

THE REJECTION OF TWO EXPLANATIONS OF BELIEF IN  
A LUNAR INFLUENCE ON BEHAVIOR

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## Abstract

Two hypotheses which might explain the basis for belief in a lunar influence on human behavior are reviewed. One relates to lunar gravitational pull, the other to human expectations. Both predict that birth and emotional disturbance increase at full moon. Four studies were conducted to test the notion of a lunar influence on behavior. In study one, nurses' belief in the effects of the moon on patient behavior were confirmed. Factor analysis revealed three underlying dimensions of nurses' beliefs which were named cosmic, sociogenic, and biogenic. In study two, examination of multiple parameters both on the first day of each phase and when full phase periods were examined, indicated that a full moon effect was found only once and did not replicate. When data on emotional disturbance were plotted by days in the lunar cycle, two peak periods were revealed--before full moon and at last quarter. The largest peak occurred 24-48 hours before full moon. Analysis of variance of these data indicated a significant effect for lunar cycles but not for days in the cycle. Examination of individual lunar synodic cycles indicated this pre-full moon peak did not replicate over individual lunar synodic cycles. When days of greatest and least lunar gravitational force in the anomalistic cycle (perigee-apogee) were examined, emotional disturbance was found to be negatively related to gravitational force. When days of greatest and least lunar gravitational force in the lunar synodic cycle (new moon, full moon vs.

first quarter, last quarter) were analysed no difference was found. In studies three and four, the effect of nurses' expectations on ratings of patient behavior at full moon were examined. No expectancy effects were found. It would appear that on occasion peak periods of mental disturbance can be identified relative to the full moon phase. Since these effects are not related to lunar gravitational force or to human expectations and they do not appear to be consistent, the conclusion is that they are not related to the lunar cycle but to some other phenomenon not at present identifiable.

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## INTRODUCTION

### Explanations of belief in a lunar influence on behavior

A belief in the effects of the moon on human behavior dates from ancient times and has survived until the present. Two hypotheses which pertain to this belief are discussed here. One relates to physical events, the other to psychological events.

### Gravitational Pull Hypothesis

Lunar gravitational force is known to be the major regulator of ocean tides. In addition, the effect of the moon's gravitational pull on earth is known to create "earth tides" in which the flexible crust of the earth rises and falls very slightly. Effects of lunar gravitational force on the human organism have also been suggested (Lieber and Sherin, 1972; Schnurman, 1948; McDonald, 1966). These researchers hypothesize that as the lunar gravitational force varies so do biological functions, including behavior, and that belief in a lunar influence reflects an observation of this relationship.

Specifically, Lieber and Sherin (1972) hypothesize that as lunar gravitational force increases so does emotional disturbance. They investigated the relationship between homicide and lunar cycle<sup>\*</sup> in two geographic locations over a fifteen year period. With respect to the gravitational pull hypothesis, they examined the relationship between homicide and the apogee-perigee cycle, approximately a 27 day cycle. Assuming a lunar gravitational force

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\* See glossary for all astronomical terms.

constant of 1, the lunar gravitational force between apogee and perigee varies by approximately 39 percent. No difference in number of homicides occurring at these times was found.

Nor did Lieber and Sherin (1972) find any increase in homicides at times of maximum tidal force i.e. times when the gravitational forces of the sun and the moon are producing the greatest additive effect-- at the coincidence of new and/or full moon with lunar perigee. In their fifteen year study there were 29 such occasions.

Lieber and Sherin (1972) reluctantly reject the gravitational pull hypothesis for homicide on the basis of their findings. They claim however, that their observations, which they were not able to quantify, were that more bizarre and ruthless crimes of homicide occur at times of maximum gravitational pull. At the present writing they are researching the gravitational pull hypothesis as it relates to crimes of violence (assault).

While Lieber and Sherin (1972) were not able to correlate increased homicide with times of greatest lunar gravitational force using apogee-perigee and full moon and/or new moon with lunar perigee as measures, they did report significantly more homicides at full moon and just after new moon in their first study. In the second study conducted in a different location, three peaks of homicide are found--after full moon, after new moon and after last quarter. The authors explain the shift to the right in the full and new moon peaks as perhaps due to a change in latitude. They suggest that although homicides did not differ at apogee-perigee, such peaks as are evident in their data may be due to the "role of gravitational forces" which is "a complex problem requiring further study" (Lieber and Sherin, 1972, p. 73). Since full moon and new moon are known to be periods of greatest gravitational pull

in the synodic cycle, this suggestion bears investigation.

The gravitational pull of the moon is also thought by some workers in obstetrical settings to cause increased births at full moon. Investigations have tested for differences in numbers of births at moon phases. McDonald (1966) reported a greater incidence of births during full and new moon phases. He suggests the "gravitational pull of the moon exerts a force on the uterus and uterine membranes" (McDonald, 1966, p.83).

Schnurman (1948) found more births on the first day of each phase change, with a tendency for the first quarter to predominate. He suggests that a lunar gravitational force is exerted on the "amniotic fluid" just as on the tides in bodies of water elsewhere (Schnurman, 1948, p.78). Presumably, the force of the amniotic fluid ruptures the fetal membranes and initiates labor in the female. Rippman (1957) investigated number of births at different moon phases and found no differences.

The foregoing researchers suggest that belief in a lunar influence relates to observation of increased behavior which correlates positively with increased lunar gravitational pull. Others also attempt to correlate known belief in a lunar influence with observation of increased activity during the lunar cycle. Results of these studies are contradictory and equivocal.

Osborne (1968) found significantly more patients were admitted to a psychiatric hospital on the fourth day following the full moon. Pokorny, 1964; Bauer and Hornick, 1968; Lilienfeld, 1969; Lester et al., 1969; all study similar variables and report no differences in measures of behavior during the four moon phases.

Shapiro et al., (1970) attempted to assess the "Transylvania effect" the notion that certain patient behavior coincides with moon phases, by examining three

measures of patient disturbance-- number of lines written in ward charts, number of patients mentioned in these charts, and number of patients receiving medications for disturbance--administered at the discretion of ward nurses. No effects were found.

### Limitations

Perhaps the most important limitation of the foregoing studies is the apparent lack of replication. While Lieber and Sherin (1972) did attempt replication in another geographic area, results of the second study not only demonstrate an increase from 2 to 3 peaks of disturbance but also give evidence of some shifts in the 2 peaks found at new and full moon in the original study. These findings do not constitute confirmation of the original effect found. Other limitations are also apparent.

Lieber and Sherin (1972) report statistically significant periodicity for homicides related to the full and new moon phase in one geographic location but do not examine the meaningfulness of the effect they claim. Significance could have been reached due to a large effect in some of the years tallied and none or a negative effect in others. Some measure of reliability is needed to assess whether the effect they claim at full and new moon replicates over lunar cycles. This could have been done by splitting data and examining it to see if there was some consistency or a positive trend to the effect being reported. Further, such statistical significance as is claimed by these researchers is achieved by testing (binomial test) for differences between number of homicides during the peak 24 hours and the following 24 hour period which was a low period. Thus a phase effect is suggested though an effect between adjacent days is tested.

In the McDonald (1966) study, examination reveals that significance is reached only by totalling data over a six year period. In any one year, a new and full moon effect cannot be identified. Here too, one has to question the reliability of the effect being claimed. Is there in fact no consistency to the effect, or is it so small that it can only be identified when data are collected over many cycles?

Schnurman's data (1948) indicate that the predominating phase for births is the first quarter. Since he suggests that increased gravitational force increases the pull on the uterine membranes forcing them to rupture, and the first quarter phase is a period of minimum lunar gravitational force, his findings are directly opposite to his hypothesis.

To date, only Lieber and Sherin (1972) specifically set out to test the relationship between lunar gravitational force and human behavior. Although they found no effect, they do say they observed "qualitative differences" in acts of violence related to gravitational force. Such differences should be further investigated.

The peaks of homicide found by Lieber and Sherin (1972) following new and full moon and the post full moon effect found by Osborne (1968) is, as Lieber and Sherin (1972) claim, suggestive of some sort of shift due perhaps to latitude change. Researchers have identified a lunar day (24.8 hour) rhythmic cycle in behavioral and physiological measures in crabs, quahogs, snails, fucus, potatoes, rats, mice and hamsters (Brown, 1956; 1959; Terracine et al., 1962; Brown, 1960; 1965). We know, from observation that a 24 hour rhythmic cycle exists in human behavior. Brown and Young (1967) have identified a monthly rhythm in



hamster activity related to the lunar cycle (29.53 days). They suggest the curve of activity is similar in shape and form to that obtained for geomagnetic activity. It may be that human rhythms, though not phase locked, possess a monthly rhythm related to the lunar cycle as does the phase labile menstrual cycle.

At the present time there is no support for the gravitational pull hypothesis. Unless or until there is, the suggestion that gravitational force and emotional disturbance are related is unwarranted. In spite of this a belief in a lunar influence on mental disturbance exists. There must be some reason for this. Since only one study has attempted to assess the relationship between gravitational force and emotional disturbance--and then a very gross measure of emotional disturbance was used-- it seems only sensible to test for a possible relationship with more sensitive measures. If however, no effects are found when a more sensitive measure of emotional disturbance is used, the study of gravitational force as a possible influencing factor for human behavior should not be pursued.

#### Human Expectations Hypothesis

That expectations about behavior may influence future behavior has been suggested by more than one theorist. Merton (1948) theorized a "self fulfilling" prophesy to account for the effect of expectations of an event which changes behavior in the direction of the expectation. Allport (1950) applied expectancy theory to an analysis of war. He suggests that nations which expect to go to war behave so as to reflect such expectations and thus affect the behavior of opponents. Rosenthal, 1964, 1966, 1968; Rosenthal and Rosnow, 1969; And Orne, 1969; provide evidence for the operation of interpersonal self-fulfilling prophecies.

One caution that arises out of the vast amount of work done recently in the task-oriented framework of expectancy research is that tasks in the areas of animal learning, responses to inkblot tests, reaction time, psychophysical judgements, and structured laboratory interviews tend to show greater expectancy effects than do tasks of person perception (Rosenthal, 1969). It is suggested (Anderson and Rosenthal, 1968) that adequate controls of expectancy effects in the person perception area cannot be obtained without a clearer understanding of intervening variables which appear to mediate these effects and sometimes produce negative or no effects. Since expectations of a lunar influence relate to believers' perceptions of behavior at full moon, and are therefore in the area of person perception, the latter findings are pertinent to a discussion of a self-fulfilling lunar prophesy.

In the lunar framework, expectancy theory would predict that consciously or unconsciously patients and those who supervise them respond in accordance with their culturally acquired expectations regarding the influence of the moon on behavior and thus each full moon helps to confirm them. Folklore and practises of the past centuries such as chaining, flogging and depriving mental patients of food at full moon contribute to a "carry-over" effect or a "psychological set" predisposing patients and staff to expect higher levels of disturbance at full moon. Sarton (1939) held that given an initial fear both staff and patients would create the very psychological conditions necessary to perpetuate such a belief. To date, no research has investigated whether staff or patients perceptions of behavior are influenced by expectations of a lunar effect. There is need for research to test an expectation hypothesis.

If belief in a lunar influence on behavior is not related to the observation of increased events due to either gravitational force or to expectancy effects, it may be related to myth. That is, if events do not increase at full moon but the belief persists that they do, the situation may be mythical. Two possible explanations for a lunar myth are found in the literature; one is related to psychoanalytic theory, the other to learning theory.

In psychoanalytic theory the mechanism of projection is viewed as a response to inner feelings which all men possess. In the lunar framework, the process might be described as one where the individual projects onto external objects; eg. the moon, his internal feelings, thoughts or beliefs about human behavior. In this way the environment is made congruent with and becomes justification for feelings or beliefs.

Learning theorists (Rotter, 1954) suggest that myth is learned as a part of cultural participation. Levy-Bruhl (translated, 1966) a social anthropologist, agreed that man's view of causality was determined by the social environment and what he called the "collective representations" those intimations of reality which are given to the individual by virtue of membership in a group. A belief in the effect of the moon on behavior can be traced to earliest times (Harley, 1885). The use of the word "lunatic" was used in primitive and popular medical theories of ancient Egypt (Sprengler, 1868, quoted in Harley, 1885). The theory is that a belief in the power of the moon on behavior has survived through the ages by enculturation.

Although belief in a lunar influence on behavior could be subsumed in either psychoanalytic or social learning theory, no attempt to specifically explain this belief has been made by theorists. Neither have psychoanalytic or learning

oriented researchers undertaken to examine the problem of why people believe the moon affects behavior. Perhaps this is because projection and enculturation are abstract concepts, not observable events that can be quantitatively measured.

The credibility of both of these theories as explanations of the lunar phenomenon is greatly weakened by a lack of verification of these hypothetical constructs. Their acceptability would appear to depend more on the disconfirmation of events occurring at full moon than the acceptance or rejection of hypotheses which might arise from either theory.

### Summary

A belief that the full moon has an effect on human behavior has been recorded over time. To determine whether a lunar influence on man exists is a concern of modern researchers. Research results are inconclusive. The problem needs to be clarified.

