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# The Laughter Prescription: A Tool for Lifestyle Medicine

**Abstract:** *Laughter is a normal and natural physiologic response to certain stimuli with widely acknowledged psychological benefits. However, current research is beginning to show that laughter may also have serious positive physiological effects for those who engage in it on a regular basis. Providers who prescribe laughter to their patients in a structured way may be able to use these natural, free, and easily distributable positive benefits. This article reviews the current medical understanding of laughter's physiologic effects and makes a recommendation for how physicians might best harness this natural modality for their patients.*

**Keywords:** laughter; prescription; lifestyle medicine; treatment

Laughter is a complex emotional response to one's environment, situation, and stimuli. Studied for many years, it was not generally perceived to have any particular healing effect until 1979, when Norman Cousins published *As Anatomy of an Illness*. In this book, Cousins described laughter as creating an analgesic effect for pain caused by his ankylosing spondylitis.<sup>1</sup> Since that time, interest in laughter as a potential therapeutic option has grown, both in popular culture as well as in scientific research, where the field of psychoneuroimmunology attempts to

explore the impact of laughter on our physiology and psychology.

Current research indicates that laughter has quantifiable positive physiologic benefits. So far, these benefits have been small and not yet widely corroborated, but in this era of preventative medicine, they indicate that research on laughter is not only timely and useful but also potentially fiscally sound. This is because laughter is (usually) free, and often without side effects. A 2010 review cataloged the available scientific evidence on the physical benefits of both spontaneous and simulated laughter.<sup>2</sup> This article will

such as a joke, which evokes a response.

In contrast, laughter refers to a physical reaction characterized by a distinct repetitive vocal sound, certain facial expressions, and contraction of various muscle groups. One study identified 5 separate types of laughter: genuine ("spontaneous"), self-induced ("simulated"), stimulated (eg, tickling), induced (ie, via drugs), and pathological.<sup>2</sup> Pathological laughter and crying is typically defined as a disorder of emotional expression due to damage of pathways in the cortex and brainstem,<sup>3</sup> and this is distinctly different from the

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update and expand on the 2010 review in order to enhance practitioners' general knowledge and understanding of how laughter pertains to medicine. Additionally, we will make recommendations as to how laughter might be incorporated into a lifestyle medicine approach.

## What Is Laughter?

"Laughter" and "humor," though often used interchangeably, have different definitions. Humor refers to the stimulus,

laughter and humor discussed in this article. Laughter can be experienced both individually, for example, while recalling a particular event, watching television, or reading a book, or socially in groups, for example, participating in a yoga laughter group or sharing stories with friends.

## Theories of Laughter: Why Do We Do It?

Theories of laughter attempt to explain the psychological motivations behind

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genuine, or “spontaneous,” laughter. Although one review<sup>4</sup> catalogued over 100 individual theories of laughter, the field is dominated by 3 in particular: release theory, superiority theory, and incongruity theory.<sup>5</sup> Release theory argues that laughter is the physical manifestation of repressed desires and motivations. Superiority theory posits that laughter is a means of increasing one’s self-esteem at the expense of others.<sup>6</sup> By contrast, incongruity theory states that humor is created by a sense of incongruity between 2 or more objects within a joke.<sup>7</sup> Currently, there is no concrete consensus on which theory is the most valid or most complete.

### What Do We Understand About the Health Benefits of Laughter From a Scientific and Physiologic Perspective?

It is commonly accepted that laughter produces *psychological* benefits, such as improving affect, depression, anxiety, and stress.<sup>8-10</sup> Nevertheless, there is growing evidence that laughter as a physical activity can additionally produce small but quantifiable positive *physiological* benefits. The literature on laughter can be separated based on the type of laughter studied: spontaneous or self-induced.

