Moonstruck! Does The Full Moon Influence Behavior?

It happens at least once every month. Sometimes, rarely, it happens twice a month. Up there in the sky. It's a bird. It's a plane. No, it's a FULL MOON.

Popular legend has it that the full moon brings out the worst in people: more violence, more suicides, more accidents, more aggression. The influence of the moon and behavior has been called "The Lunar Effect" or "The Transylvania Effect." The belief that the full moon causes mental disorders and strange behavior was widespread throughout Europe in the middle ages. Even the word "lunacy" meaning "insanity" comes from the Latin word for "moon."

You may hear people say,

"Just ask an emergency room nurse or a police phone operator. They will tell you that they are busier on nights when there is a full moon."

Is there scientific evidence to support these beliefs? Let's look at the data.

**Violence, Aggression and Crime**

- 11,613 cases of aggravated assault in a 5-year period: assaults occurred more often around the full moon.
  Reference: [Human aggression and the lunar synodic cycle](1978)
- 34,318 crimes in a 1-year period: crimes occurred more frequently during the full moon.
- 58,527 police arrests in a 7-year period: no difference in the number of arrests made during any phase of the moon.
  Reference: [Antisocial behavior and lunar activity: a failure to validate the lunacy myth](1977)
- 361,580 calls for police assistance in a 3-year period: calls had no relationship to the phase of the moon when the day of the week, holiday and year were controlled.
• 1,289 aggressive "incidents" by hospitalized psychiatric patients in a 105-week period: no significant relationship between the severity or amount of violence/aggression and phase of the moon. Reference: Lunar cycles and violent behaviour (1998)

• The rate of agitation in 24 nursing home residents in a 3-month period: no significant relationship of agitation to moon phase. Reference: Full moon: Does it influence agitated nursing home residents? (1989)

• The number of aggressive offenses (fighting, threatening or assaulting an officer, creating a disturbance) for 1,300 male inmates in a medium security prison in a one year period: no significant relationship between aggressive offenses and moon phase. Reference: Full moon: Aggression in a prison setting as a function of lunar phases, (1998)


• 2,017 homicides in a 3-year period: no relationship between the number of homicides and the phase of the moon. Reference: Porkorny, A.D., Moon phases, suicide, and homicide, Am. J. Psychiatry, 121:66-67, 1964

• 20,500 homicides in the United States in a 1-year period: no relationship between the number of homicides and the phase of the moon. Reference: Temporal variation in suicide and homicide (1979)

• 1,840 incidences of "acting-out" in people in a psychiatric treatment facility in a 3-year period: no relationship between the number of acting-out incidences and the phase of the moon. Reference: Lunar phase and acting-out behavior (1986)

Anxiety, Depression and Psychosis

• 782 patient records and 4,600 consultations in an 18-year period: no relationship between the phase of the moon and the number of times people contacted their doctors for anxiety or depression. Reference: Lunar cycle and consultations for anxiety and depression in general practice, (1997)

• 18,495 records from patients admitted to a psychiatric hospital in an 11-year period: admissions for psychosis were highest during the new moon and lowest during the full moon. Reference: Lunar madness: an empirical study (1977)

• 25,568 psychiatric emergency room visits in a 13-year period: visits increased near the first quarter moon and a decreased around the new moon and full moon. Reference: Human aggression and the lunar synodic cycle (1978)

• 8,473 psychiatric admissions in a 9-year period and 1,909 emergency psychiatric evaluations in a 1-year period: no relationship between admissions or evaluations and the phase of the moon. Reference: No effect of lunar cycle on psychiatric admissions or emergency evaluations (2006)

• The average number of contacts with psychiatric services over a 10-year period: no relationship between contacts and phase of the moon.
Reference: Frequency of contact with community-based psychiatric services and the lunar cycle: a 10-year case-register study (1997)

- 7,844 emergency calls to a suicide prevention/crisis call center in a 2-year period: the highest number of total calls was during the new moon, not the full moon. When calls for suicide threats were analyzed, there were more calls during the first quarter of the moon and new moon.
  Reference: Moon phases and crisis calls: a spurious relationship (1977)

- 4,575 telephone calls to a crisis center in a 6-month period: no relationship between crisis center calls and moon phase.
  Reference: Lunar phases and crisis center telephone calls (1990)

- 36,268 calls to a crisis center in a 8-year period: no relationship between crisis center calls and moon phase.
  Reference: Investigation of periodicity in crisis intervention calls over an eight-year span (1979)

- 76,065 calls to a crisis center in a 4-year period: decreased calls by females during the new moon period; increased calls by males during the new moon period.