The first question that needs to be asked is whether a contemporary belief in the effect of the moon on human behavior exists. If it does, is it the result of the observation of real events or is it a result of fantasy? Two hypotheses suggest themselves to determine whether events do increase at full moon. The first is the gravitational pull hypothesis which predicts a positive relationship between human activity and lunar gravitational force, which is maximized at full and new moon. The second is the expectations hypothesis which predicts that perceptions of behavior by believers in a lunar effect are altered at full moon. If neither of these hypothesis is correct, the presence of a belief in a lunar effect on behavior may be related to myth.

Research to date has focused largely on tests of variation in behavior during the lunar cycle. Findings are equivocal. It is difficult to pinpoint where in the lunar cycle behavior

might escalate. Peak periods of activity are sometimes found at full and new moon, sometimes after, and sometimes not at all. Since data collection methods, statistical tests of significance, and geographic location (which may be an important variable) vary, it is difficult to assess the work that has been done. There is a need to clarify;

- 1) if there is a belief
- 2) if events do increase at full moon
- 3) if there is a relationship between events and lunar gravitational force
- 4) if there is a relationship between the perception of events and human expectations of a lunar effect.

This study attempted to clarify these issues by first; confirming the presence of a belief in a full moon effect among nurses; second, by testing for a relationship between moon phases and reported human behavior (birth and emotional disturbance); third, by testing for a relationship between emotional disturbance and lunar gravitational pull; and fourth, by investigating nurses' expectations of a lunar influence on behavior as they relate to ratings of patient behavior during the four moon phases.

## STUDY ONE

Purpose

The purpose of this study is to investigate obstetric and psychiatric nurses' beliefs regarding the influence of several factors, including the moon, on patient behavior. An attempt is made to identify the underlying dimensions of nurses' beliefs about the precipitating factors in birth and mental illness.

Method

Subjects Ss were 74 obstetric nurses working at three urban hospitals and 86 psychiatric nurses taking a psychology course at a community college in British Columbia.

Procedure A questionnaire (Appendix A) was administered to nurses. Questions were divided into two sections. The first dealt with beliefs about the precipitating factors in birth (De Lee and Greenhill, 1947) and mental illness, respectively. Different precipitating factors were rated on a five point scale ranging from 1) 'not at all' to 5) 'a lot'. Other questions concerning periodicity in birth and mental illness were included in the second section.

Frequency tabulations of the data were carried out. Kaiser's normal varimax rotation of principal components<sup>1</sup> with unities in the diagonal, was applied to responses to items in the first section. This method of analysis which seeks simple structure, aims to identify the independent sources of variance in the data and maximize interpretability of the factors.

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1. See Harman (1967) and Rummel (1970) for detailed accounts of factor analysis and related procedures.

## Results

a) Obstetric Nurses Responses to the question "to what extent do moon phases affect delivery?" are listed below. 50 percent of the nurses believed that moon phases had at least some influence on delivery (table 1).

Table 1: Extent of Obstetric nurses' belief in effect of moon on childbirth

Item response	Frequency	Cumulative frequency	Cumulative percent
A lot	6	6	8
quite a bit	12	18	25
some	17	35	50
a very little	5	40	56
not at all	31	71	100

Responses to the nine questions in the first section, which related to the precipitating factors in childbirth, were ranked according to average scale values and are presented in table 2. As seen, obstetrical nurses believe the major precipitating variable in delivery is the effect of "hormones" on the body. The next most important is thought to be "pressure on the presenting part". Of the nine variables affecting delivery, the influence of the moon ranked sixth.

When asked what kinds of obstetrical events were affected by the moon, most (40) of the 43 nurses answering the question indicated the moon exerts its effect on normal as opposed to premature or breech births.

Table 2: Means, standard deviations and average ranks for 74 obstetric nurses on 9 variables affecting childbirth

Variable	Mean	S.D.	Rank
Hormones	3.48	1.34	1
Pressure on presenting part	3.45	1.29	2
Injuries	3.26	1.00	3
Shocks	3.15	.95	4
Laxatives	2.8	1.04	5
Moon phases	2.57	1.53	6
Menstruation	2.20	1.14	7
Minor Illnesses	2.01	.89	8
Atmospheric pressure	1.7	1.07	9

Only 4 of the 74 nurses knew the correct phase of the moon at the time the questionnaire was administered. Three of these were believers in a lunar influence. 50 nurses answered the question "if you feel the moon has an effect on childbirth does it matter whether the moon is visible?" 39 said it did not.

Substituting means for seven pieces of missing data a factor analysis was done on responses to questions in the first section of the survey. Results reveal three underlying factors. The first, which accounts for 26 percent of the total variance of the 9 variables, includes laxatives, shocks, injuries and minor illnesses. It appears to describe an exogenous factor.

The second factor, which accounts for 17 percent of the total variance, includes atmospheric changes and moon phases and appears to describe a cosmic factor.



The third factor, includes pressure on the presenting part, menstruation and hormones. It accounts for 16 percent of the total variance and appears to describe an endogenous factor (table 3). These three factors account for 59 percent of the total variance of the variables.

Table 3: Factor loadings after varimax rotation for beliefs concerning birth. N=74 obstetric nurses

Variable	Factor		
	1	2	3
Pressure on presenting part	.19	.14	.59
Menstruation	-.13	.09	.73
Hormones	-.15	-.10	.59
Laxatives	.75	.26	.02
Shocks	.76	.16	-.09
Injuries	.81	-.12	.10
Minor illness	.62	.03	-.37
Atmospheric changes thunderstorms	.22	.77	.11
Moon phases	-.03	.90	-.01

b) Psychiatric Nurses Responses of the 86 psychiatric nurses to the question "to what extent do moon phases affect mental illness?" indicate that approximately 74 percent (64) believe an influence exists. 10 felt the moon was a very important variable and 53 percent felt the moon exerted at least some influence (table4).

Table 4: Extent of psychiatric nurses' belief in effect of moon on mental illness

Item response	Frequency	Cumulative frequency	Cumulative frequency
A lot	10	10	12
quite a bit	13	23	27
some	23	46	53
a very little	18	64	74
not at all	22	86	100

Of the 64 nurses who believed in some degree of lunar influence, 53 thought that the full moon was the phase of importance (table 5). 24 nurses knew the correct phase of the moon on the day the questionnaire was administered. Of these, 21 were believers in a lunar influence on mental illness. In answer to the question of whether the moon had to be visible to exert an effect, 56 of the 68 nurses who answered said 'no'.

Table 5: Frequency table of psychiatric nurses reports of important moon phase affecting mental illness

Moon phase	Frequency
New	7
1st quarter	0
full	53
last quarter	4

N=64

Responses to the 8 questions related to the important variables in precipitating mental illness were ranked on the basis of average scale values as reported in table 6. The most important variable affecting mental illness was thought to be a 'physical agent' (drugs, injury, etc.). The second most important variable was considered to be "situational". Of the 8 variables listed as possible precipitating variables in mental illness, the effect of the moon ranked sixth.

Table 6: Means, standard deviations and average ranks for 86 psychiatric nurses on 8 variables affecting mental illness

Variable	Mean	S.D.	Average rank
Physical agent	3.84	.86	1
situation	3.81	.91	2
self	3.76	1.06	3
other person	3.32	.85	4
heredity	3.31	.99	5
moonphase	2.62	1.29	6
supernatural (magic)	2.53	1.03	7
atmosphere	1.92	.93	8

Substituting means for 11 pieces of missing data Kaiser's normal varimax rotation of principal components was applied to responses to questions in the first section of the survey. Results revealed three underlying factors (table 7). The first appears to be cosmic and includes the variables, atmosphere

(lightning , etc.) supernatural events (magic, etc.) and moon phases. It accounts for 21 percent of the total variance.

The second factor is sociogenic and is described by the variables, situation, other person, and self. It accounts for 20 percent of the total variance.

The third factor appears to be biogenic and includes heredity and physical agents. This factor accounts for 17 percent of the total variance. The total variance accounted for by the three factors is 58 percent.

Table 7: Factor loadings after varimax rotation for beliefs concerning effects of moon on mental illness

N= 86 psychiatric nurses

Variable	Factor		
	1	2	3
Heredity	.09	-.21	.75
physical agent	.07	.21	.81
situation	-.20	.66	.10
other person	.10	.80	.09
self	.18	.65	-.22
atmosphere	.73	.06	.07
supernatural (magic)	.63	.15	.28
moonphase	.83	-.14	-.09

### Discussion

There is a difference between the two groups of nurses studied and their views about the effect of the moon on patients' behavior. Obstetric nurses are less ready than psychiatric

nurses to accept a lunar influence. A sizable majority of psychiatric nurses however, hold that the moon, and indeed the full moon, influences mental illness.

While both groups of nurses might admit to belief in a lunar influence, they do not rank this variable high relative to the influence of other variables which might be affecting birth and mental illness. Nor were many obstetric nurses, aware which phase the moon was in when the study was done. This suggests that this belief is not strongly held nor attended to by most nurses.

The situation for those psychiatric nurses, approximately 24 percent, who not only believe in a lunar influence but also know what phase the moon is in when questioned, needs to be further examined. If these nurses are rating patient behavior on the basis of their expectations, then the lunar phenomenon as a function of nurses' expectations would receive support. Some measure of patient disturbance at moon phases needs to be done to determine whether beliefs about the moon influence behavior ratings at full moon. Two of the following studies attempt to do this.

Perhaps the most interesting outcome of this study of nurses' beliefs lies in the factor analysis. Here the aims of simple structure in the analysis of the responses of both groups of nurses would appear to have been achieved. As seen, all factors identified have groupings with loadings appearing as extremely high or low and thus aiding clear interpretation of factors. No loading on any factor appears in the middle range to cloud interpretation.

Interpreting the factors, we find obstetric nurses believe exogenous, cosmic and endogenous factors operate to influence birth. The independent source of belief which

accounts for the most variance is the exogenous or external factor. Obstetric nurses' beliefs regarding the effects of endogenous or biogenic variables on birth are more tightly knit. Variables loading on this factor are felt by nurses to be the most important variables affecting birth.

Psychiatric nurses believe cosmic, sociogenic and biogenic factors operate to influence mental illness. The source of most variance in beliefs is accounted for by the cosmic factor-- which includes the variable "the moon". This factor then accounts for the greatest individual differences in beliefs among psychiatric nurses. Beliefs concerning the biogenic factor accounts for the least variance. Variables loading on this factor are felt by nurses to be the most important influences affecting mental illness.

The findings of three similar independent sources of belief related to the causes of birth and mental-illness here, finds support in a study by Steinhauser (1969). Investigating nurses' concepts regarding treatment of mental illness across psychiatric settings, Steinhauser (1969) identified three independent ideological dimensions: somatatherapeutic, psychotherapeutic, and sociotherapeutic. Contrary to her hypothesis that the degree of support for different treatment orientations would be a function of nurses training programs, Steinhauser (1969) found a similar degree of support for psychotherapeutic and somatatherapeutic treatments among registered nurses and psychiatrically trained nurses. Clearly, this finding is upheld here where not only training programs differ between groups of nurses but also areas of work. It is difficult to think of nursing areas further apart in orientation than obstetrics and psychiatry, yet the underlying influences thought to precipitate both birth and mental illness are the same. From whichever perspective the nurse views the patient, it seems her concept of illness and its causes are unitary.

## STUDY TWO

### Purpose

The purpose of this study is to investigate:

1) whether a relationship exists between moon phases and births and/or mental disturbance.

2) whether a relationship exists between emotional disturbance and lunar gravitational pull.

In part one, the first day of each of the four moon phases is examined to test for increased births and increased telephone calls to a crisis centre. In part two, using a different measure of mental disturbance, full phase periods were examined to test for a relationship between moon phases and emotional disturbance. These data were also used to investigate days of greatest and least gravitational pull.

### Method

Part one: Data on births occurring on the first day of each moon phase for a period of 24 lunar cycles (December, 1969- November 1971) was collected from three large urban hospitals and totalled by moon phases. Data appear in Appendix C.

Data on number of calls received on the first day of each moon phase for a period of 26 lunar cycles (December, 1969- January, 1972) was collected from a crisis centre and totalled by phases. Data appear in Appendix D.

Part two: Data on number of "unusual occurrences" reported at a mental hospital for a period of 12 lunar cycles (May 6, 1972- April 26, 1973) was collected and totalled across phases. Data appear in Appendix E. These data were also plotted by days in the lunar cycle. The 29.53 day lunar cycle was divided into equal intervals using phase-interphase intervals.

Phase-interphase scale: Days were scaled to 48 hours before and after the day on which a phase began.<sup>2</sup> Interphase days were days between the 48 hour period after and 48 hours before phases, totalled and divided by the number of days in the interphase period. Although this scale is not linear due to the greater number of hours in the interphase period, it does provide a means of assessing the five day period around each phase change--the period of interest in this study.

Gravitational Force Measures: In order to assess the effects of gravitational force on the earth, measures at times of maximum and minimum gravitational force were required so the contrast between these two periods could be quantitatively assessed. Periods of known maximum and minimum gravitational force relative to the two known lunar cycles--the anomalistic and the synodic cycle were chosen.

Days of minimum and maximum lunar gravitational force in the anomalistic cycle--the approximately 27 day cycle of days when the moon is closest to and farthest away from the earth--were tabled for 13 cycles. Data appear in Appendix F. Apogee is the day in the cycle when the moon is farthest from the earth. At this time the effects of lunar gravitational force on earth are minimal relative to the anomalistic cycle. Perigee is the day when the moon is closest to the earth and gravitational force effects are greatest relative to the anomalistic cycle. If gravitational force effects are operating to increase behavior, one would expect measures of disturbance then to be greater at perigee than apogee.

