



THE ACTIVE INGREDIENTS IN HUMOR: PSYCHOPHYSIOLOGICAL BENEFITS AND RISKS FOR OLDER ADULTS

Ronald A. Berk

The Johns Hopkins University,
School of Nursing
Baltimore, Maryland, USA

Humor produces psychological and physiological effects on our body that are similar to the health benefits of aerobic exercise. These benefits are some of the best kept secrets from those persons who probably have the most to gain from that information—older adults. Many of them who must live with chronic pain, arthritis, rheumatism, emphysema, memory loss, depression, and stress may be able to cope better with their conditions or find temporary relief by using humor. This article presents an up-to-date, comprehensive synthesis of 30 years of research evidence on 15 psychophysiological benefits of humor and laughter with their implications for older adults. The specific risks for this growing segment of the population also are identified. Strategies for communicating this information through publications and formal presentations by health educators working in gerontology are suggested. A curriculum outline is provided for use in developing short, feature presentations or integrating the content into existing exercise and health-related courses and programs. If these efforts are effective, eventually the health benefits of humor and laughter will be as familiar to our senior citizens as the risk factors associated with heart disease and smoking.

Physicians, nurses, psychologists, occupational therapists, and other healthcare professionals are increasingly recognizing the therapeutic value of humor (Bellert, 1989; Cushner & Friedman, 1989; Elgee, 1990; Ewers, Jacobson, Powers, McConney, & Kraus, 1983; Lieber, 1986; Reynes & Allen, 1987; Robinson, 1977; Rosenheim & Golan, 1986; Sherman, 1998; Tooper, 1988; Wooten, 1996). In fact, there has

Address correspondence to Ronald A. Berk, The Johns Hopkins University, 525 North Wolfe Street, Room 433, Baltimore, MD 21205-2110, USA. E-mail: rberk@son.jhmi.edu

been increased attention to the use of therapeutic humor with older adults (A. Klein, 1998; McGuire & Boyd, 1993; McGuire, Boyd, & James, 1992; Nahemow & McClusky-Fawcett, 1986; Richmond, 1995; Simon, 1988, 1990; Sullivan & Deane, 1988; Yoder & Haude, 1995) and in geriatric education, especially to teach sensitive topics, such as aging, death, dying, grieving, and suicide in the elderly (Johnson, 1990).

Many of the psychophysiological benefits of humor and laughter are similar to the health benefits of aerobic exercise. Unfortunately, those benefits seem to be some of the best kept secrets from those persons who probably have the most to gain from that information—older adults. As the aging process takes its toll on the mind and body, this growing segment of the population has more close encounters of the medical kind than any other segment of the population. Those persons who must live with chronic pain, arthritis, rheumatism, emphysema, memory loss, depression, and stress may be able to cope better with their conditions or find temporary relief by using humor.

The 1998 film *Patch Adams* has renewed interest in the effectiveness of laughter as a treatment for many psychological and physiological problems. However, Robin Williams' one fleeting line in the movie citing its therapeutic benefits was spoken in less than five seconds. Similarly, on television, when PBS programs their annual fund-raising campaign, occasionally they feature a humorist, such as Loretta LaRoche, who may refer to the stress-reduction benefits of lightening up and using humor. Further, "health watch" newsletters regularly mailed to senior citizens or even the general public rarely alert readers to the health benefits of laughter (Berk, 1999). Based on what is currently known about those benefits, they are certainly worthy of more attention than they have received in movies, television, and healthcare publications.

The purposes of this article are fourfold: (1) to provide an up-to-date, comprehensive synthesis of the research evidence on 15 psychological and physiological benefits of humor and laughter; (2) to identify the physiological risks; (3) to discuss the implications of those benefits and risks for older adults; and (4) to recommend strategies for disseminating that information to them.

The psychophysiological research on humor partitions the humor process into three elements: (1) the stimulus (humor), (2) the emotional response (mirth), and (3) the physical response or behavior (laughter). The relationships among the elements of the humor process and their psychophysiological effects are depicted Figure 1. The next section on the psychological benefits focuses on element (2); the two sections covering the physiological benefits and risks deal with (3).