Spontaneous laughter differs significantly from self-induced laughter. The former refers to “genuine” or unforced laughter, often in response to a stimulus, whereas the latter describes laughter that is simulated *de novo*. Spontaneous laughter is often associated with positive mood, whereas simulated laughter is primarily physical and is not necessarily associated with positive emotions or feelings. Neuroimaging suggests that different neural pathways are used in these 2 forms of laughter.<sup>11</sup>

Do spontaneous and simulated laughter have the same effect on the body? One theory, the motion creates emotion theory (MCET),<sup>2</sup> posits that the body does not actually know the difference between intentionally laughing and laughing instinctively. Therefore, if one

induces oneself to laugh (by simulating or self-inducing laughter), the body can be coaxed into an identical physiologic response. According to the MCET, simulated laughter can capture the positive benefits of spontaneous laughter—but without using any humor at all. This is distinctly unlike the other theories of laughter, which argue that the benefits arise from nonphysical sources, for example, positive mood.

Positive mood is closely tied to spontaneous laughter, and it is thought to have independent cognitive effects of its own.<sup>12</sup> However, parsing out the interaction between positive mood and spontaneous laughter has been difficult. A study involving 87 subjects reported that manipulating mood with music and video—specifically a peppy Mozart piece paired with a video of a laughing baby, versus music from *Schindler’s List* and a news report about an earthquake—significantly affected performance on a creative thinking task of learning involving the classification of picture sets with visually complex patterns.<sup>13</sup> However, another study of 60 subjects randomly assigned to watch a neutral, positive affect, or comedy video found that compared to a comedy video (presumably elicits both laughter and positive affect), a video that produced only positive affect and no laughter was not enough to cause endorphin release.<sup>14</sup> Another study of 33 people found that natural killer cell activity increased only when the subject exhibited mirthful laughter while watching a humorous video (mean increase of 15.77 LU,  $P = .037$ ).<sup>15</sup> Otherwise, if the subject watched the video but did not laugh, natural killer cell activity actually decreased. Because of the difficulty of the task and the paucity of research on the topic, this article will consider positive mood and spontaneous laughter together as a unit, and make no effort to distinguish between the two.

### Spontaneous Laughter

Spontaneous laughter—also known as “genuine” laughter—has been far more widely studied. One early study examined the stress hormones levels of 10 subjects

watching an hour-long humor video.<sup>16</sup> Among experimental subjects, cortisol decreased from  $240 \pm 60$  at baseline to  $90 \pm 10$  a half-hour after finishing the video, compared to control subjects who decreased from  $390 \pm 90$  to  $270 \pm 60$  after the same amount of time. The experimental group had a significantly larger reduction ( $P = .011$ ), although both groups had a consistent drop from baseline. A larger, more recent study involving 52 patients shown a 1-hour humor video found increases in natural killer cell activity, IgG, IgM, and other leukocytes.<sup>17</sup> Other studies ( $n = 33$  and 21) have corroborated some of these findings, determining that natural killer cell activity was higher in the group watching the comedic video compared to the control.<sup>15,18</sup> Interestingly, another study of 20 subjects found that an amusing film actually produced similar increases in epinephrine and norepinephrine levels as an aggression-provoking one.<sup>19</sup> The authors postulated that this was due to the emotional arousal, which can elevate sympathetico-adrenomedullary activity regardless of whether or not the arousal is positive or negative.

Other studies have linked laughter and humor with increased levels of pain tolerance. In one, 200 subjects were subjected to a painful cold-pressor stimulus after being shown a film. Those who viewed a humorous film had a significant advantage in pain tolerance time after a 30-minute wait period.<sup>20</sup> Another experiment of 40 subjects found that a laughter-inducing narrative, as opposed to other forms of distraction such as an interesting narrative audio tape, increased discomfort thresholds.<sup>21</sup> Similarly, a study of threat-induced anxiety involving 53 subjects found that those exposed to a humorous tape recording consistently rated themselves as less anxious and reported smaller increases in stress as the time to receive an electric shock approached.<sup>22</sup>