The second measure of maximum-minimum gravitational force relates to the lunar synodic cycle--the 29.53 day orbit

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2. As listed in the Canadian Almanac and Directory, 1972 and 1973.



of the moon around the earth. Times of new and full moon are periods of greatest gravitational force. At this time moon and sun are lined up producing additive effects of gravitational force on the earth. Times of minimum gravitational force are at 1st and last quarter when the moon's gravitational force effect is subtracted from that of the sun (see Fig. 1.). Data for these periods were tabled--new moon+full moon vs. 1st quarter+last quarter--for 12 synodic cycles. Once again, given the gravitational pull hypothesis, one would expect measures of emotional disturbance to be greater when summed over days of new moon and full moon rather than days of first and last quarter.

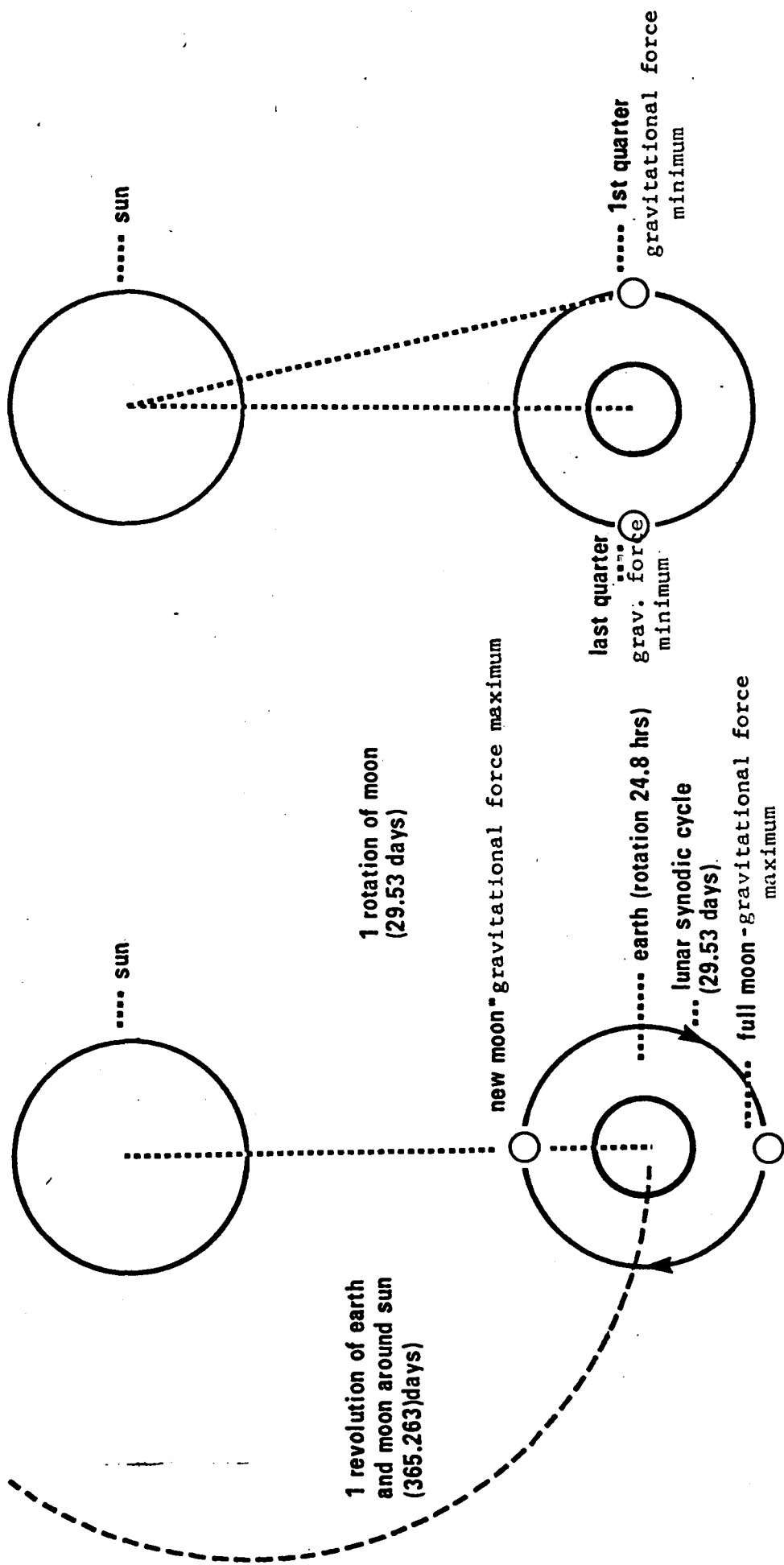
The variability in gravitational force between maximum and minimum periods in the synodic cycle is greater than that for the anomalistic cycle. Therefore one would expect greater variability in any measure of disturbance associated with the former effects. In addition, one would expect correspondence for maximum and minimum measures in both lunar cycles examined.

Statistical Analysis: Data in part one were analysed using the chi square test of significance, using a random model to generate expected frequencies. Data in part two were examined using the chi square test for differences between moon phases and the binomial test and the normal curve approximation to binomial values for data on gravitational pull. Data by days in the lunar cycles were plotted using a phase-interphase scale and examined using a repeated measures analysis of variance.

## Results

Part one: There were 976 normal deliveries when births on the first day of each of the four moon phases were totalled. Table 8 indicates no significant difference between the number of births on the first day of each moon phase

**FIG 1. Gravitational force of sun and moon maximized at spring tides (A) and minimized at neap tides (B)**



**A. SPRING TIDES**

**B. NEAP TIDES**

( $\chi^2 = 2.02$   $p > .2$ ). Chi squares were calculated on the basis of a priori expectations of equal distributions across quarters. As indicated in Table 8 no effects are significant.

Table 8: Total births by 1st day of moon phases, December 1969- November, 1971.

Hospital	Moon phase				Total	$\chi^2$	Corrected for continuity
	NM	1st Q	FM	LQ			
A	70 (76)	78 (76)	76 (76)	80 (76)	304	.73	.63
B	57 (56)	56 (56)	51 (56)	59 (56)	223	.61	.47
C	115 (112)	111 (112)	117 (112)	106 (112)	449	.63	.51
Total	242 (244)	245 (244)	244 (244)	245 (244)	976	.03	.01

$p > .2$  (Expected values are in parentheses)

There were 4, 662 incoming calls to a crisis centre when calls on the first day of each of the four moon phases were totalled. Chi squares were calculated on the basis of a priori expectations of equal distributions across the quarters. Table 9 indicates no significant difference between the number of calls on the first day of each phase for 1970 or for the total number for the two year period. Significance however, is reached for 1971 due to the increased number of calls on full moon day over those expected. Here the lack of replication of a full moon effect can be seen.

Table 9: Total crisis centre calls by 1st day of moon phases  
December 1969- December 1971

Year	Number of telephone calls				Total	$\chi^2$	Corrected for continuity
	NM	1st Q	FM	LQ			
1970	462(461)	440(461)	445(461)	498(461)	1845	4.48	4.32
1971	667(704)	733(704)	767(704)	650(704)	2817	12.8*	12.65*
Total	1129(1165)	1173(1165)	1212(1165)	1148(1165)	4662	3.3	3.2

\* $p < .01$  (Expected values are in parentheses)

Part two: There were 1,155 "unusual occurrences" reported by nurses at a large mental hospital for the four phase periods studied (Appendix E). Table 10 reveals no significant difference between the phases ( $\chi^2 = 1.56$   $p > .2$ ).

Table 10: Unusual occurrence reported by moon phases May 6, 1972-  
April 26, 1973

12 phases	Frequency
New moon	298
1st quarter	287
full moon	272
last quarter	298
Total	1155

$\chi^2 = 1.56$        $df = 3$        $p > .2$

During the 12 lunar synodic cycles studied there were 13 days each of apogee and perigee. 24 unusual occurrences

were reported at perigee and 46 at apogee (Appendix F). The probability of this deviation from chance is .01 (normal curve approximation to the binomial test)  $X=2.55$   $p<.01$  two tailed test).

For days of greatest and least gravitational pull in the 12 synodic cycles, there were 78 unusual occurrences reported when the first days of new and full moon were summed and 72 when the first days of first and last quarter were summed (table 11) (see Appendix G). A normal curve approximation to the binomial test of these two periods indicates there is no significant difference ( $Z=.41$   $p>.7$  two tailed test).

Table 11: Unusual occurrence reports by days of greatest and least gravitational pull in the lunar synodic cycle

	Greatest gravitational pull		Least gravitational pull
New moon	39	1st quarter	28
Full moon	39	last quarter	44
Total	78		72
$Z=.41$ $p>.7$			

Unusual occurrences plotted for days of phase-interphase showed an apparent periodicity (Fig. 2). Reports of disturbance peaked twice in the lunar cycle. The largest peak occurs 48-24 hours before full moon. The next largest peak occurs 24 hours after last quarter. A repeated measures analysis of variance on reports of occurrences in the 12 lunar cycles by days in the cycles (table 12) are summarized in table 13. There is a significant effect for lunar cycles ( $p<.05$ ) but not for days in the cycle. A review of the plots

Fig. 2 Unusual occurrences by lunar phase - interphase intervals 24

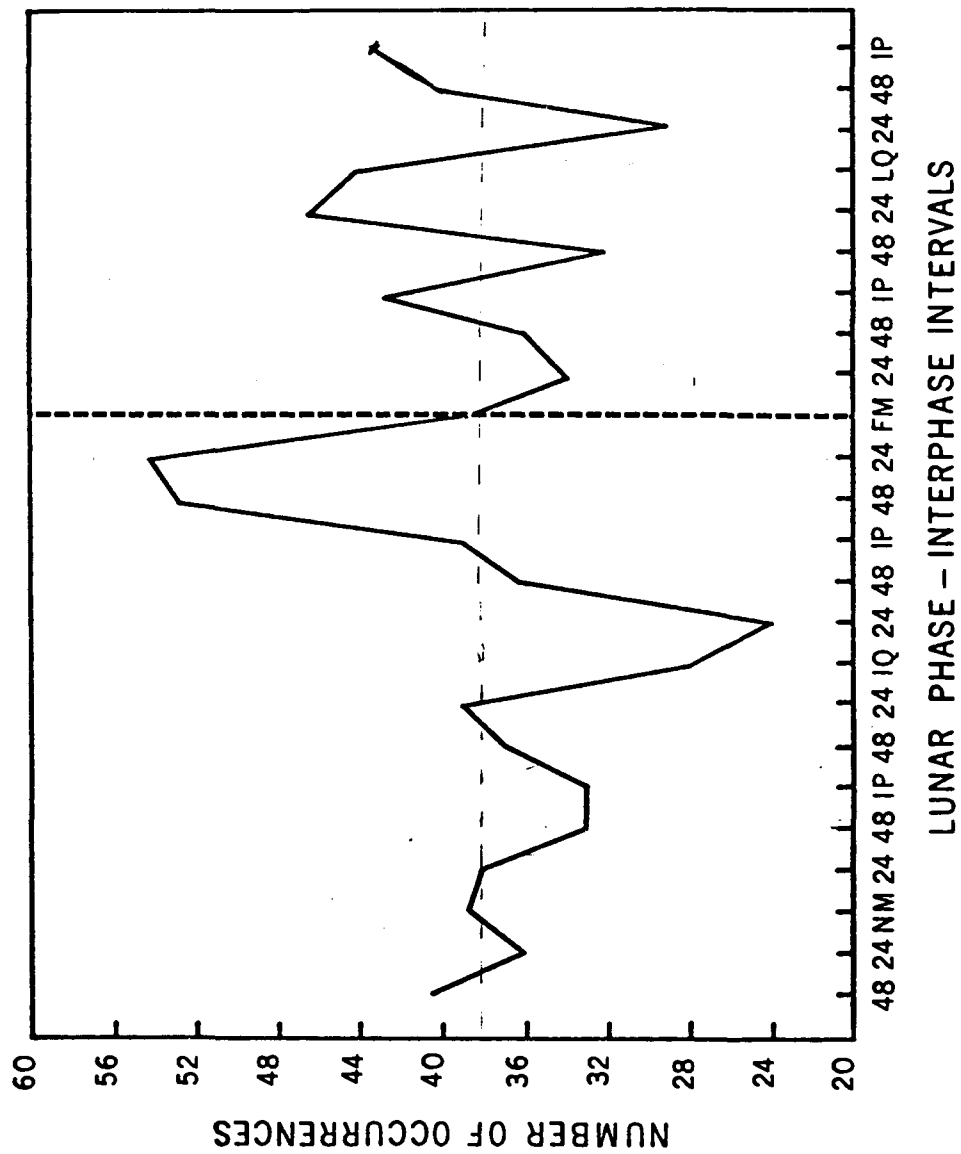


Table 12: Unusual occurrence reports at mental hospital, Vancouver, B.C.  
 May 6, 1972--April 26, 1973 by lunar cycles and days

