, 59 were women. . . . Women on the first shift accounted for all but 4 of the cases, and all of these 58 cases were women in the dressmaking departments or in a cloth-mending department adjacent to the dressmaking area. . . .

Of the 62 cases, 50 occurred on the Wednesday and Thursday referred to in the news report. Five occurred on Tuesday, and 4 occurred on Friday of that week. The only earlier case was on the previous Friday, and 1 case occurred each on the Saturday and Monday following the first news release on the epidemic. Thus, within the 11-day period, 95% of the cases reported occurred in 4 consecutive days with 80% of them occurring on 2 consecutive days. . . .

Whatever our approach to this phenomenon, there are thus several basic facts which must be taken into account. The epidemic occurred during the peak pro-

duction season. It came and went rather quickly, lasting for all practical purposes a week or less. It rose rapidly to a peak and just as rapidly disappeared. Those who were affected were almost all women, and almost all of them worked on the day shift. All but a very few cases were found in one functionally and spatially separate section of the plant. Whatever "it" was, it struck first-shift women in the dressmaking departments more consistently than anyone else. And, most important of all, "it" could not be explained in any "normal" way.

DESIGN AND BASIC FINDINGS

Our investigation was based on a series of interviews with the workers in the plant. Management permitted us to conduct it on two conditions: We could not begin until 2 months after the incident, and we could not tell the workers that the incident was our primary interest. Reference to the incident was made only in passing after most of the interview had been completed.

We restricted the interviews to women on the first shift, and the analysis focused on those white women in the dressmaking departments. We interviewed all of the women known to have been affected and a random one-fourth sample of others in the same departments. There were thus 56 affected cases and 88 nonaffected cases.

During the interview, after alluding to the incident, we asked: "Did anything like this happen to you?" Surprisingly, 17 of our presumed nonaffected cases said "Yes," and they told us about being bitten, feeling ill, etc. Though we had not anticipated this, it required us to make a three-way comparison in the analysis. We referred to our three groups as affecteds, self-defined affecteds, and controls. (The latter is a term we would no longer use, but it is retained here for consistency.) The central focus of our investigation was to differentiate among these three groups of women. Because some were affected and others evidently were not, our most basic task was to differentiate between the controls and the two kinds of affecteds, but because the affecteds had come to the attention of physicians during the incident and the self-defined affecteds had not, we needed to understand that difference as well.

Not surprisingly, 2 months later, those most affected by the incident were most likely to say they believed in "the bug" or some other physical cause of the illness. Although only 51% of the controls gave this response, 71% of the self-defined affecteds and 81% of the affecteds did so.

Our theoretical position led us to focus the analysis on three kinds of factors thought to be relevant in understanding a case of mass psychogenic illness. We thought that such cases occur under conditions in which a number of persons find themselves under stress, so we looked for evidence that those who were affected most were under a heavier strain than those who were not affected. The personality of the individuals presumably also makes a difference. We expected that

women who were more nervous and tense, and those who more easily adopted "the sick role" might be more easily affected. Finally, the pattern of spread of the illness, over a period of time, suggested that some interpersonal influence process might be important, so we also focused on the social relations the women had with each other. A brief statement about our findings regarding each of these factors will suffice.

Strain. We investigated various sources of strain, both on and off the job. Since the workers were women, many of whom were married and had children, conflicts between work and family responsibilities (especially with overtime work) seemed likely. We found four measures of strain that differentiated between the affecteds and the controls. Affecteds were more likely to have worked a lot of overtime and to provide half or more of the family income. They were also more likely to see variation in output in their section, thus being more aware of possible invidious comparisons among workers. And, finally, they were less likely to mention their supervisor as one they would go to if they had a problem, an indication, we thought, of felt strain with the supervisor. An index, composed of these four items, clearly differentiated between the affecteds and the controls. However, the self-defined affecteds did not score high on it; they looked very much like the controls, and seemed to be under much less strain than the affecteds.