- 736 telephone counseling calls in a 4-month period: no relationship between calls and the moon phase.
  Reference: Psychological Reports, 35:752-754, 1974

- 100 admissions to a psychiatric hospital in a 3-year period: no relationship between hospital admissions and the phase of the moon.
  Reference: Lunar phases and psychiatric hospital admissions (1994)

- Visits to a psychiatric emergency department in a 5-year period: no statistical difference between the number of patients seen on full moon nights and non-full moon nights.

**Suicides**

- 928 suicides in a 4-year period: suicides did not increase during the full moon. In fact, more suicides were noted during the new moon.
  Reference: Lunar association with suicide (1977)

- 897 suicides committed in a 3-year period: no relationship between suicides and the phase of the moon.
  Reference: Suicides and the lunar cycle (1997)

- 504 suicides committed in a 1-year period: no relationship between suicides and the full moon.
  Reference: The Moon and Suicide (1978)

- 383 cases of attempted suicide in a 1-year period: no relationship between attempted suicides and the phase of the moon.

- 1,997 suicides in a 13-year period: suicides did not occur more often during the full moon.
  Reference: Human aggression and the lunar synodic cycle (1978)

- 4,190 suicides in a 58-year period: suicides had no relationship between suicides and the phase of the moon.
  Reference: Variation in suicide occurrence by time of day, day of the week, month, and lunar phase (1991)
• 3,054 suicides between 1998 and 2003: no relationship between suicides and lunar phase.
• 1,187 cases of "self-poisonings" in a 1-year period: no relationship between self-poisonings and the phase of the moon.
  Reference: *Self-poisoning and moon phases in Oslo* (1986)
• 841 cases of "self-poisonings" in a 4-year period: self-poisonings did occur more often on the day of the full moon.
  Reference: *Full moon and poisoning* (1980)
• 184 cases of self-inflicted burns in a 20-year period: no relationship between self-inflicted burns and phase of the moon.
• 2,497 suicides in a 3-year period: no relationship between the number of suicides and the phase of the moon.
• 25,137 suicides in the United States in a 1-year period: no relationship between the number of suicides and the phase of the moon.
  Reference: *Temporal variation in suicide and homicide* (1979)
• 65,206 completed suicides in a 36-year period: no relationship between the number of completed suicides and the phase of the moon.

**Emergency Room Calls/Emergency Room Visits/Hospital Admissions**

- Calls to a poison center monitored over a 1-year period: unintentional poisonings occurred more often during the full moon cycle. However, the number of calls due to intentional poison exposure (suicides/drug abuse) was significantly LOWER during the full moon and higher during the new moon.
- 1,444 trauma victim hospital admissions in a 1-year period: no increase in hospital admissions during the full moon.
  Reference: *Trauma and the full moon: a waning theory* (1989)
- 354,150 trauma patients treated in emergency unit in a 36-year period: slight decrease in trauma patients during the full moon.
  Reference: *Relation of the weather and the lunar cycle with the incidence of trauma in the Groningen region over a 36-year period* (2009)
- 150,999 patients visits to the emergency department in 4-year period: no increase in total patient visits, ambulance runs, admissions to hospital on the day of the full moon.
- 3,468 emergency room visits and hospital admissions by people who intentionally took poison: visits and admissions were not different on days with full moons.
- 368 cardiac arrests and 872 acute myocardial infarctions in a 6-year period: no relationship between cardiac arrests and myocardial infarctions and the moon phase.
- 6,827 emergency department diagnosis of cardiopulmonary resuscitation in an 11-year period: no relationship between diagnosis and the full moon.

- 10,916 emergency cases in a 6-year period: no relationship between emergency cases and the full moon.

- 1,240 cases of myocardial infarction or sudden cardiac death in a 7-year period: no relationship between myocardial infarctions or sudden cardiac deaths and the full moon.
  Reference: Lunar phases are not related to the occurrence of acute myocardial infarction and sudden cardiac death (2003)

- 2,416 referrals for oral and maxillofacial emergencies in a 16-month period: no relationship between emergencies and the full moon.

- 14,970 surgical patients in a 7-year period: no relationship between deaths and the phase of the moon in which surgery was performed.
  Reference: A double-blind, controlled clinical trial of homeopathy and an analysis of lunar phases and postoperative outcome (1998)

- 782 patients (866 operations) observed for complications after surgery: no relationship of complications to the phase of the moon.