Lunar cycle	Phase new moon	I.P.	Phase 1st quarter	I.P.	Phase full moon	I.P.	Phase last quarter	I.P.
	48 24 NM 24 48		48 24 1st 24 48		48 24 FM 24 48		48 24 LQ 24 48	
1	4 2 3 2 3	3.5	3 2 3 0 3	3	4 4 3 3 1	4.3	1 4 2 2 1	5
2	4 0 4 8 3	2.5	6 3 4 0 2	2	4 4 4 0 8	3	0 3 6 4 7	4.5
3	6 4 4 2 1	1	7 4 0 4 6	4.3	4 4 3 1 5	4	3 2 7 0 4	.5
4	3 6 3 4 2	3	4 1 3 1 1	1.3	3 3 0 1 1	2	1 4 2 2 4	2.5
5	3 2 1 3 3	3.5	3 2 4 3 3	3	9 4 1 7 0	1.5	3 11 4 2 1	5
6	4 5 4 4 0	4.6	0 4 3 4 5	6	6 4 7 2 2	5.5	1 2 7 2 3	4.5
7	3 7 5 4 5	2	3 2 1 0 3	4	4 3 2 5 3	4.5	7 6 4 5 2	4.3
8	8 3 3 3 5	2	2 3 0 2 2	2	2 8 4 4 2	1	3 2 2 2 4	4.5
9	2 2 2 4 3	2.6	3 4 3 2 1	2.5	6 3 2 0 6	6	1 4 1 2 2	3.5
10	1 1 2 2 2	3.3	5 7 2 3 4	4.5	6 2 5 10 4	5	7 2 1 4 5	2.8
11	1 2 3 3 4	3	1 4 1 3 4	4	4 6 4 1 2	2	2 4 6 3 4	2.3
12	2 3 5 1 2	3	0 3 4 2 2	2.5	1 5 4 0 2	1.8	3 2 2 1 3	3.3

Table 13: Analysis of variance for data on number of unusual occurrences reported by days and by lunar cycles

SV	df	SS	MS	F
Total	287	999.98		
Lunar cycles (L)	11	64	5.82	1.73*
Days (D)	23	82.58	3.59	1.07
LD	253	853.40	3.37	

\* $p < .05$

#### Discussion

Findings here suggest that nurses' belief in the influence of the full moon on behavior may be linked to observation of increased disturbance in a particular setting at a particular time but that no consistent full moon effect exists. For example, increased telephone calls to the crisis centre on full moon days in 1971 might lead to a belief in a lunar effect but this effect will not replicate in 1970. In addition, when information on crisis centre calls is coupled with that obtained on births for the first day of each moon phase, it seems quite clear that no consistent full moon effect can be found.

Similarly, increased reports in unusual occurrences immediately before full moon at the mental hospital might incline nurses to associate this effect with full moon. Support for this notion however, must be discounted when this cumulative effect is found not to replicate in the individual lunar cycle. Such effects as have been found in



this study may explain why other studies on the lunar effect are equivocal. Lack of replication or reliability of measures have contributed to this equivocation.

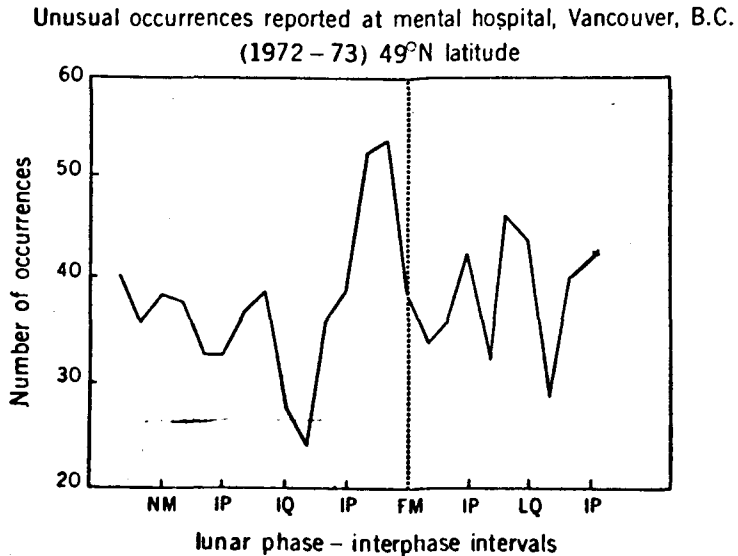
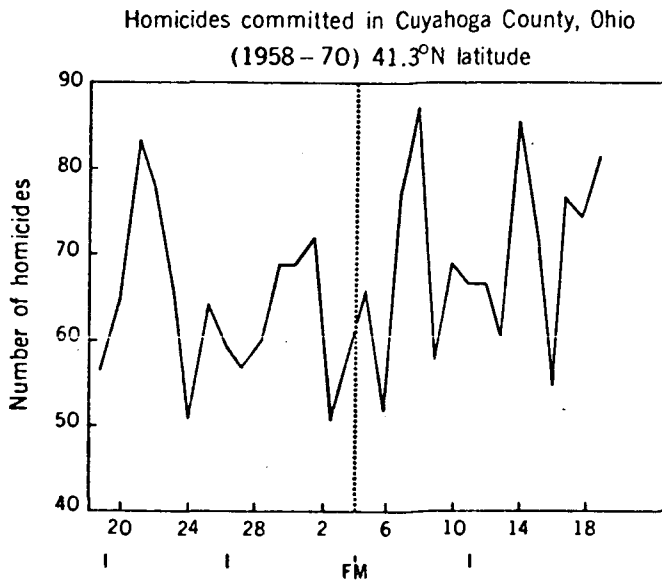
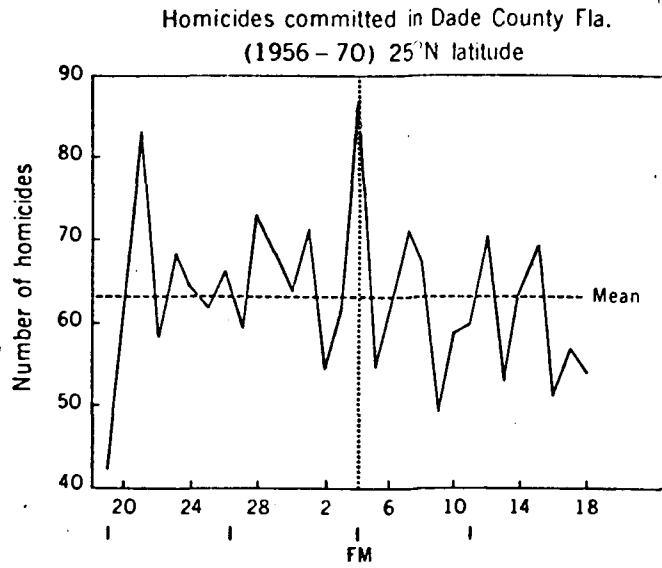
The present study is similar to that done by Lieber and Sherin (1972) in that both find a peak period of disturbance around full moon. It does not confirm Lieber and Sherin's (1972) or Brown and Young's (1967) findings of peak periods both at new and full moon in homicide and hamster activity respectively. Rather than being suggestive of lunar gravitational force rhythm then, findings here, which appear to be the result of a cumulative effect over synodic cycles, suggest a 28-30 day rhythm similar to that of the phase labile menstrual cycle. This suggestion must be tempered however, by the fact that unusual occurrences do not increase around full moon in every synodic cycle. Once again, the effect does not appear reliable. In addition to this evidence for rejection of a gravitational force effect, there is further evidence for rejection found in table 9 where, although significance is reached due to increased telephone calls at the crisis centre on full moon day, calls on new moon day are less than expected.

The suggestion of Lieber and Sherin (1972) that latitude may play an important role in the shift in peaks which occur in different locations seems unlikely. A comparison of the curves of homicide in their studies and of unusual occurrences here indicates that the full moon peak does not continue to shift to the right as latitude increases (Fig. 3.). Cuyahoga County, Ohio and Vancouver, B.C. are closer to each other with respect to geographic latitude than they are to Dade County, Fla., and yet peaks of activity are further apart.

Findings of tests of the gravitational pull hypothesis do not indicate support. Testing apogee-perigee in the anomalistic

Fig 3:

COMPARISON OF CURVES OF HOMICIDE IN TWO LOCATIONS WITH CURVE OF UNUSUAL OCCURRENCES IN A THIRD



cycle, indicates that as gravitational force diminishes, disturbance increases significantly. Testing periods of maximum and minimum gravitational force in the synodic cycle reveals no difference. On the basis of this evidence, it seems unlikely that there is any relationship between gravitational force and emotional disturbance.

In conclusion, research undertaken here indicates that a full moon effect may be found either on the first day of full moon or before full moon but that such effects appear unreliable because they do not replicate. If, as appears to be the case here, increased disturbance can be demonstrated occasionally at or near full moon but cannot be related to gravitational force, and further does not appear to be consistently present within lunar cycles, a search for the correlates of a full moon effect must be sought elsewhere, perhaps in human expectations.

### Purpose

The purpose of this study is to investigate whether psychiatric nurses' expectations of a lunar influence on mental illness are correlated with ratings of patient behavior during moon phases.

### Method

Subjects Ss were 122 nurses<sup>3</sup> working in acute care areas of a large mental hospital in British Columbia.

Procedure A questionnaire (Appendix I) was administered to Ss. As in study I the first set of questions dealt with beliefs about the precipitating factors in mental illness. Once again, different precipitating factors were rated on a five point scale ranging from 1) 'not at all' to 5) 'a lot'. The second set of questions dealt generally with rhythmicity in mental illness. This was an attempt to disguise interest in beliefs concerning a lunar influence.

Since I was becoming known at the hospital as one whose interest was in a lunar effect, a nurse not previously connected with the research was brought in to administer the questionnaire to Ss.

On the basis of responses to the question "to what extent do moon phases affect mental illness?" Ss were divided into 5 groups depending on their strength of belief in a lunar effect (table 14).

Reports of 'unusual occurrences' at the hospital for the period May 6, 1972 to April 26, 1973 were reviewed. In this period there are 12 each of the four moon phases. The day a phase began was designated as the day closest to that

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3. Registered Nurses and Registered Psychiatric Nurses.

listed in the Canadian Almanac and Directory<sup>4</sup> (Appendix J). Reports of unusual occurrences by subjects in each of the groups identified for each of the four moon phases were recorded. These reports were all recorded prior to the administration of the questionnaire to nurses.

Chi square tests of significance were calculated using data from those subjects who reported unusual occurrences during the study period.

### Results

Of the 122 nurses given questionnaires, 115 completed all or most of the questions. Of those who answered questions, 23 would not sign their name. In addition, 11 employees term of employment did not extend the full period of study. Discounting these, 81 Ss were identified for the study (table 14). A frequency count of responses to the question "which phase of the moon has the most effect on mental illness" indicates all but one of those who believe in a lunar effect feel the full moon in the important phase.

Table 14: Extent of nurses' belief in the effect of the moon on mental illness

Item response	Frequency	No signature	Employed full period
a lot	7	2	5
quite a bit	10	0	10
some	19	4	15
a very little	39	11	18
not at all	39	6	33
did not answer	8		
<b>Total</b>	<b>122</b>	<b>23</b>	<b>81</b>

4. Listing by days hours and minutes.

A review of 'unusual occurrence' reports for the period of study indicates the following types of behavior are reported:

- 1) aggressive acts against self or others
- 2) property damage
- 3) accidents, falls etc.
- 4) physical illness, seizures, severe back pain etc.
- 5) suicide
- 6) fires, unexplained and deliberately set
- 7) escape
- 8) sexual intercourse between patients

Using reports of the above kinds of behavior by Ss 156 incidents were recorded for the study period (Appendix K). 26 Ss did not report an occurrence. These consisted of 9 Ss who rated their belief 3) or more; 5 who rated belief as 'a very little' and 12 who did not believe in the lunar influence (Appendix L). Only one explosive ward situation involving three patients was recorded, the remainder were isolated incidents (table 15).

Table 15: Unusual occurrences reported by Ss for the four moon phases (acute area)

Ss	Strength of belief	New moon	1st Q	FM	LQ	
5	5	1	2	0	2	
10	4	2	7	4	3	
15	3	8	2	3	11	
18	2	11	14	13	10	
33	1	10	11	24	18	
Total		32	36	44	44	= 156

Table 16 reports chi square test of significance to determine if a relationship exists between nurses' degree of belief in a lunar influence and reports of unusual occurrences at moon phases. As noted, Ss who strongly (5) or quite strongly (4) believe were combined into a single category so expected cell frequencies would not fall below that desired for appropriate use of the chi square test. Marginals were used to calculate expectations of distributions across the quarters except for the totals where a priori expectations of equal distributions across the quarters was used. As seen, significance is reached for Ss who hold the belief moderately ( $p < .05$ ) but not for any other group. This finding holds when the more conservative test of significance, Yates correction for continuity, is applied to the data.