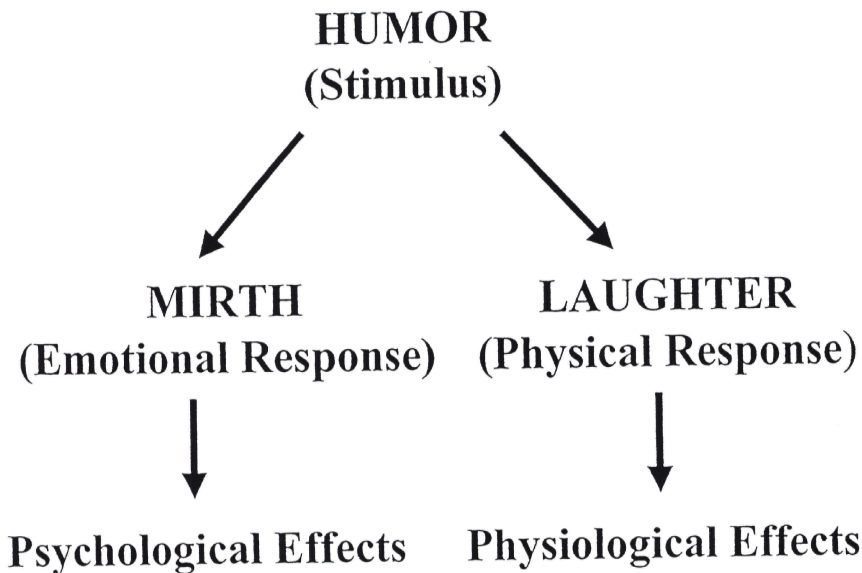


FIGURE 1 The humor process and its psychophysiological effects.

PSYCHOLOGICAL BENEFITS

Nearly a century ago, L. Kline (1907) stated that the largest psychological function of humor is

[T]o detach us from our world of good and evil, of loss and gain, and enable us to see it in proper perspective. It frees us from vanity on the one hand and from pessimism on the other by keeping us larger than what we do and greater than what can happen to us (p. 438).

This function of detachment, which considers humor as an adaptive coping mechanism, underlies the research on the psychological effects. It also is the conceptualization of humor adopted by psychological theorists such as Sigmund Freud, Gordon Allport, and Rollo May:

- Humor is “the highest of [the] defensive processes” (Freud, 1960, p. 233).
- “The essence of humor is that one spares oneself the affects to which the situation would naturally give rise and overrides with a jest the possibility of such an emotional display” (Freud, 1959, p. 216).
- “The neurotic who learns to laugh at himself may be on the way to self-management, perhaps to cure” (Allport, 1950, p. 92).
- Humor has the function of “preserving the sense of self ... It is the healthy way of feeling a ‘distance’ between one’s self and the

problem, a way of standing off and looking at one's problem with perspective" (May, 1953, p. 61).

Using humor involves a cognitive shift in perspective that allows one to distance oneself from the immediate threat of a problem situation; that is, view it from a different frame of reference, and reduce the negative feelings that would normally occur (Dixon, 1980; Kuhlman, 1984; O'Connell, 1976). Within this context, humor serves both as a response to a problem stimulus and as a stimulus to trigger an emotional response, consistent with the $S \rightarrow R$ model of the humor process. Therefore, this psychological interpretation consists of three components: (1) the problem stimulus, the problem situation or external stressor, (2) the humor response, the cognitive shift in perspective or cerebral process that enables one to mentally separate from the problem, and (3) the emotional response, the outcome feeling from that separation.

The problem stimulus may be any uncomfortable or threatening situation encountered during the aging process. It includes the day-to-day stressors of life as well as illness, surgery, chronic pain, death, and grieving. The most important question is not whether these grim realities of life will occur, but how will one respond to them?

The humor response is the adaptive detachment or coping mechanism that permits one to deal more effectively with the preceding aversive experiences. Wooten (1996) views humor as a self-care tool to cope with life stressors. It promotes a sense of objectivity that buffers the negative emotional responses (Galloway & Cropley, 1999).

The emotional response to a threatening situation is typically negative. There may be feelings of fear, shame, embarrassment, anxiety, tension, stress, depression, loneliness, escape, anger, hostility, and low self-esteem. The intervening humor response to problem stimuli can significantly reduce the impact and possibly paralyzing effect of those negative reactions.