Personality. Our least expected findings occurred in this part of the analysis. We had expected the affecteds to have high scores on the Cornell Medical Index (acknowledging a large number of physical symptoms) and to more readily adopt the sick role (see a doctor with minor symptoms). Instead, they acknowledged *fewer* physical symptoms than either the controls or the self-defined affecteds, and they did not say they would more readily adopt the sick role. Although these outcomes were, and remain, somewhat puzzling, we adopted a tentative interpretation that involved the concept "denial." We noted that the affecteds not only acknowledged fewer symptoms, on the average, but many more of them than either of the other groups refused to acknowledge *any* symptoms. Although the symptom list offered by us included very minor difficulties, 30% of the affecteds denied having any of them, compared with 20% of the controls and none of the self-defined affecteds. This finding reminded us of another, encountered in the analysis of strain. A number of the women had small children, and we assumed that overtime would present a problem with child care. Some of these women denied that it was a problem and some even said they liked to work overtime. We referred to this as role-conflict denial. Only 10% of the controls and 6% of the self-defined affecteds gave this kind of response, but 29% of the affecteds did so. Finally, we were also reminded that when we asked the women the open-ended question about their involvement in the incident ("Did anything like this happen to you?"), four of the affecteds said "No," even though there was a medical report on their involvement.

We interpreted all of these bits and pieces of evidence as suggesting that at least some of the affected women tended to deny difficulties, and we thought that probably such women would be less likely to cope successfully under conditions of strain. They would thus presumably be more likely to become seriously upset ultimately, exhibiting symptoms that would require medical attention. Interestingly, the self-defined affecteds were quite different. They readily acknowledged symptoms as well as role conflicts—in fact, that was what brought them to our attention during the interviews, and it might have been the reason for their not having become so sick that they had to see a doctor. Although much of this is speculative, based on inadequate evidence, the interpretation is at least worthy of consideration.

Social Relations. The idea of "contagion" is central to most discussions of mass psychogenic illness. Although the term is used in different ways, it clearly suggests that earlier cases have some effect on the probability of a person's being stricken. On the basis of previous literature, we perceived three possible connections between a woman's social position in the factory and the ways in which contagion might occur. It might be that women who were social isolates would be more likely to be stricken because they did not have the social support in the work setting that would help them cope with the threat. It seemed even more likely, though, that women who had social relations with others who had been stricken might themselves fall victim to the contagion, because the illness would seem "closer" and the threat very real if a close associate got sick. Finally, if one interprets contagion as a kind of "crowd response" in which some sort of emotional identification with others in the same setting is sufficient to make one person's experience meaningful to another, social relations might be wholly irrelevant to the path of the contagion.

Actually, we found some evidence in support of all three of these expectations. Overall, the most general finding is that both affected and self-defined affected cases are linked together by bonds of friendship and work-related associations (eat lunch together, car pool members, work partners, etc.). The closer the kind of interpersonal link (e.g., friend rather than work partner), the greater the tendency for the members of each of the three categories to choose each other. But at all levels there are more ties between affecteds and self-defined affecteds than between either of these and the controls. The three categories of women thus all have some characteristics of a "group," but the two groups of affected and self-defined affected women overlap considerably.

However, when the sequence of affected cases is considered, evidence is found for both of the other two patterns. The early affected cases, those that occurred before the two days on which most were stricken, were much more likely to be social isolates than were the other affected women. Thus, those who evidently established the idea that "something is wrong" were outside these group networks. Similarly, those women stricken late on the second big day and

afterwards tended to be outside the social networks of the affecteds and self-defined affecteds. However, they were not isolates, because they received friendship and other social tie nominations from other controls. There is some evidence, therefore, that the later contagion spilled out of the social networks of affected cases. (Most of the cases that occurred outside the dressmaking departments also came late in the period of contagion.)