Table 16: Solution of chi square in a contingency table for data relating degree of belief in a lunar influence to reports of unusual occurrences during moon phases

Degree of belief		NM	Moon Phases			Total	Corrected for continuity
			1st Q	FM	LQ		
4.5	observed	3	9	4	5	21	
	expected	4.3	4.8	5.9			
	$\chi^2$	.39	3.6	.61	.14	4.75	3.36
3	observed	8	2	3	11	24	
	expected	4.9	5.5	6.7	6.7		
	$\chi^2$	1.97	2.3	2.1	2.7	9*	6.68*
2	observed	11	14	13	10	48	
	expected	9.8	11.1	13.5	13.5		
	$\chi^2$	.14	.78	.02	.91	1.86	1.23
1	observed	10	11	24	18	.63	
	expected	12.9	14.5	17.7	17.7		
	$\chi^2$	.65	.85	2.2	.004	3.7	2.97
Total	observed	32	36	44	44	156	
	expected	39	39	39	39		
	$\chi^2$	1.25	.23	.64	.64	2.77	2.28

\*  $p < .05$

### Discussion

The incidence of reports of 'unusual occurrences' during full moon phase did not appear to be related to nurses' beliefs or expectations about a lunar effect. When unusual occurrences are used as a quantifiable measure of mental disturbance, non-believers do not report fewer incidents at full moon than those who believe. Nurses expectations about the lunar influence therefore, are not operating to fulfill a prophesy and do not appear to affect behavior ratings in the expected direction.

The findings that beliefs about a full moon effect and reports of unusual occurrences are not related is interesting. If this finding replicates, it indicates that expectations theory as it is generally understood and accepted--and commonly thought to apply in a lunar context, is false. Ss do not act directly in accordance with their expectations. Though belief in a lunar influence is confirmed, expectancy effects arising from this belief are not present.



Purpose

The purpose of this study was to attempt to replicate the findings of study III.

Method

Subjects Ss were 71 nurses working in long term patient areas of the same large mental hospital used in study III.

Procedure The same questionnaire used in study III (Appendix I) was administered to Ss. Except for the area in which the study was carried out, all aspects of the design and analysis were identical to study III.

Results

All but one of the 71 Ss answered the question about belief in a lunar influence. Only one did not sign her name. Ten Ss' term of employment did not span the full period of study. This left a total of 59 Ss for the study. All of the believers felt the full moon was the phase of importance for mental disturbance (table 17). 129 'unusual occurrences' were reported by Ss for the study period (Appendix M). 17 Ss did not report an occurrence. These consisted of 5 Ss who rated belief 3) or above; 7 who held the belief 'a very little' and 5 who did not believe (Appendix N).

Table 17: Unusual occurrences reported by Ss for the four moon phases (long-term area)

Ss	Strength of belief	Moon phases				
		NM	1st Q	FM	LQ	
4	5	4	1	4	1	
6	4	3	4	5	2	
17	3	14	7	11	14	
16	2	2	7	9	3	
16	1	10	13	7	8	
Total		33	32	36	28	= 129

Table 18 reports chi square tests of significance to determine if a relationship exists between nurses' degree of belief in a lunar influence and reports of 'unusual occurrences' at moon phases. Once again as in study III Ss who strongly (5) or quite strongly (4) believe in a lunar effect were combined into a single category so expected cell frequencies would not fall below a desired level for appropriate use of the  $X^2$  test. The only effect worth noting was for the non-believers ( $p < .1$ ). When Yates correction for continuity is applied to the data, no effects are significant. What significance is reached is due to observed frequencies in the first quarter moon phase exceeding that expected. In terms of the hypothesis being tested here regarding the full moon, there are no significant effects.

Table 18: Solution of chi square in a contingency table for data relating degree of belief in a lunar influence to reports of unusual occurrences during moon phases

Degree of belief		Moon phases				Total	Corrected for continuity
		New	1st Q	FM	LQ		
4.5	observed	7	5	9	3	24	
	expected	6.14	5.95	6.7	5.2		
	$X^2$	.12	.15	.8	.94	2	1.2
3	observed	14	7	11	14	46	
	expected	11.8	11.4	12.8	10		
	$X^2$	.43	1.7	.26	1.6	4.01	2.91
2	observed	2	7	9	3	21	
	expected	5.35	5.2	5.8	4.5		
	$X^2$	2.1	.64	1.7	.52	4.97	3.31
1	observed	10	13	7	8	28	
	expected	7.16	6.9	7.8	6.1		
	$X^2$	1.13	5.28	.08	.61	7.1*	5.63
Total	observed	33	32	36	28	129	
	expected	32.3	32.3	32.3	32.3		
	$X^2$	.02	.001	.44	.56	1.02	

\*  $p < .1$

(marginals used to calculate distributions across quarters except for totals where a priori expectations of equal distributions across quarters was used.)

Discussion

In this study nurses' expectations about a lunar influence appear not to be operating at all to influence judgements of behavior. This is additional support for the notion that the expectations hypothesis as it is generally thought to apply to a lunar influence is false.

## GENERAL DISCUSSION

A belief in the power of the moon on human behavior has existed for centuries. In the studies reported here, a contemporary belief in the power of the full moon on birth and emotional disturbance was confirmed three times. A finding of increased mental disturbance at full moon however, could be found only once when measurable parameters were looked at several times either by the first day of each moon phase or when days in moon phases were collapsed over phases-- this effect did not replicate.

When data from one psychiatric area were plotted over lunar cycles by days for a period of 12 synodic cycles, a peak period of activity was found 24-48 hours before full moon. The reliability of this effect however, must also be questioned for it appears to be related to a cumulative effect over cycles rather than to the individual lunar synodic cycle-- it does not replicate over cycles.

An explanation of why studies on moon phase and mental disturbance have been equivocal to date might be that different methods of data collection and analysis have led to different interpretations of the lunar effect. Without reliability measures or replication, an effect may be found once, and claimed. As seen here, when data are examined in a variety of ways and not analysed for reliability, equivocation could arise. Here, because of attempts to assess reliability, it is quite clear that a full moon effect did not replicate and therefore no claim to having found a full moon effect can be made. While findings of increased mental disturbance around full moon might lead one to speculate that belief in a full moon effect is a result of an observation of

these events in this setting, any generalization to other settings cannot be supported because of the unreliability of the effect found.

One of the most interesting outcomes of this study was found in the factor analysis of obstetric and psychiatric nurses beliefs' about the precipitating factors in birth and mental illness. Stability in the underlying dimensions (biogenic, sociogenic and cosmic) of nurses beliefs' was found to exist across these two (psychiatric and obstetric) disparate patient care settings. In both groups of nurses, the biogenic factor accounts for the least variance, suggesting that there is greater consensus as to the effects of the biogenic factor. Variables loading highest on the biogenic factor are thought by nurses to be the most important influences on birth and mental illness. The cosmic factor, which includes the variable "influence of the moon" accounts for the most variance in psychiatric but not in obstetric nurses beliefs'.

Support for the notion that nurses beliefs' regarding the "causes" of illness are stable across settings is found in the work of Steinhauer (1969) who analysed nurses' concepts of the treatment of mental illness. It would appear that striking similarities exist in the underlying dimensions of nurses' beliefs about the precipitating factors in illness regardless of the type of training-- Registered nurse or Registered Psychiatric nurse-- or the area of work. Training programs, which traditionally are based on a medical model, may be a reason for this.

In the introduction, two hypotheses of a lunar influence were proposed as possible explanations for belief in a lunar effect. It would seem, on the basis of evidence presented here, both have to be rejected. There is no support for the

notion that as lunar gravitational force increases so does mental disturbance. At apogee, as opposed to perigee, emotional disturbance is significantly greater--the opposite of that hypothesized. This effect cannot be confirmed however, when periods of maximum and minimum gravitational force in the lunar synodic cycle are compared. The conclusion must be that gravitational force and emotional disturbance are not directly related.

The expectations theory, as evidence here indicates, has also to be rejected. Perceptions of patient behavior reflected in nurses' reports of 'unusual occurrences' do not correspond to their expectations. This finding replicated. It would appear then that judgements of patient behavior are not influenced by nurses' beliefs about a lunar influence. In the natural then, as opposed to the artificial laboratory setting, where most expectancy effects are found, no effects were delineated. This may be because the lunar expectancy effect is so small that it is being concealed by a multiplicity of variables operating in the natural setting to affect ratings of behavior. More and better controlled retrospective studies might clarify this issue.

Just what a peak period of emotional disturbance around full moon found by Lieber and Sherin (1972) Osborne (1968) and by Brown and Young (1967) as well as here, is related to is not clear from this research. It is evident however, that the peaks of activity found in homicide and hamster activity by Lieber and Sherin (1972) and by Brown and Young (1967) respectively are substantially different from the peaks found here. These differences cannot be easily explained. In addition, analysis here reveals that such an effect as is found before the full moon is not a function of all synodic cycles. If it is not, the conclusion must be that the effect is not related to the lunar cycle but to some other phenomenon not at present identifiable.

## GLOSSARY

1. Apogee-- point in the orbit of a satellite of the earth at the greatest distance from the centre of the earth.
2. Geophysical-- relating to or based on the geophysics of the earth-- meteorology, hydrology, oceanography, seismology, volcanology, magnetism, radioactivity, and geodesy.
3. Lunar day-- period from nadir (directly below observer) through zenith (directly above observer) to nadir.
4. Lunar month-- period from new moon to the next.
5. Lunar synodic cycle-- 29.53 days. For example, as above.
6. Perigee-- point in the orbit of a satellite of the earth that is nearest to the earth.
7. Period of Maximum lunar gravitational pull-- time of coincidence of new and/or full moon with lunar perigee.
8. Synodic period-- period between two successive conjunctions of celestial bodies. Same as lunar synodic cycle and lunar month.
9. Meteorology-- study of motions and phenomena of atmosphere.
10. Cosmic-- related to the universe, as distinct from the earth.
11. Astronomy-- the science of the celestial bodies and of their magnitudes, motions, and constitution.
12. Anomalistic cycle-- period from apogee to perigee. Approximately a 27 day cycle.

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## Questionnaire for Obstetric Nurses

1. To what extent do the following factors affect delivery?

a. pressure on the presenting part

a lot	quite a bit	some	a very little	not at all
-------	----------------	------	------------------	---------------

b. menstruation

a lot	quite a bit	some	a very little	not at all
-------	----------------	------	------------------	---------------

c. hormonal action

a lot	quite a bit	some	a very little	not at all
-------	----------------	------	------------------	---------------

d. taking a laxative

a lot	quite a bit	some	a very little	not at all
-------	----------------	------	------------------	---------------

e. emotional shocks

a lot	quite a bit	some	a very little	not at all
-------	----------------	------	------------------	---------------

f. injuries--falls or car accidents

a lot	quite a bit	some	a very little	not at all
-------	----------------	------	------------------	---------------

g. minor illness

a lot	quite a bit	some	a very little	not at all
-------	----------------	------	------------------	---------------

h. atmospheric changes--thunderstorms,  
changes in the electric charge of the  
air

a lot	quite a bit	some	a very little	not at all
-------	----------------	------	------------------	---------------

i. moon phases

a lot	quite a bit	some	a very little	not at all
-------	----------------	------	------------------	---------------

2. Is there a seasonal variation in births?

Yes \_\_\_\_\_ No \_\_\_\_\_

3. If so, which season has the greatest incidence of births?

Spring \_\_\_\_\_ Summer \_\_\_\_\_ Fall \_\_\_\_\_ Winter \_\_\_\_\_

## Questionnaire for Obstetric Nurses

1. To what extent do the following factors affect delivery?

a. pressure on the presenting part

a lot	quite a bit	some	a very little	not at all
-------	----------------	------	------------------	---------------

b. menstruation

a lot	quite a bit	some	a very little	not at all
-------	----------------	------	------------------	---------------

c. hormonal action

a lot	quite a bit	some	a very little	not at all
-------	----------------	------	------------------	---------------

d. taking a laxative

a lot	quite a bit	some	a very little	not at all
-------	----------------	------	------------------	---------------

e. emotional shocks

a lot	quite a bit	some	a very little	not at all
-------	----------------	------	------------------	---------------

f. injuries--falls or car accidents

a lot	quite a bit	some	a very little	not at all
-------	----------------	------	------------------	---------------

g. minor illness

a lot	quite a bit	some	a very little	not at all
-------	----------------	------	------------------	---------------

h. atmospheric changes--thunderstorms,  
changes in the electric charge of the  
air

a lot	quite a bit	some	a very little	not at all
-------	----------------	------	------------------	---------------

i. moon phases

a lot	quite a bit	some	a very little	not at all
-------	----------------	------	------------------	---------------

2. Is there a seasonal variation in births?

Yes \_\_\_\_\_ No \_\_\_\_\_

3. If so, which season has the greatest incidence of births?

Spring \_\_\_\_\_ Summer \_\_\_\_\_ Fall \_\_\_\_\_ Winter \_\_\_\_\_

4. Is there a daily fluctuation in births?

49

Yes \_\_\_\_\_ No \_\_\_\_\_

5. If yes, at what period of the day do most deliveries occur?

Morning \_\_\_\_\_ Afternoon \_\_\_\_\_ Evening \_\_\_\_\_

6. If you feel the moon affects the birth rate, to what extent are the following kinds of obstetrical events affected?

a. normal deliveries

\_\_\_\_\_ | \_\_\_\_\_ | \_\_\_\_\_ | \_\_\_\_\_ | \_\_\_\_\_ |  
a lot    quite    some    a very    not at  
         a bit                    little    all

b. premature deliveries

\_\_\_\_\_ | \_\_\_\_\_ | \_\_\_\_\_ | \_\_\_\_\_ | \_\_\_\_\_ |

c. breech deliveries

\_\_\_\_\_ | \_\_\_\_\_ | \_\_\_\_\_ | \_\_\_\_\_ | \_\_\_\_\_ |

d. any other-please specify \_\_\_\_\_

7. What phase is the moon presently in? \_\_\_\_\_

8. Staff Member:

R.N. \_\_\_\_\_

Practical Nurse \_\_\_\_\_

Aide \_\_\_\_\_

9. If you feel the moon has an effect on childbirth, does it depend on whether the moon is visible?

Yes \_\_\_\_\_ No \_\_\_\_\_

## Questionnaire for Psychiatric Nurses

1. To what extent do the following affect mental illness?

a. heredity

\_\_\_\_\_

a lot	quite	some	a very	not at
	a bit		little	all

b. physical agent-injury, drugs  
etc.