- 54,457 trauma patients admitted to emergency rooms in three hospitals: no increase in admissions or in the severity of the injury during the full moon.
  Reference: The full moon and admission to emergency rooms (2004)

- 1,374,235 consultations in general practice offices in one year: small increase in the number of consultations six days AFTER the full moon.

- 452 bladder cancer patients who had a radical cystectomy (bladder removal) during a 12-year period: no relationship between the moon phase when surgery was done and surgical complications, the number of re-operations, or survival.
  Reference: Lunar phases and zodiac signs do not influence quality of radical cystectomy-a statistical analysis of 452 patients with invasive bladder cancer (2007)

- 555 patients who had post-operative nausea and vomiting: no correlation between the phase of the moon and occurrence of post-operative nausea and vomiting 24 hours after anesthesia.
  Reference: The influence of the weather and the phase of the moon on post-operative nausea and vomiting (2006)

- 130 patients who suffered a rupture of an abdominal aortic aneurysm: significantly more ruptures during the waxing moon period.

- 3,706 spontaneous births during a 12 month period: no differences in the number of births for different moon phases.
  Reference: Labor ward workload waxes and wanes with the lunar cycle, myth or reality? (1998)

- 11,691 births during a 4 year period: no differences in the number of births for different moon phases.
  Reference: Human births and the phase of the moon (1979)

- 4,071,669 births during a 38 year period: no relationship between the number of births
and the phase of the moon.

Reference: Lunar cycle and the number of births: a spectral analysis of 4,071,669 births from South-Western Germany (2008)

- 6,725 births during a 7 year period: no relationship between the number of births, birth complications or gender of the baby and phase of the moon.


- 564,039 births during a 5 year period: no significant differences in the frequency of births, route of delivery, births to multigravid women, or birth complications for the different phases of the moon.

Reference: The effect of the lunar cycle on frequency of births and birth complications (2005)

- 167,956 births during a 6 year period: no significant correlation between the number of births and the phase of the moon.

Reference: Birth rate and its correlation with the lunar cycle and specific atmospheric conditions (2005)

- 12,102 animals examined at animal emergency center in a 3-year period: no association between the full moon and number of examinations per day.

Reference: The influence of the full moon on the number of accessions to an animal emergency centre (2007)

- 11,940 dogs and cats examined at a veterinary emergency center in an 11-year period: no difference in the number of daily emergencies on full moon days and non-full moon days. However, there was a small increase in the number of emergencies on grouped "fuller moon days" (during waxing gibbous, full moon and waning gibbous phases) compared to the number of emergencies on other days.


- 147,295 emergency visits (103,669 dogs, 41,513 cats, and 2113 other species) to animal clinic in a 16-year period: no increase in the number of emergencies on full moon days.

Reference: Association of holidays, full moon, Friday the 13th, day of week, time of day, day of week, and time of year on case distribution in an urban referral small animal emergency clinic. (2009)

Drug Use/Overdose

- 1,182 drug overdose cases recorded in a 15-month period: no relationship between overdose cases and the full moon phase.

Reference: Drug overdose and the full moon (1980)

- 949 cases of drug use (toxicology screenings) in a 1-year period: no relationship between drug use and the phase of the moon.

Reference: Hospital-based toxicology: patterns of use and abuse (1990)

- 2,403 patients (drug abuse) and 10,501 patients (psychiatric illness, not drug abuse) admitted to an emergency department in a 7-year period: no relationship between admissions and the phase of the moon.

Reference: Declining rate of substance abuse throughout the month (2001)
Accidents

- 246,926 traffic accidents involving property damage and 50,492 traffic accidents with non-fatal injuries in a 9-year period: no relationship was found between accidents and moon phase. However, this research did find that accidents of both kinds occurred more often on Friday and Saturday and on Halloween. New Year’s Eve and Thanksgiving also had higher rates of traffic accidents involving property damage.
  Reference: Cyclical calendar and lunar patterns in automobile property accidents and injury accidents (1998)

- 2,382 fatal traffic accidents in a 13-year period: accidents were not higher during the full moon.
  Reference: Human aggression and the lunar synodic cycle (1978)

- 4,835 traffic accidents in a 4-year period: no relationship to the phase of the moon. However, there was an increase in the number of accidents that occurred in the summer and on weekends.
  Reference: Human aggression and the lunar synodic cycle (1993)

- 200,545 traffic accidents in a 5-year period: no relationship to the phase of the moon for the number of accidents or the severity of the accidents.