The cardiovascular effects of laughter appear to be quantifiable, although potentially short-lived. A study of 10 healthy subjects showed that cardiac parasympathetic activity decreased immediately on watching a comedy

video, and just as quickly returned to baseline when finished.<sup>23</sup> This was in comparison to tragedy videos, in which the parasympathetic activity also dropped, but did not return to baseline afterward. Some of the temporary effects of laughter on the cardiovascular system are predictable, given that laughter involves an increase in physical activity from baseline. A study of 8 subjects found that laughter appears to significantly increase stroke volume and cardiac output, while significantly decreasing oxygen consumption, arteriovenous oxygen difference, and total peripheral resistance.<sup>24</sup> A study of blood pressure involving 16 normotensive subjects found that laughing during a blood pressure measurement increased systolic blood pressure by an average of 12 points.<sup>25</sup> This research suggests that the body responds physiologically to a bout of laughter as it does to a bout of exercise.

In 2011, additional studies further suggested the positive effects of spontaneous laughter. For example, a study presented at the European Society of Cardiology 2011 Congress found vasodilative effects lasting up to an hour after watching a comedic movie scene, whereas an action scene prompted vasoconstriction.<sup>26</sup> Another study used humor therapy as “medication” to treat agitation in patients with dementia. The SMILE study found a 20% reduction in agitation using humor therapy, which is an improvement comparable to the common use of antipsychotic drugs but without the side effects. Agitation levels remained lower at the 26-week follow up. In this study, humor therapy used trained staff as “Laughter Bosses” to act much like the “Clown Doctors” used in hospitals on children’s wards to help improve mood and increase lightheartedness. (SMILE study results were presented at the National Dementia Research Forum 2011 on September 22 and 23.)

### Self-Induced, or Simulated Laughter

In contrast to spontaneous laughter, the proposed benefits of simulated laughter

are largely based on the MCET: that the physical act of laughing is enough to create a positive physiologic response. Research on simulated/self-induced laughter, as opposed to spontaneous laughter, is very recent, and therefore only preliminary results are available.

A randomized control longitudinal study in India recruited 115 IT professionals to participate in 7 sessions of laughter yoga as a way to reduce stress.<sup>27</sup> The type of laughter yoga used consisted of bursts of simulated laughter followed by yogic deep breathing relaxation techniques. This study found no significant change in heart rate, respiratory rate, heart rate variability, breath rate, or secretory IgA in either group. However, the laughter yoga group had a significantly greater drop in blood pressure (Laughter Yoga group = 7.46 mm Hg; Control group = 3.03 mm Hg), as well as a lower postintervention systolic blood pressure (Laughter Yoga group = 120.78 mm Hg; Control group = 125.96 mm Hg,  $P < .04$ ). Additionally, the Laughter Yoga group showed a significant drop in cortisol levels (pre-intervention:  $0.25 \pm 0.14$ ; post-intervention:  $0.18 \pm 0.11$ ) whereas the Control group did not.

Another study of laughter yoga examined 60 depressed geriatric patients in Tehran, Iran.<sup>28</sup> Study subjects were randomized to receive laughter yoga therapy, exercise therapy, or nothing. Both laughter yoga and exercise therapy groups had a significant decrease in depression scores compared to the control group ( $P < .001$  and  $P < .01$ , respectively), and the laughter yoga group had an additional increase in life satisfaction compared to the control group ( $P < .001$ ). Interestingly, no significant differences were found between the laughter yoga and exercise groups.

### Summary of Literature

Current literature on laughter is promising, suggesting that laughter has many positive physiologic effects on the body. It remains important, however, to retain a certain amount of healthy

skepticism until results have been repeated and reaffirmed. In this vein, there remains much to do in terms of determining the duration and long-term impact of these effects. In terms of methodology, randomized control trials are in short supply compared to intervention trials,<sup>2</sup> as are standardized instruments to help better compare results among studies. Increased methodological rigor will be important for the future. Furthermore, the distinction between spontaneous versus self-induced/simulated laughter remains an important area for exploring the MCET. Finally, having higher-powered studies that can parse out the difference between positive mood and the physical act of spontaneous laughter, for instance, can help further our understanding on the topic. There is great potential for future research in laughter. Randomized controlled large-scale trials are needed to further elucidate the physiologic effects of laughter.