\_\_\_\_\_

a lot	quite	some	a very	not at
	a bit		little	all

c. situational

\_\_\_\_\_

a lot	quite	some	a very	not at
	a bit		little	all

d. other person

\_\_\_\_\_

a lot	quite	some	a very	not at
	a bit		little	all

e. self

\_\_\_\_\_

a lot	quite	some	a very	not at
	a bit		little	all

f. atmospheric changes-  
thunderstorms, changes in the  
electric charge of the air

\_\_\_\_\_

a lot	quite	some	a very	not at
	a bit		little	all

g. supernatural-religious,  
magic

\_\_\_\_\_

a lot	quite	some	a very	not at
	a bit		little	all

h. moon phases

\_\_\_\_\_

a lot	quite	some	a very	not at
	a bit		little	all

2. Is there a seasonal variation in mental illness?

Yes \_\_\_\_\_ No \_\_\_\_\_

3. If so, which season has the greatest incidence of mental illness?

Spring \_\_\_\_\_ Summer \_\_\_\_\_ Fall \_\_\_\_\_ Winter \_\_\_\_\_

4. Is there a daily fluctuation in patients behavior?

Yes \_\_\_\_\_ No \_\_\_\_\_

5. At what period of the day are patients most disturbed?

morning\_\_\_\_ afternoon\_\_\_\_ evening\_\_\_\_

6. If you feel the moon affects mental illness which phase of the moon has the most effect?

New\_\_\_\_ 1st Quarter\_\_\_\_ full\_\_\_\_ last quarter\_\_\_\_

7. To what extent are the following conditions affected by the moon?

a. organic brain syndromes

a lot	quite	some	a very	not	at
	a bit		little		all

b. psychoses

a lot	quite	some	a very	not	at
	a bit		little		all

c. neuroses

a lot	quite	some	a very	not	at
	a bit		little		all

d. personality disorders

a lot	quite	some	a very	not	at
	a bit		little		all

e. mental retardation

a lot	quite	some	a very	not	at
	a bit		little		all

f. psychophysiological disorders-  
skin, G.I. cardio-vascular, etc.

a lot	quite	some	a very	not	at
	a bit		little		all

g. any other- please specify

a lot	quite	some	a very	not	at
	a bit		little		all

8. What phase is the moon presently in? \_\_\_\_\_

9. Staff member:

RN\_\_\_\_  
Psychiatric Nurse\_\_\_\_  
Place of work\_\_\_\_\_

10. If you feel the moon has an effect on mental illness, does it depend on whether the moon is visible?

Yes\_\_\_\_ No\_\_\_\_

Births by first day of each moon phase in three urban hospitals, December 1969-November, 1971.

<u>Dec. 1969</u>		<u>Number of births at Hospital</u>		
<u>Moon phase</u>	<u>Date</u>	<u>A</u>	<u>B</u>	<u>C</u>
LQ	1	2	3	2
NM	9	5	2	2
1st Q	15	6	3	3
FM	23	6	1	4
LQ	31	4	3	5
<u>Jan. 1970</u>				
NM	7	5	5	4
1st Q	14	4	1	1
FM	22	6	4	2
LQ	30	6	1	5
<u>Feb. 1970</u>				
NM	6	4	2	1
1st Q	12	7	5	4
FM	21	4	2	4
LQ	28	6	4	0
<u>March, 1970</u>				
NM	7	6	2	5
1st Q	14	2	3	3
FM	22	7	5	2
LQ	30	2	1	6
<u>April, 1970</u>				
NM	5	8	7	3
1st Q	13	5	4	2
FM	21	3	1	2
LQ	28	5	0	1
<u>May, 1970</u>				
NM	5	5	1	1
1st Q	13	7	4	2
FM	20	6	2	2
LQ	27	3	1	2



## Number of births at Hospital

53

	<u>Date</u>	<u>A</u>	<u>B</u>	<u>C</u>
<u>June, 1970</u>				
NM	3	6	5	2
1st Q	11	4	4	4
FM	19	5	2	5
LQ	25	6	2	5
<u>July, 1970</u>				
NM	3	4	2	1
1st Q	11	1	2	0
FM	18	5	5	0
LQ	25	9	5	5
<u>August, 1970</u>				
NM	2	4	3	3
1st Q	10	3	2	3
FM	16	5	0	5
LQ	23	4	1	3
NM	31	6	2	4
<u>Sept. 1970</u>				
1st Q	8	9	1	1
FM	15	4	0	4
LQ	22	2	7	1
NM	30	7	3	1
<u>October, 1970</u>				
1st Q	7	4	0	4
FM	14	6	2	1
LQ	21	8	6	1
NM	30	4	2	2
<u>Nov. 1970</u>				
1st Q	6	8	1	2
FM	13	3	4	5
LQ	20	4	3	4
NM	28	6	4	4
<u>Dec. 1970</u>				
1st Q	5	3	5	4
FM	12	8	2	1
LQ	20	9	2	2
NM	28	4	1	6

	<u>Date</u>	<u>Number of births at Hospital</u>		
		<u>A</u>	<u>B</u>	<u>C</u>
<u>January, 1971</u>				
1st Q	3	3	2	1
FM	11	3	3	2
LQ	19	3	2	5
NM	26	8	2	1
<u>February, 1971</u>				
1st Q	2	5	4	3
FM	10	7	5	5
LQ	18	8	2	1
NM	25	2	1	0
<u>March, 1971</u>				
1st Q	3	4	1	3
FM	11	8	2	2
LQ	19	2	1	2
NM	26	6	4	4
<u>April, 1971</u>				
1st Q	2	1	4	5
FM	10	4	2	5
LQ	18	4	1	3
NM	24	2	1	2
<u>May, 1971</u>				
1st Q	2	4	0	5
FM	10	5	1	1
LQ	17	2	6	5
NM	24	6	2	3
1st Q	31	6	1	0
<u>June, 1971</u>				
FM	8	6	0	2
LQ	15	6	2	3
NM	22	7	4	4
1st Q	30	5	1	2
<u>July, 1971</u>				
FM	8	7	1	6
LQ	15	4	2	4
NM	22	6	0	5
1st Q	30	6	3	4

Number of births at Hospital

	<u>Date</u>	<u>A</u>	<u>B</u>	<u>C</u>
<u>August, 1971</u>				
FM	6	4	4	1
LQ	13	6	1	1
NM	20	4	1	2
1st Q	28	7	2	5
<u>Sept. 1971</u>				
FM	4	3	1	3
LQ	11	2	2	6
NM	19	3	1	3
1st Q	27	5	2	4
<u>October, 1971</u>				
FM	4	3	1	6
LQ	11	7	1	6
NM	19	1	0	4
1st Q	27	7	1	5
<u>November, 1971</u>				
FM	2	5	1	3

= 24 synodic cycles

Crisis Centre calls by first day of each moon phase  
December 1969-December, 1971

<u>Moon Phase</u>	<u>Date</u>	<u>No. calls</u>	<u>Moon phase</u>	<u>Date</u>	<u>No. calls</u>
<u>Dec. 1969</u>			<u>Jan. 1971</u>		
LQ	1	22	1st Q	3	43
NM	9	35	FM	11	35
1st Q	15	25	LQ	19	64
FM	23	22	NM	26	45
LQ	31	16	<u>Feb. 1971</u>		
<u>Jan. 1970</u>			1st Q	2	47
NM	7	31	FM	10	55
1st Q	14	30	LQ	18	52
FM	22	24	NM	25	50
LQ	30	37	<u>March 1971</u>		
<u>Feb. 1970</u>			1st Q	3	46
NM	6	23	FM	11	58
1st Q	12	26	LQ	19	59
FM	21	30	NM	26	59
LQ	28	33	<u>April, 1971</u>		
<u>March, 1970</u>			1st Q	2	51
NM	7	34	FM	10	58
1st Q	14	20	LQ	18	58
FM	22	29	NM	24	63
LQ	30	32	<u>May, 1971</u>		
<u>April, 1970</u>			1st Q	2	54
NM	5	19	FM	10	59
1st Q	13	34	LQ	17	39
FM	21	23	NM	24	34
LQ	28	32	1st Q	31	61
<u>May, 1970</u>			<u>June, 1971</u>		
NM	5	21	FM	8	56
1st Q	13	28	LQ	15	63
FM	20	27	NM	22	47
LQ	27	28	1st Q	30	53
<u>June, 1970</u>			<u>July, 1971</u>		
NM	3	24	FM	8	66
1st Q	11	26	LQ	15	28
FM	19	39	NM	22	57
LQ	25	30	1st Q	30	70

<u>Moon phase</u>	<u>Date</u>	<u>No. calls</u>	<u>Moon phase</u>	<u>Date</u>	<u>No. calls</u>
<u>July, 1970</u>			<u>August, 1971</u>		
NM	3	41	FM	6	42
1st Q	11	41	LQ	13	45
FM	18	61	NM	20	58
LQ	25	40	1st Q	28	61
<u>August, 1970</u>			<u>September, 1971</u>		
NM	2	31	FM	4	72
1st Q	10	34	LQ	11	67
FM	16	16	NM	19	68
LQ	23	24	1st Q	27	66
NM	31	33	<u>October, 1971</u>		
<u>September, 1970</u>			FM	4	62
1st Q	8	51	LQ	11	50
FM	15	45	NM	19	50
LQ	22	50	1st Q	27	70
NM	30	40	<u>November, 1971</u>		
<u>October, 1970</u>			FM	2	69
1st Q	7	50	LQ	9	76
FM	14	46	NM	17	58
LQ	21	52	1st Q	25	65
NM	30	48	<u>December, 1971</u>		
<u>November, 1970</u>			FM	2	68
1st Q	6	37	LQ	9	49
FM	13	38	NM	17	78
LQ	20	51	1st Q	24	46
NM	28	41	FM	31	67
<u>December, 1970</u>					
1st Q	5	38			
FM	12	45			
LQ	20	51			
NM	28	41			

= 26 synodic cycles

## APPENDIX E

Unusual occurrences reported by moon phase periods  
 May 6, 1972-April 26, 1973

1972

<u>Phase</u>	<u>Date</u>	<u>No.occurrences</u>
<u>May</u>		
LQ	6	23
NM	13	19
1st Q	20	23
FM	28	25

<u>June</u>		
LQ	5	14
NM	11	29
1st Q	18	22
FM	27	21

<u>July</u>		
LQ	4	38
NM	11	20
1st Q	18	31
FM	26	23

<u>August</u>		
LQ	2	22
NM	9	23
1st Q	17	15
FM	25	9
LQ	31	18

<u>September</u>		
NM	7	26
1st Q	16	29
FM	23	25
LQ	30	27

<u>October</u>		
NM	7	26
1st Q	15	34
FM	22	26
LQ	29	31

<u>Phase</u>	<u>Date</u>	<u>No.occurrences</u>
<u>November</u>		
NM	5	26
1st Q	14	18
FM	21	32
LQ	28	35

<u>December</u>		
NM	6	19
1st Q	14	18
FM	21	16
LQ	27	28

1973

<u>January</u>		
NM	4	24
1st Q	12	17
FM	19	25
LQ	26	17

<u>February</u>		
NM	3	26
1st Q	10	25
FM	17	40
LQ	25	24

<u>March</u>		
NM	5	21
1st Q	12	26
FM	19	19
LQ	27	25

<u>April</u>		
NM	3	31
1st Q	10	21
FM	17-26	19

Unusual occurrences reported at perigee and apogee  
for the 12 synodic cycles between May 6, 1972-  
April 26, 1973

Month	Date	Perigee	Apogee
May	12	2	3
	25		
June	9	4	2
	22		
July	7	2	4
	19		
August	3	0	1
	16		
	28		
September	13	0	4
	25		
October	10	2	5
	23		
November	7	3	5
	20		
December	4	2	8
	19		
	31		
January	16	1	2
	28		
February	13	4	2
	25		
March	10	1	2
	25		
April	5	1	2
	21		
<b>Total</b>		<b>24</b>	<b>46</b>

\* Dates of apogee and perigee from Observers Handbook of Royal Astronomical Society of Canada, 1972 and 1973.