This analysis thus suggests that the flow of the epidemic may pass through several phases. It may begin when a few socially isolated women exhibit a form of behavior that is rather dramatic, so dramatic that it cannot help but be noticed. With the observation of these first few cases, a reasonable explanation evolves that is meaningful in that setting. Both the visibility of the illness and the reasonableness of its explanation increases as the behavior pattern spreads to women who are more socially integrated, and the contagion then follows rapidly along sociometric channels. Finally, though, the cases become so numerous that the threat becomes visible to everyone in the situation and the credibility of the explanation increases. As almost everyone begins to accept the reality of the threat, cases begin to occur throughout the population, and the pattern becomes a kind of "crowd response." Thus, all three theoretical positions we originally considered received some support, though the core of the epidemic seems to have followed a set of sociometric channels.

Whereas the analysis of social strain and personality data had left us in doubt about the place of the self-defined affecteds in the epidemic, the analysis of social relations helped clarify the matter. The earlier analysis showed them to be rather sensible women who were realistic about their situation and were capable of coping with the strains they experienced. It was thus puzzling that they had become affected at all. However, here we find that these women were closely linked in a number of ways with the affecteds. The network of social ties in which they were involved presumably tended to increase the strain they felt and made it more likely that they would experience symptoms. At the same time, they were evidently better able to cope with those symptoms on their own and were thus less likely to come to the attention of the medical authorities.

PERSONAL CHARACTERISTICS, SOCIAL RELATIONS, AND MODE OF RESPONSE

Several of the earlier findings have suggested that *how* an affected woman responded during the epidemic was an important variable, and we had several cues to factors associated with different modes of response. We differentiated among the affected women according to whether they fainted, almost fainted, or did neither. We reasoned that the woman who fainted was evidently overcome with fear and tension before she could get medical assistance, whereas the others evidently got to the doctor before experiencing such overwhelming emotions. . . .

Those who were deniers presumably would tend to delay acknowledging a problem and should be more likely to faint, whereas those who easily acknowledge symptoms should be unlikely to do so. Those who had friends who were also affected might be expected to be alerted to the reality of the danger and be more likely to seek aid before they were overwhelmed. Those who had a generally high inclination to adopt the sick role would presumably seek assistance under conditions of less distress than those who normally had a low inclination to seek medical aid. We examined each of these possibilities. . . .

In this analysis . . . the two factors that stand out are role-conflict denial (which evidently delayed a woman's admitting the need for help and thus increased the probability that she would faint) and social ties to earlier affected cases (which seems to have accelerated the tendency to seek aid and thus lowered the probability of fainting). We were surprised to find that symptom denial and inclination to adopt the sick role were not related to the type of response the women exhibited. We knew from an earlier analysis, however, that both of these variables were related to having ties with earlier affected cases. Those with ties to earlier cases tended to be symptom deniers more often and to have a lower inclination to adopt the sick role. It thus seemed possible that there was some kind of interaction effect between having social relations with earlier affecteds and some of our measures of personal characteristics. To test this possibility, we computed the proportion who fainted for each of the major personal characteristic categories, holding social relations constant. The findings are reported in Table 1.1.

TABLE 1.1
Distribution of Cases of Fainting According to Symptom Denial, Role-Conflict Denial, and Inclination to Adopt the Sick Role, Controlling for the Presence of Social Ties with Earlier Cases[a]

	Affecteds	
Characteristic	*Linked Percentage*	*Not Linked Percentage*
Denial of all symptoms	36.4 (11)*	33.3 (6)
Acknowledge some symptoms	7.1 (14)	56.0 (25)
Role-conflict denial	57.1 (7)	55.6 (9)
No role-conflict denial	5.6 (18)	54.5 (22)
Low inclination to adopt sick role	20.0 (10)	71.4 (7)
High inclination to adopt sick role	13.3 (15)	50.0 (24)

*The number in parentheses following each percentage is the number of affected cases in that category. For instance, there are 11 affecteds who are symptom deniers and who have links with earlier affected cases. Of these, 36.4% fainted.

[a] Kerckhoff and Back (1968). Reprinted by permission.

Although the patterns are somewhat different, in all three cases we find that when the woman had both social relations with earlier affecteds and the particular personal characteristic, she was least likely to faint. The combination of being a nondenier and having a tie with an earlier case or having a high inclination to adopt the sick role and having such a tie produced the fewest fainters. The interaction effect between social relations and the personal characteristic is most apparent, however, for the two measures of denial. . . .