There are eight psychological benefits of humor based upon available quantitative and qualitative research evidence. Five lessen negative reactions:

1. Humor reduces anxiety (Cann, Holt, & Calhoun, 1999; DeSpelder & Strickland, 1983; Doris & Fierman, 1956; Dworkin & Efran, 1967; Hedl, Hedl, & Weaver, 1981; Liechty, 1987; Nezu, Nezu, & Blissett, 1988; Singer, 1968; Smith, Ascough, Ettinger, & Nelson, 1971; Yovetich, Dale, & Hudak, 1990).
2. Humor reduces tension (Brill, 1940; Goodheart, 1994; O'Connell, 1960; Wooten, 1996).

3. Humor reduces stress (Bizi, Keinan, & Beit-Hallahmi, 1988; Dixon, 1976, 1980; Labott & Martin, 1987; Lefcourt, Davidson-Katz, Shepherd, & Phillips, 1995; Lefcourt & Martin, 1986; Lefcourt & Thomas, 1998; Martin, Kuiper, Olinger, & Dance, 1993; Martin & Lefcourt, 1983; Nezu et al., 1988; Prerost, 1988; Rosenberg, 1991; White & Camarena, 1989; Wooten, 1996).
4. Humor reduces depression (Danzer, Dale, & Klions, 1990; Deaner & McConatha, 1993; Lieber, 1986; Overholser, 1992; Porterfield, 1987).
5. Humor reduces loneliness (Overholser, 1992).
Three have positive effects:
6. Humor improves self-esteem (Frecknall, 1994; Kuiper & Martin, 1993; Kuiper, Martin, & Dance, 1992; Martin et al., 1993; Overholser, 1992).
7. Humor restores hope and energy (Bellert, 1989).
8. Humor provides a sense of empowerment and control (Sherman, 1998; Thorson, 1985; Wooten, 1996).

PHYSIOLOGICAL BENEFITS

The physical act of laughing can affect the entire body. Consider Kuhn's (1994) surgical dissection of laughter into the following 15 stages:

1. **Smirk:** Slight, often fleeting upturning of the corners of the mouth, completely voluntary and controllable.
2. **Smile:** Silent, voluntary and controllable, more perceptible than a smirk; begins to release endorphins.
3. **Grin:** Silent, controllable, but uses more facial muscles (e.g., eyes begin to narrow).
4. **Snicker:** First emergence of sound with facial muscles, but still controllable (if you hold in a snicker, it builds up gas).
5. **Giggle:** Has a 50% chance of reversal to avoid a full laugh; sound of giggling is amusing; efforts to suppress it tend to increase its strength.
6. **Chuckle:** Involves chest muscles with deeper pitch.
7. **Chortle:** Originates even deeper in the chest and involves muscles of torso; usually provokes laughter in others.
8. **Laugh:** Involves facial and thoracic muscles as well as abdomen and extremities; sound of barking or snorting.
9. **Cackle:** First involuntary stage; pitch is higher and body begins to rock, spine extends and flexes, with an upturning of head.
10. **Guffaw:** Full body response; feet stomp, arms wave, thighs slapped, torso rocks, sound is deep and loud; may result in free

flowing of tears, increased heart rate, and breathlessness; strongest solitary laughter experience.

11. **Howl:** Volume and pitch rise higher and higher and body becomes more animated.
12. **Shriek:** Greater intensity than howl; sense of helplessness and vulnerability.
13. **Roar:** Lose individuality; i.e., the audience roars!
14. **Convulse:** Body is completely out of control in a “fit” of laughter resembling a seizure; extremities flail aimlessly, balance is lost, gasp for breath, collapse or fall off chair.
15. **Die Laughing:** Instant of total helplessness; a brief, physically intense, transcendent experience; having died, we are thereafter reborn in a refreshing moment of breathlessness and exhaustion with colors more vivid and everything sparkling; everything is renewed. (Adapted from pp. 34–35).

This physical description of laughter translates into seven specific physiological benefits that involve the central nervous, muscular, respiratory, circulatory, endocrine, immune, and cardiovascular systems (Fry, 1986, 1992). Those benefits, extracted from the accumulated research evidence, and their implications for older adults are presented next.

Improves Mental Functioning

Laughter increases catecholamine levels in the body, which improve overall mental functioning (Fry, 1984). The postlaugh euphoric experience is associated with adequate functioning of the left and right hemispheres of the brain (Derks, Bogart, & Gillikin, 1991; Goldstein, 1976; Svebak, 1982). Although these effects do not reverse the aging process, older adults who chortle regularly will experience increased interpersonal responsiveness, alertness, and memory.