## APPENDIX G

Unusual occurrences reported on the first day of  
four moon phases. May 6, 1972-April 26, 1973

Month	Date	New Moon	Full	first Q	last Q
May	6				2
	13	3			
	20			3	
	28		3		
June	5				2
	11	4			
	18			4	
	27		4		
July	4				6
	11	4			
	18			0	
	26		3		
August	2				7
	9	3			
	17			3	
	25		0		
	31				2
September	7	1			
	16			4	
	23		1		
	30				4
October	7	4			
	15			3	
	22		7		
	29				7
November	5	5			
	14			1	
	21		2		
	28				4



## APPENDIX G (cont'd)

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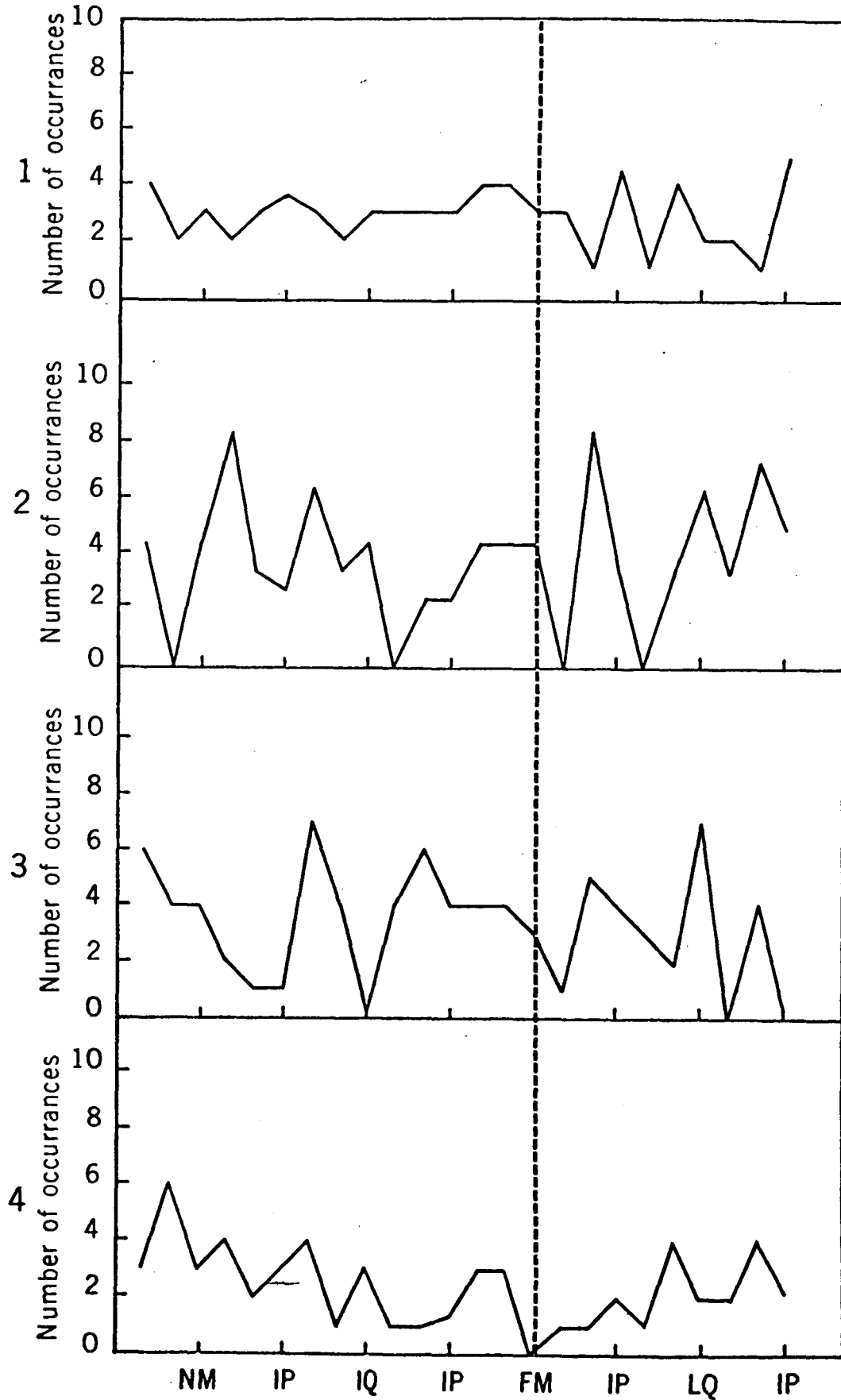
Month	Date	New moon	Full	1st Q	last Q
December	6	3			
	14			0	
	21		4		
	27				2
January	4	2			
	12			3	
	19		2		
	26				1
February	3	2			
	10			2	
	17		5		
	25				1
March	5	3			
	12			1	
	19		4		
	27				6
April	3	5			
	10			4	
	17		4		
<b>Total</b>		<b>39</b>	<b>39</b>	<b>28</b>	<b>44</b>

New moon +full moon= 78

1st Q + last Q = 72

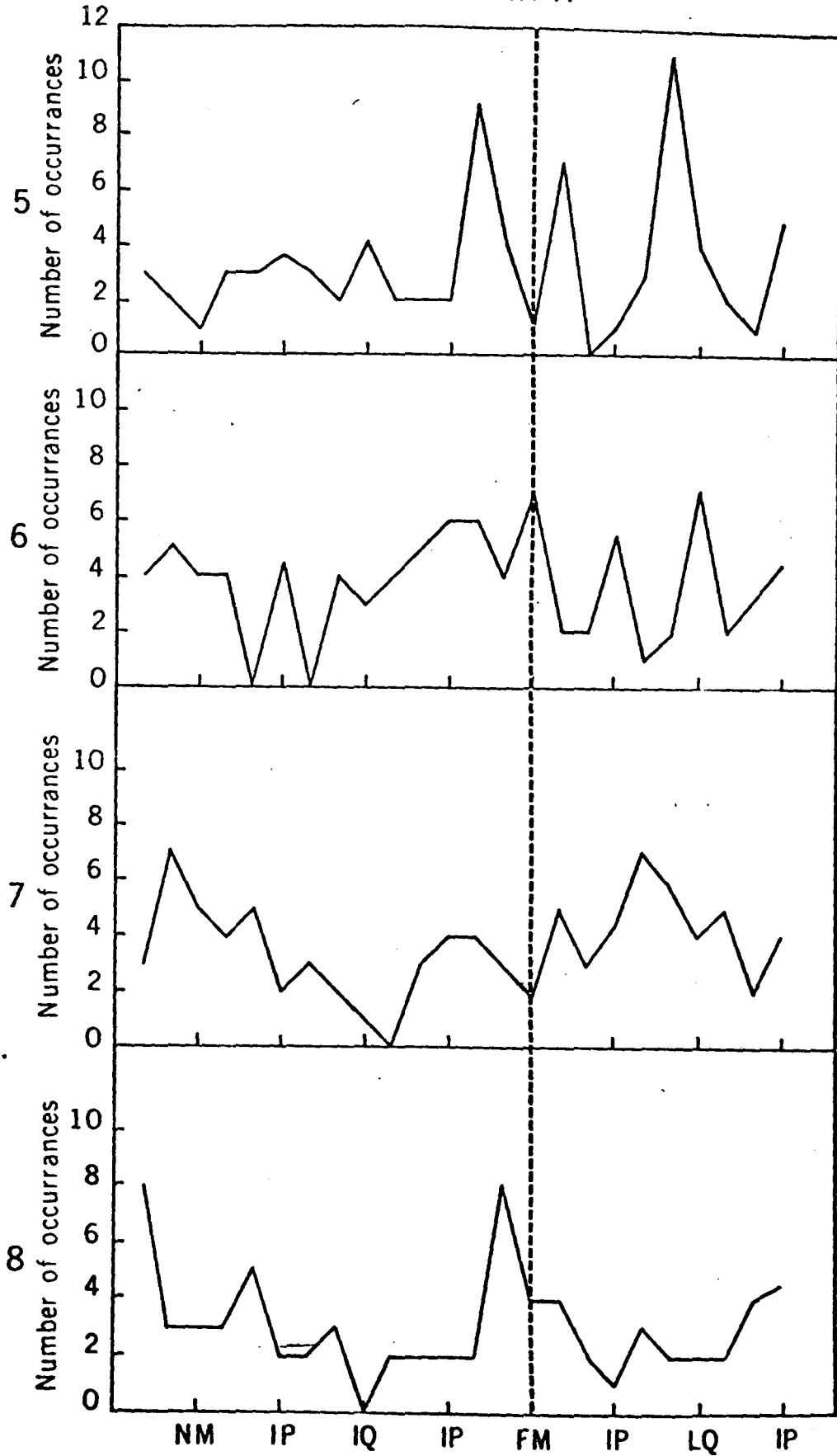
Phase - Interphase intervals  
by individual lunar cycles

APPENDIX H



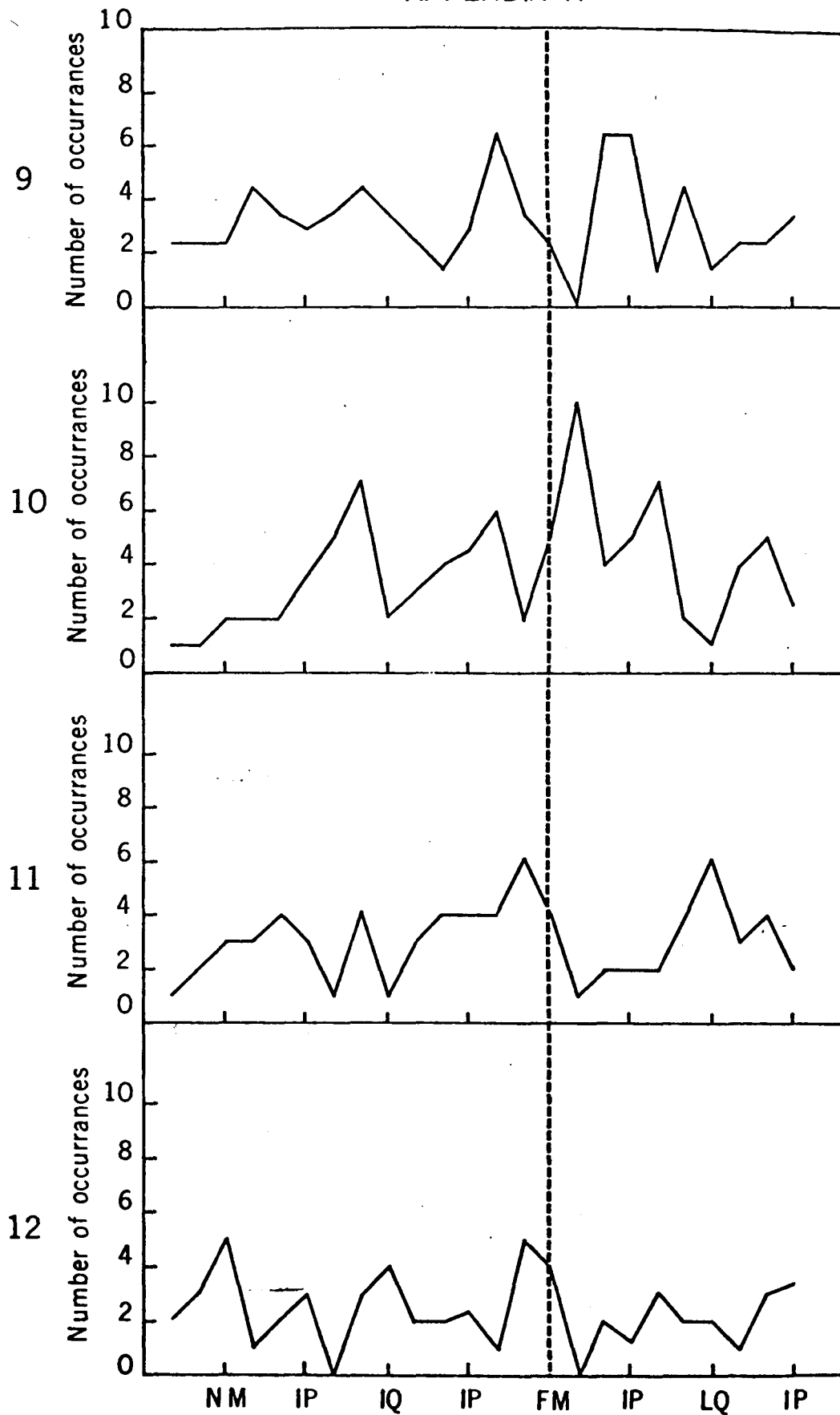
Phase - Interphase intervals  
by individual lunar cycles