### Laughter and Professionalism: Should Physicians Use Humor as a Tool to Induce Therapeutic Laughter?

An important remaining question is whether or not laughter can be made into a convenient, useful therapy for patients. Laughter has no side effects, is readily accessible—already permeating many of our daily social interactions. Thus, whether the intent is to help a patient achieve positive physiologic benefits or simply enhance provider-patient communication, it deserves a closer examination to determine its applicability in the medical setting.

Of course, health is a serious and often grave matter, and humor delivered at inappropriate times can be devastating, insensitive, and crass. In this vein, certain types of humor must be considered off-limits—in particular cynical and derogatory humor directed at the patient. Unfortunately, some studies indicate that avoiding these types of humor, including “dark” and/or negative humor as a coping mechanism for providers, can be

more difficult than imagined.<sup>29-31</sup> Indeed, negative humor can be passed down as a sort of “hidden curriculum” and perpetuated through many generations of providers.<sup>32</sup>

Within the bounds of appropriateness, however, both humor and laughter can be beneficial. For one, laughter shared between the provider and patient conveys a measure of trust and light-heartedness. Furthermore, humor can improve communication, as a joke can signal a transition in the conversation from the serious to more benign topics. In general, medical providers do best when acting cautiously and following the patient’s lead. Knowing a patient well and acknowledging any humor expressed by him or her is recommended.

One additional unexplored field is the possibility of using laughter “therapy” as a means of sparking a more creative approach to lifestyle change. Depressed mood has been shown to be associated with decreased physical activity and weight gain in several societies. A recent survey of roughly 1500 Israelis<sup>33</sup> used logistic regression and showed that less exercise and more weight was correlated with depressive symptoms after adjusting for confounders, although whether the direction of the correlation is such that mood causes the decrease in activity or vice versa is unclear. Given that laughter and humor is a key element to happiness and is often used as a therapeutic tool for depression,<sup>7,34</sup> both traditionally and more recently in the form of “Laughter Yoga” exercises mentioned above,<sup>27,28</sup> it could potentially be used to counteract the effects of depression and aid new approaches to lifestyle change. More recently, laughter and humor are being used in geriatric care of patients with dementia,<sup>35</sup> resulting in a positive climate that could also potentially be fertile ground for instituting lifestyle changes.

### The Laughter Prescription: A Speculative Template

One method for putting laughter into practice is to discuss laughter with the patient during a visit. Providers can ask,

“What has made you laugh recently?” or “How often do you laugh?” Inquiring about laughter opens the door to light heartedness and also could lead to counseling on laughter and sharing the latest research with the patient. More important, it allows the provider to determine what the patient finds funny, thereby allowing the provider to tailor recommendations to better fit the patient’s needs and preferences. This also contains the potential to deepen the therapeutic relationship between patient and provider. Put together with a more structured approach, the health care provider could consider prescribing laughter to patients.

The MCET theory states that it may be enough for patients to simply self-induce the physical act of laughing in order to gain positive benefits. Therefore, prescribed laughter may be very helpful in that all patients—even those potentially unwilling to seek out comedy or humor—can still engage in laughter and derive benefits from it. There are laughter yoga classes and videos available online and even courses offered at local recreations centers. If a patient fails to benefit from the therapy, then very little—if anything—is lost in the attempt, as there are no side effects. As such, adding in a brief 1-minute conversation on laughter may represent an additional fast, inexpensive, and no-risk tool in the physician’s toolbox.