An even more fundamental point to be made on the basis of this analysis is that the role of social ties with affected cases is different depending on whether we are trying to understand *how a woman gets sick* or *how she comes to the attention of the medical authorities*. Having ties with any other affected case, whatever the order of reporting to the doctor, tends to be associated with getting sick. But having ties to a case that has already had medical attention tends to be associated with seeking such attention before fainting. . . . If we use the emotional experience as our dependent attribute, the order of affected cases is not important, but if we use the behavior which follows from that experience (fainting or going to the doctor) the order affected is quite important.

A MULTIDIMENSIONAL MODEL

Throughout our analysis it has been apparent that no one of our variables is a completely successful predictor of a woman's becoming affected, even though the three different types of predictors (strain, personal characteristics, and social relations) have all proved to be effective. In several instances we have seen that combinations of these variables have proved more effective than the individual measures. The implication throughout has been that different kinds of people, under different kinds of strain, and with different patterns of social relations, respond differently. We should thus expect that some kind of multidimensional model would be most effective in organizing our findings.

If we are to attempt an overall statement of the contribution our analysis makes to an understanding of the dynamics of the epidemic, however, we must again recognize that we have to this point been dealing with only a part of the population of plant workers who were exposed to the experience of the epidemic. Although there seems to be good reason to leave the Negroes and those outside the dressmaking departments out of our analysis, it is also true that thus far we have not even dealt with all of those white women in the dressmaking departments. The fact that we have a sample of those who did not report to the doctor plus the total population of those who received medical aid complicates the situation. This is particularly true because the self-defined affecteds have played such an important part in our analysis. Ideally, a summary statement should reflect the process occurring throughout the relevant population (i.e., white women in the dressmaking departments). We must therefore make some assump-

tions about those women in the population whom we did not interview. The most reasonable assumption appears to be that our sample of nonaffected cases (controls plus self-defined affecteds) is representative of the population of nonaffected cases, and that the distribution of all characteristics within that sample is the same as the distribution within the population. We must also assume that we actually achieved a one-fourth sample of those nonaffected cases. Thus, whenever we examine the distribution of a particular characteristic, we need to multiply the data we have on the nonaffected cases by four and then add it to the data we have on the affected cases. This should then allow us to make the best estimate of the distribution of these characteristics within the total white female population in the dressmaking departments. Given such assumptions, we can analyze the distribution of the important characteristics within what can most legitimately be called the "population at risk."

In order to present in summary fashion the effect of the kinds of factors we have discussed earlier within the total population at risk, we selected the three most important measures from the earlier analysis and combined them. First there was the summary measure of strain which we viewed as an index of the situations in which our subjects found themselves. . . . This was then combined with the measure of the woman's position in the interpersonal influence process during the epidemic. Since we were going to use as our dependent measure the fact that a woman was or was not an affected case, we counted intimate ties with *any* other affected woman as an indication of a woman's social position. Such ties ranged in number from zero to three. Finally, within the categories defined by these situational and sociometric measures, we differentiated between two kinds of persons, those who were and were not deniers by one or both of our measures. Since there were 5 possible levels of strain, 4 degrees of social linkage with affecteds, and 2 types of persons, this led to 40 possible combinations. Because some of the combinations did not appear and others were very infrequent, we reduced the number of categories by collapsing the strain and social position measures into 3 levels each. This provided the basis for an 18-cell table.

The data are reported in Table 1.2. The first number in each cell is the number of affecteds of that type, the second is the number of self-defined affecteds, and the third is the number of controls. Both of these latter two numbers were arrived at by multiplying the number of self-defined affecteds and controls of each type in our sample by four, thereby providing an estimate of the number of such women within the population at risk. The total number of cases in the table is 408.