- 4,835 traffic accidents in a 4-year period: no relationship to the phase of the moon for the entire 4-year period. An increase in accidents was observed during summer months and on weekends. Also, for one year, the number of accidents was lowest during the full moon.
  Reference: Geophysical variables and behavior: LXXII. Barometric pressure, lunar cycle, and traffic accidents (1993)

- Medical staff "incidents" recorded in a 4-year period: no relationship to the phase of the moon.
  Reference: Don't pass the buck! the full moon is not responsible for an increase in the occurrence of untoward events in a hospital setting! (1979)

- 3,842 falls by hospitalized, adult patients in a 5-year period: no relationship to the phase of the moon.

Animal Bites

- 1,621 patients over 3 year period who were bitten by either a cat, rat, horse or dog: the incidence of animal bites was significantly higher around the full moon.
  Reference: Do animals bite more during a full moon? Retrospective observational analysis (2000)

- 1,671 patients over a 1 year period who were bitten by dogs: no relationship between the frequency of dog bites and the phase of the moon.
Problems Studying the Lunar Effect

Perhaps one of the first things that you notice about these studies is that the results are inconsistent. Some studies show that a particular behavior will occur more often during the full moon and other studies show no relationship between behavior and the full moon. This finding alone casts doubt on the theory that the full moon influences behavior. It may also be that experiments have been designed differently. For example, some studies include "full moon" behaviors that occur a few days before and after the full moon, while other studies include only those behaviors within a single day of the full moon.

Selective Memory?

Because many people believe that the full moon can affect behavior, experiments must be designed carefully to eliminate the possibility that people's beliefs will influence the data. For example, if people know that they are in an experiment which studies how the moon affects behavior, they may act in ways that change the results. It is possible that people have a "selective memory" for strange events that happen on the full moon; they remember strange incidents that occur during a full moon, but forget when these same things happen at other times.

Correlation Does NOT Mean Causation

It is also important to remember that studies that examine relationships between behavior and the phase of the moon determine only correlations. These types of studies determine if one set of numbers varies in a reliable manner with another set of numbers. If they do, then it can be said that a relationship exists.

The existence of a relationship between two "variables" DOES NOT mean that one variable causes the other variable. For example, if you looked for a relationship between the number of points scored by a basketball team and the number of books checked out of a library on different days, you might find a significant relationship. This doesn't mean that the score of basketball games causes people to check out library books or that checking out library books causes the basketball team to score more points. The reason why these two activities vary in a similar fashion is completely unknown and untested. It just happens that the two measurements vary in a related fashion.
In the basketball/library book example, the relationship could be caused by many things, maybe even by the weather. Maybe there was a lot of rain when the basketball scores and library books were counted. Perhaps the rain caused the basketball players to practice more (resulting in more points scored) and caused more people to visit the library (resulting in more checked-out books).

Some experiments do show that on days with a full moon there is more abnormal behavior. However, many of these studies have been criticized because they were not performed properly. For example, some of these experiments:

- tested only a few people over a short period of time.
- did not analyze the data with proper statistical tests.
- did not take into account the day of the week on which the full moon occurred.
- did not take into account whether the full moon occurred on a holiday or a weekend.

Although most experiments fail to show a relationship between the phase of the moon and abnormal behavior, the belief in the "lunar effect" is still strong among many people. Unfortunately, the occasional newspaper story that describes strange behaviors during a full moon only reinforces this myth.

Did you know?

- The full moon appears once every 29.53 days.
- The distance between the moon and the Earth varies from about 221,438 miles (356,410 kilometers) to 252,681 miles (406,697 kilometers). The average distance between the moon and the Earth is 238,828 miles (384,400 kilometers).
- The diameter of the moon is 2,160 miles (3,476 kilometers). For comparison, the diameter of the Earth is 7,926 miles (12,756 kilometers).
- The circumference of the moon is 6,790 miles (10,927 kilometers). For comparison, the circumference of the Earth at the equator is 24,902 miles (40,075 kilometers).
- Sometimes there are two full moons in one month. It IS possible to have a month without a full moon, but this does not happen very often and it can happen only in the month of February. You will have to wait until February 2018 for the next month without a full moon.
- The surface gravity of the moon is 1/6 that of the Earth.
- The first lunar landing occurred on July 20 at 4:18 p.m. (EDT) when the Apollo 11 Lunar Module touched down on the moon at Tranquility Base (Sea of Tranquility). At 10:56 p.m., astronaut Neil Armstrong touch one foot to the
moon's surface. (Source: NASA)

More information about the full moon and behavior:

1. Do things get crazy when the moon is full? - from the Straight Dope
2. The full moon and lunar effects - from the Skepdic's dictionary