We propose that laughter prescriptions might contain detailed information as to the frequency, intensity, time, and type of laughter (forming the useful mnemonic “FITT”), much like pharmacological prescriptions and exercise prescriptions. This format aims to give patients clear and easy-to-remember guidelines. It is also a way to present laughter in a serious manner. When prescribing laughter, it would be of utmost importance to individualize the recommendations, taking into consideration the patient’s own sense of humor and willingness to engage in new activities, such as laughter yoga.

An example of a laughter prescription:

- (F) *Frequency*: once a week
- (I) *Intensity*: belly laughing
- (T) *Time*: 30 minutes
- (T) *Type*: your favorite sit-com

Laughter prescriptions remain largely speculative, but existing research indicates that efficacious laughter “treatments” typically occur once a week or less, for 30 to 60 minutes.<sup>36</sup> Nevertheless, shorter frequencies and times, such as individual sessions as short as 20 minutes, can still have a positive impact.<sup>18</sup> Intensity remains an open-ended question. It remains unclear how much, or with what amount of enthusiasm, one’s laugh leads to emotional and physical benefits. Type is the most variable factor of all. Again, tailoring recommendations to what the patient finds funny is an important part of creating an effective prescription. Furthermore, whether or not humor is even needed to generate laughter (eg, laughter yoga instead of watching comedies) is up to the individual patient.

Another consideration is the idea of group laughter, or laughter shared among other people. Although most studies look at the impact on one’s body through the use of a humorous cartoon, in reality this is only a small aspect of all the stimuli that humans find amusing. Social laughter often occurs in a situation with a stand-up comedian. One functional magnetic resonance imaging study looking at the effect of stand-up comedians found that clips considered humorous activated reward centers in the brain.<sup>37</sup> Another study from Israel looked at the effect of humorous videos on schizophrenic inpatients and found an improvement in patient’s psychopathology, mood, and mental status.<sup>38</sup> A randomized controlled trial done in Japan, which allocated 27 individuals older than 60 to weekly 120-minute group laughter-with-exercise sessions over 3 months, found an increase in self-rated health as well as in objective bone mineral density, and a decrease in HbA1c levels,<sup>39</sup> suggesting that group laughter sessions may be a way to encourage the elderly to exercise. However, it is currently unknown the extent to which group laughter provides

different benefits compared to laughing on one's own.

There are barriers to implementing laughter therapy into one's practice. Finding the time to discuss laughter, even just a 1-minute conversation, is understandably challenging. Giving a laughter prescription to patients suffering from depression and dementia could also be difficult. Significant life stressors, such as a recent death in the family, moving to a new home, being fired from a job, and so on, understandably make people feel unwilling or unable to laugh; however, laughter might still prove to be effective medicine in these situations. In such cases, it might take social support from friends and family in order to help the patient to engage in laughter. Thus, like many lifestyle behaviors, it is likely best if the environment and the people closest to the patient are on board with the laughter prescription in order for it to be successful long term.

## Conclusion

While it is well known that both laughter and humor can have deep and long-lasting psychological effects, it is only recently that our knowledge of the physiologic effects of laughter has grown. This modern change has been in no small part driven by the practices of laughter yoga and similar self-induced, or simulated, forms of laughter. Whereas laughter and humor were once thought of as nearly interchangeable, laughter is now a distinct physical action that can be effective on its own. Currently, research is indicating that the physical act of laughing, even without humor, is linked to chemical changes in the body that potentially reduce stress and increase pain tolerance. Understanding the distinction between spontaneous and simulated laughter is likely to become a stronger point of emphasis moving forward.

The United States is presently straining under the weight of rapidly increasing medical costs. Although there are limitations to the current medical literature on laughter, enough evidence indicates that laughter may be employed

as part of our basic armamentarium to help prevent diseases, reduce costs, and ensure a healthier population. While more research must be done, it is also important to acknowledge there is not much to lose in laughing. With no downsides, side-effects, or risks, perhaps it is time to consider laughter seriously.

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