If we wish to "predict" which cases were affected, using the three factors of strain, social influence, and denial, we might pick out cells containing 56 cases in such a way as to maximize the accuracy of prediction. The cells with the double asterisks contain a total of 54 cases. To fill out the required number we might draw randomly 2 more cases from some adjacent cell. Since no such cell has half or more affecteds, we may assume that both cases so drawn would be

TABLE 1.2
Distribution of the Population at Risk Classified by Level of Strain, Ties with Affected Cases, and Denial[a]

		Level of Strain		
		0–1	*2*	*3–4*
No Affected Intimates	No Denial	4-16-96	2-4-36	2-0-0**
	Denial	3-0-56	2-4-4*	3-0-0**
One Affected Intimate	No Denial	4-20-52	2-8-12*	4-0-4**
	Denial	3-0-4*	7-0-4**	4-0-4**
Two or More Affected Intimates	No Denial	3-4-0*	3-4-8*	2-8-0**
	Denial	3-0-0**	2-0-4**	3-0-0**

NOTE: The first number in each cell is the number of affecteds, the second is the number of self-defined affecteds, and the third is the number of controls. An "intimate" is a friend, one to whom one would go for advice or would expect to come to her for advice, a carpool or lunch partner, or one defined as the best worker in the section. "Denial" includes both the denial of symptoms and role-conflict denial. Cells with double asterisks designate those categories in which more affected cases are found. Those with single asterisks, together with those with double asterisks, designate those categories in which more affected and/or self-defined affected cases are found (see text).

[a] Kerckhoff and Back (1968). Reprinted by permission.

nonaffecteds. How well does such a table order the cases? Perhaps most important is the fact that there is a simple pattern to be seen. First, there is a general tendency for the proportion of affecteds in the cells to increase as we move from upper left to lower right. All but one of the cells with double asterisks are in the last column or last row of the table. Second, either an extreme level of strain or close association with two or more other affecteds tends to lead a woman to be affected, irrespective of the other factors. Third, denial, when added to either social influence or strain, greatly increases the probability of being affected.

Also, it is striking that so many of the 56 cases we have just singled out are affecteds. Not only are 30 (or 53.6%) of them affecteds, but of the remaining 352 cases, 326 (or 92.6%) are *not* affecteds. There is thus an overall accuracy of designation of 87.3%. This level of accuracy, of course, is far greater than could be accomplished using any of the three kinds of measures individually. Although it is clear that the strain and social relations measures predict well in the more

extreme cases, the *combination* of variables is clearly important at the less extreme levels.

We may also ask whether such a table helps to single out the self-defined affecteds as well. Because there were 17 such cases in our sample, we can assume that there were 68 in the population at risk. These, plus the 56 affecteds, would give a total of 124 women who experienced symptoms during the epidemic. The cells with the single and double asterisks contain 115 cases. To fill out the required number, we could draw 9 cases randomly from the cell in the first row and second column, and we could assume that 1 of these 9 cases would be either affected or self-defined affected. Of these 124 cases, 72 (or 58.1%) are either affecteds or self-defined affecteds, and of the remaining 284 cases 232 (or 81.7%) are controls. There is thus an overall accuracy of designation of 74.5 percent.

The important part of these results, however, is the high proportion of affected (or self-defined affected) cases in the critical cells, since only a very small percentage of the total of 408 were either affected (13.8%) or self-defined affected (16.7%). Perhaps the best way to illustrate the effectiveness of the three independent attributes is to note that the cells in Table 1.2 which are marked with asterisks represent less than three-tenths (28.1%) of the population at risk, but they contain more than three-fourths (76.8%) of those who received medical treatment and more than half (57.3%) of all those who experienced symptoms. The three independent measures are thus much more effective in discriminating between those who did and did not go to the doctor than they are in discriminating between those who did and did not experience symptoms, although they do both to a significant extent.

A GENERAL OVERVIEW

Even though our data fail to provide a completely adequate explanation of the facts of the epidemic, the analysis presented . . . has indicated that there is more order in this seemingly chaotic situation than one might at first have expected. . . . Therefore, it may be well to state in a more succinct summary form what we believe this analysis has done to clarify the order in the chaos. We will do this through a set of statements. . . .