APPENDIX H



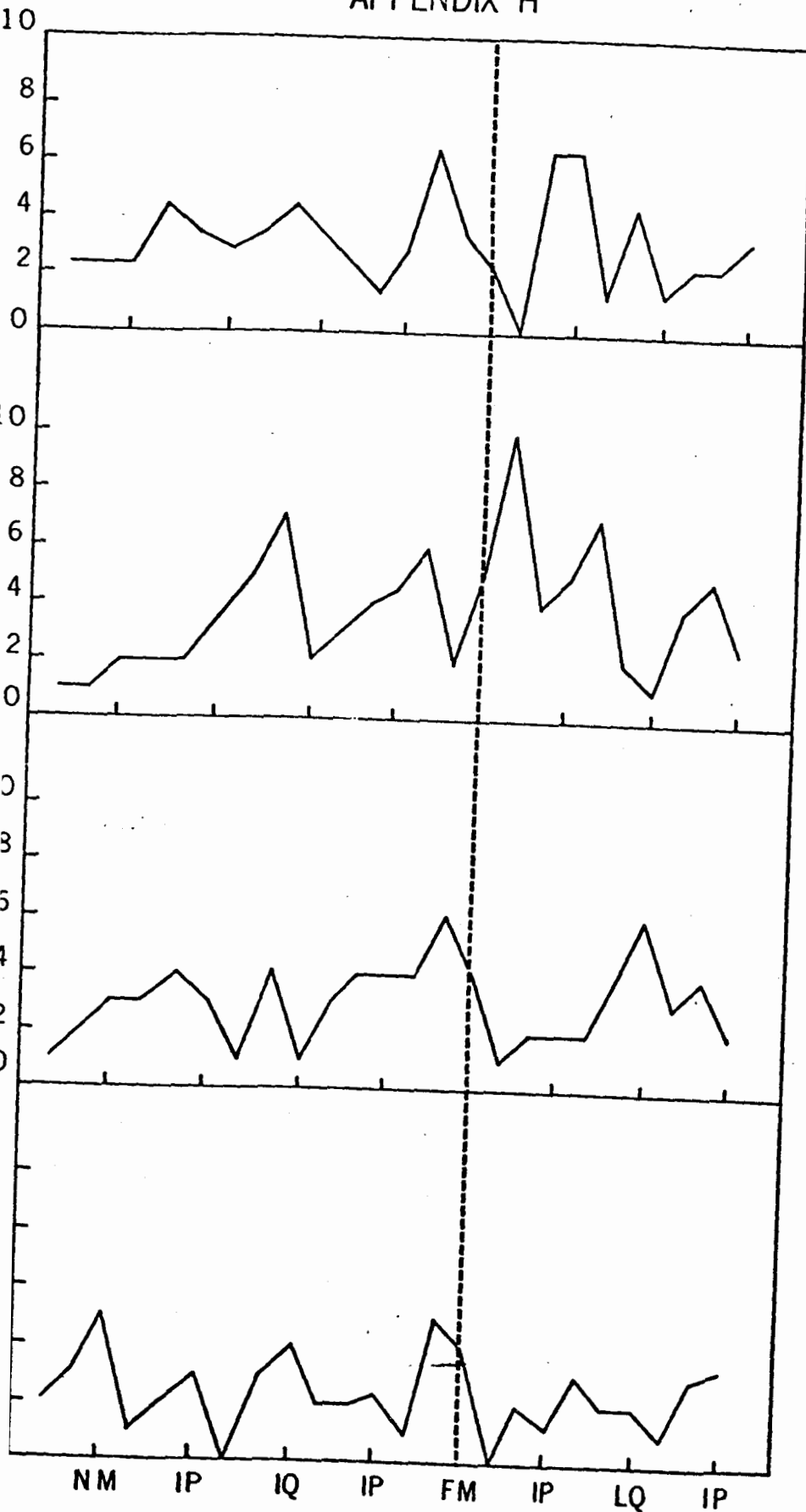
Phase - Interphase intervals  
by individual lunar cycles

APPENDIX H



Phase-Interphase intervals  
by individual lunar cycles

APPENDIX H



the number

$\frac{1}{\text{not at all}}$

$\frac{1}{\text{not at all}}$

$\frac{1}{\text{not at all}}$

$\frac{1}{\text{not at all}}$

$\frac{1}{\text{not at all}}$

$\frac{2}{\text{not at all}}$

$\frac{2}{\text{not at all}}$

$\frac{2}{\text{not at all}}$

h season has

3. If you feel there is a daily fluctuation in patient behaviour, which period of the day are patients most disturbed?

Morning \_\_\_\_\_ Afternoon \_\_\_\_\_ Evening \_\_\_\_\_

4. If you feel the moon affects mental illness which phase of the moon has the most effect?

New \_\_\_\_\_ 1st quarter \_\_\_\_\_ Full \_\_\_\_\_ Last quarter \_\_\_\_\_

5. Do you feel the holding of a religious belief helps or hinders mental health?

Helps \_\_\_\_\_ Hinders \_\_\_\_\_

6. Does mental illness appear to be periodic?

Yes \_\_\_\_\_ No \_\_\_\_\_ Sometimes \_\_\_\_\_

7. If "yes" or "sometimes", which type of illness is subject to periodic bouts?

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

8. Are patients more disturbed when the weather is dull?

Yes \_\_\_\_\_ No \_\_\_\_\_

9. Does a patient's menstrual cycle influence her behaviour?

Yes \_\_\_\_\_ No \_\_\_\_\_

10. If yes, does it make her

More disturbed \_\_\_\_\_ Less disturbed \_\_\_\_\_

## APPENDIX J

67

## Lunar synodic cycles for the year May 1972-May 1973

Month	last Q	New moon	first Q	full moon
1972				
May	6 <sup>07.26</sup>	12 <sup>23.08</sup>	19 <sup>20.16</sup>	27 <sup>23.28</sup>
June	4 <sup>16.22</sup>	11 <sup>06.30</sup>	18 <sup>10.41</sup>	26 <sup>13.46</sup>
July	3 <sup>22.26</sup>	10 <sup>14.23</sup>	18 <sup>02.46</sup>	26 <sup>02.4</sup>
August	2 <sup>03.02</sup>	9 <sup>00.26</sup>	16 <sup>20.09</sup>	24 <sup>13.22</sup>
August	31 <sup>07.48</sup>			
September		7 <sup>12.29</sup>	15 <sup>14.13</sup>	22 <sup>23.07</sup>
September	29 <sup>14.16</sup>			
October		7 <sup>03.08</sup>	15 <sup>07.55</sup>	22 <sup>08.25</sup>
October	28 <sup>23.41</sup>			
November		5 <sup>20.21</sup>	14 <sup>00.01</sup>	20 <sup>18.07</sup>
November	27 <sup>12.45</sup>			
December		5 <sup>15.24</sup>	13 <sup>13.36</sup>	20 <sup>04.45</sup>
December	27 <sup>05.28</sup>			
<u>January 1973</u>				
January		4 <sup>10.42</sup>	12 <sup>00.27</sup>	18 <sup>16.28</sup>
January	26 <sup>1.05</sup>			

\* listings by day, hour and minutes.

## APPENDIX J (cont'd)

68

<u>1973</u>	<u>last Q</u>	<u>new moon</u>	<u>first Q</u>	<u>full moon</u>
February		3 <sup>04.23</sup>	10 <sup>09.05</sup>	17 <sup>05.07</sup>
February	24 <sup>22.10</sup>			
March		4 <sup>19.07</sup>	11 <sup>16.26</sup>	18 <sup>18.33</sup>
March	26 <sup>18.46</sup>			
April		3 <sup>06.45</sup>	9 <sup>23.28</sup>	17 <sup>08.51</sup>
April	25 <sup>12.59</sup>			
May		2 <sup>15.55</sup>	9 <sup>07.07</sup>	16 <sup>23.58</sup>
May	25 <sup>03.40</sup>			



## APPENDIX K

Moon phases by unusual occurrence reports in  
acute wards, May 6, 1972-April 26, 1973

69

<u>Month</u>	<u>Date</u>	<u>No. occurrences</u>	<u>Month</u>	<u>Date</u>	<u>No. occurrences</u>
<u>May</u>			<u>November</u>		
LQ	6	3	NM	5	3
NM	13	4	1st Q	14	2
1st Q	20	7	FM	21	7
FM	28	3	LQ	28	7
<u>June</u>			<u>December</u>		
LQ	5	4	NM	6	4
NM	11	3	1st Q	14	3
1st Q	18	3	FM	20	4
FM	27	3	LQ	27	5
<u>July</u>			<u>January, 1973</u>		
LQ	4	4	NM	4	2
NM	11	1	1st Q	12	2
1st Q	18	2	FM	19	1
FM	26	3	LQ	26	3
<u>August</u>			<u>February</u>		
LQ	2	1	NM	3	2
NM	9	1	1st Q	10	5
1st Q	17	0	FM	17	5
FM	25	3	LQ	25	2
LQ	31	3	<u>March</u>		
<u>September</u>			NM	5	6
NM	7	2	1st Q	12	4
1st Q	16	2	FM	19	2
FM	23	5	LQ	27	5
LQ	30	4	<u>April</u>		
<u>October</u>			NM	3	2
NM	7	3	1st Q	10	1
1st Q	15	4	FM	17-26	4
FM	22	4			
LQ	29	3			

Unusual occurrence reports by Ss degree of belief in a lunar influence and moon phases-- acute area

Strength of belief	Moon phase			
	NM	1st Q	FM	LQ
A aot	1	0	0	0
	0	2	0	0
	0	0	0	0
	0	0	0	1
	0	0	0	1
Quite a bit	1	3	0	1
	0	0	0	0
	0	0	0	0
	0	0	1	0
	0	1	2	2
	0	0	1	0
	0	0	0	0
	0	0	0	0
	0	2	0	0
1	1	0	0	
Some	0	0	0	0
	0	0	0	0
	1	0	0	0
	1	0	0	1
	0	0	1	0
	1	0	0	0
	0	0	1	0
	0	0	0	0
	0	0	0	0
	4	1	0	3
	0	1	0	2
	0	0	0	0
	0	0	0	2
	0	0	1	0
1	0	0	2	
0	0	0	1	

Strength of  
belief

Moon phase

	NM	1st Q	FM	LQ
	0	0	0	0
	0	0	0	0
	0	0	0	0
	0	0	0	0
	1	0	1	1
	0	1	0	0
	0	0	1	0
	0	2	0	0
A very little	1	0	1	0
	0	1	0	0
	0	1	0	1
	1	0	2	0
	0	0	1	2
	1	2	1	1
	1	4	3	2
	1	1	0	0
	2	2	1	1
	1	0	2	1
	2	0	0	1
	0	0	0	0
	0	0	3	1
	0	1	1	1
	0	0	0	0
	1	1	0	0
	0	0	1	1
	1	0	4	1
	0	0	0	0
	0	0	0	0
	0	0	0	0
	0	0	0	0
Not at all	0	1	0	0
	0	0	0	0
	0	0	0	0
	0	1	1	0
	0	0	0	0
	1	0	0	0
	0	0	1	0
	0	0	1	0
	0	0	0	1
	0	1	0	0
	1	0	0	0
	0	0	0	0
	0	0	0	0
	0	0	0	0
	0	0	1	1

Strength of  
belief

Moon phases

	NM	1st Q	FM	LQ
	0	0	1	1
	2	2	1	2
	0	0	0	0
	1	0	1	2
	0	0	1	2
Not at all (cont'd)	1	2	4	4
	2	1	0	1
	0	0	2	0
	0	0	1	0

## APPENDIX M

73

Lunar synodic cycles by unusual occurrences  
in long term wards May 6, 1972-April 26, 1973

Month	date	No. occurrences	Month	date	No. occurrences
<u>May, 1972</u>			<u>November</u>		
LQ	6	1	NM	5	4
NM	13	4	1st Q	14	2
1st Q	20	3	FM	21	4
FM	28	4	LQ	28	6
<u>June</u>			<u>December</u>		
LQ	5	1	NM	6	1
NM	11	2	1st Q	14	0
1st Q	18	1	FM	20	3
FM	27	4	LQ	27	3
<u>July</u>			<u>January, 1973</u>		
LQ	4	4	NM	4	4
NM	11	2	1st Q	12	4
1st Q	18	6	FM	19	6
FM	26	3	LQ	26	0
<u>August</u>			<u>February</u>		
LQ	2	2	NM	3	1
NM	9	3	1st Q	10	1
1st Q	17	2	FM	17	4
FM	25	0	LQ	25	4
LQ	31	1	<u>March</u>		
<u>September</u>			NM	5	2
NM	7	4	1st Q	12	4
1st Q	16	0	FM	19	4
FM	23	1	LQ	27	5
LQ	30	2	<u>April</u>		
<u>October</u>			NM	3	1
NM	7	5	1st Q	10	3
1st Q	15	4	FM	17-26	3
FM	22	1			
LQ	29	0			

APPENDIX N

Unusual occurrence reports by Ss degree of belief  
in a lunar influence and moon phases-long term area

Strength of belief	NM	Moon phase		FM	LQ
		Ist	Q		
a lot	2	0		2	1
	0	0		0	0
	1	1		1	0
	1	0		1	0
quite a bit	0	0		1	0
	1	1		1	0
	1	2		1	1
	0	0		1	0
	0	1		0	1
	1	0		1	0
SOME	3	1		0	0
	2	1		1	1
	0	2		0	1
	1	0		0	2
	0	0		0	0
	0	0		0	0
	2	0		4	1
	3	1		0	3
	0	0		3	0
	0	0		0	0
	2	0		0	1
	0	0		0	2
	0	0		0	0
	0	1		1	1
	0	1		0	0
0	0		2	2	
1	0		0	0	

Strength of belief	Moon phase			
	NM	1st Q	FM	LQ
a very little	0	0	0	0
	0	1	7	1
	0	0	0	0
	0	0	0	0
	0	0	1	1
	0	0	0	0
	1	1	0	0
	0	0	0	0
	0	0	0	0
	1	2	1	0
	0	1	0	0
	0	2	0	0
	0	0	0	0
	0	0	0	1
not at all	1	0	0	0
	1	1	1	0
	0	2	0	0
	0	0	0	0
	0	0	0	2
	1	3	0	2
	0	0	1	0
	0	0	0	0
	3	3	2	2
	0	0	1	0
	0	0	0	0
	1	0	0	0
	2	3	1	2
	0	0	0	0
0	0	0	0	
1	1	1	0	