Most affecteds were exposed to a great deal of strain, or were deniers, or both. . . .

The difference between affecteds and self-defined affecteds was largely due to differences in personal qualities and in sources of strain. . . .

The difference between self-defined affecteds and controls was largely a difference in social relations and personal qualities. . . .

If the strain experienced was sufficiently great, it alone was likely to lead a woman to become affected during the epidemic. . . .

If social influence was strong enough, it alone was likely to lead a woman to become affected. . . .

Among those affecteds with social ties with other affecteds, the ones who became affected first exhibited the most extreme symptoms. . . .

The combination of denial and a moderate level of strain or social influence greatly increased the tendency to become affected. . . .

Personal and social characteristics interact to affect the tendency to exhibit the most extreme symptoms. . . .

There were many persons (the self-defined affecteds) who played an important part in the development and spread of the contagion who were not known by the authorities to have been affected. . . .

CONCLUDING OBSERVATIONS

. . . To sketch the various patterns that need to be combined it is necessary to broaden our perspective to include at least the whole plant as well as a more extended period of time than we have investigated. This is especially true for an understanding of the central belief in the case, the belief in a poisonous insect. Some of the early news items alluded to the fact that there had been complaints of insects for several weeks before the epidemic. Evidently during this time there had diffused rather widely in the population of the plant the belief that there was an uncommon number of insects and that they constituted at least a nuisance. It is within this context that the first few cases must be seen. As the symptoms and the knowledge of sickness spread, the link between this earlier belief and the immediate experience was made. The insect changed from a nuisance to a threat.

We must assume that in the face of this threat a number of different things began to happen, the most obvious and most central from our perspective being the rapid increase in reported symptoms. But there must have been other patterns of contagion going on at the same time. Undoubtedly in the face of this threat some of the women (with or without having experienced symptoms) evolved the solution of leaving the plant and there would presumably have been a contagious adoption of that solution. Others probably turned to officials in the plant for remedial action, and there would presumably have been a contagious move in that direction by some of the workers.

The increase of reported symptoms evidently understates the actual increase in symptoms—our self-defined affecteds attest to this. Given the experience of symptoms, a woman might or might not have become known to the medical authorities. She could have "clocked out of there," taken an aspirin, "talked it out" with a friend or her supervisor, *or* gone to the doctor. Except for the accidental discovery of the self-defined affecteds, our concern would have been

exclusively with those known to the medical authorities. Even within that group, however, it proved useful to differentiate between those who went to the doctor on their own and those who fainted before they could find aid. A relevant aspect of this differentiation is the suggestion that there developed during the period of the epidemic a greater tendency to seek aid before being overcome. Thus, for those who did develop symptoms and could not cope with them in any other way, there evidently evolved an acceptable solution where one had not existed before. There was evidently a process of social facilitation in the use of this method of coping. In addition, there was also evidence that persons with milder symptoms were likely to report to the doctor in the latter part of the epidemic. This could be interpreted either as an indication of a heightened awareness of physiological disturbances and thus a tendency to define mild symptoms as significant, as an indication of a desire to cooperate with the officials by keeping them informed of even mild "attacks," or as a means of using a socially approved way of accomplishing some other goal (getting attention, going home, etc.).

This seems to mean that in any such case there are several processes of dissemination going on at the same time, all of which are interrelated but any one or combination of which may become the focus of attention: (1) the spread of a belief in a threat; (2) the spread of the experience of symptoms; (3) the spread of relatively unobtrusive methods of coping with the threat and/or the symptoms; (4) the spread of cases of collapse in the face of the threat and/or the experience of symptoms; (5) the spread of the solution to the experience of symptoms via seeking medical aid. Only the last three are likely to bring the process to the attention of outsiders, and, depending on the "unobtrusive" methods devised, it may be that only the last two will do so. All of these processes are to be expected whether the "cause" of the symptoms is "real" or "purely imaginary." In fact, we put these terms in quotation marks because we suspect that it is never possible to use them in such cases with complete confidence, and the social effects will be the same in any event.

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