Exercises and Relaxes Muscles

A hearty laugh requires the coordinated movement of 15 facial muscles plus spasmodic skeletal muscle contractions, which involve a large mass of muscle tissue. As Kuhn’s (1994) description of the stages of laughter indicates, laughing creates a total body response that is clinically beneficial. It exercises the facial, chest, abdominal, and skeletal muscles and improves their tone (Paskind, 1932), which can be particularly important for bedridden or wheelchair-bound older people. Cousins (1979) has described laughter as “a form of jogging

for the innards.” Even the muscles of the gastrointestinal system are affected so that the digestion rate is improved.

Another major benefit that occurs after a hearty laugh is muscle relaxation. The laugh decreases muscle tension in the neck, shoulders, and abdominals, and can break the spasm-pain cycle patients frequently experience in neuralgias and rheumatism (Cushner & Friedman, 1989; Fry, 1986, 1992).

Improves Respiration

As an extension of the muscle contractions mentioned above, laughter exercises the lungs and chest muscles, thereby conditioning the lungs, which improves respiration (Lloyd, 1938). A laugh disrupts the normal cyclic breathing pattern, increases ventilation, clears mucous plugs, and accelerates the exchange of residual air, which enhances blood oxygen levels (Fry & Rader, 1977). The increased pulmonary ventilation causes a blowing off of the excess carbon dioxide and water vapor which builds up in residual air. More oxygen is available for red blood cell uptake and there is less excess moisture to encourage pulmonary bacterial growth (Fry, 1994). These effects of laughter can help elderly patients with chronic respiratory conditions, such as emphysema, and can reduce the chances of bronchial infection and pneumonia.

Stimulates Circulation

Laughter initially produces an increase in heart rate and blood pressure, which exercises the myocardium and increases arterial and venous circulation. This exercise can have a distinctly beneficial effect for the heart muscle, similar to any common aerobic exercise (Fry, 1994). This causes increased movement of oxygen and bloodborne nutrients to tissues (Fry & Savin, 1988; Fry & Stoft, 1971). These effects can be beneficial to older adults who lead sedentary life styles by choice or due to physical limitations or disabilities. After a laugh subsides, a brief relaxation phase occurs, during which the pulse rate and blood pressure drop below the prelaugh baseline levels.

Decreases Stress Hormones

In response to stress, the body increases the secretion of hormones. Laughter is regarded as a type of stress called eustress, which is healthy stress (Milsum, 1985). Researchers have been able to quantify the effects of laughter on neuroendocrine and stress hormones. Investigations of those responses have measured decreases in serum

cortisol, dopac, epinephrine, and growth hormone levels in the blood (Berk, Tan, Nehlsen-Cannarella, Napier, Lee et al., 1988; Berk, Tan, Nehlsen-Cannarella, Napier, Lewis et al., 1988; Berk et al., 1989; Berk, Tan, Napier, & Eby, 1989; Fry, 1971, 1984, 1992). These effects collectively furnish the physiological evidence for the stress reduction benefit of laughter. They also are related to the stimulation of the immune system.

Increases Immune System's Defenses

Several studies have investigated the effects of laughter on the immune system. One index of immune functioning is immunoglobulin A (IgA), the predominant antibody in saliva, tears, and intestinal secretions, and the primary defense against viral and bacterial infections in the upper respiratory and gastrointestinal tracts (Tomasi, 1976). Low levels of IgA have been associated both with high levels of self-reported life stress and increased illness, particularly upper respiratory infections (McClelland, Alexander, & Marks, 1980). Preliminary evidence linking humor and IgA has been provided by Dillon, Minchoff, and Baker (1985) and Lefcourt, Davidson-Katz, and Kueneman (1990). They found that concentrations of IgA increased as a result of watching humorous videotapes, such as *Richard Pryor Live*. Unfortunately, IgA levels declined shortly after the viewing. The researchers suggested that long-term effects might be realized by incorporating humor as a coping strategy in everyday life.

These results were not corroborated by Martin and Dobbin (1988). Persons with a strong sense of humor did not have consistently higher IgA levels overall than did those with less of a sense of humor. The differences in immune function only appeared when sense of humor interacts with stress. It was concluded that individuals with a strong sense of humor experience less impairment in immune functioning following stress, and, therefore, would be less prone to infectious illnesses under those conditions. These findings substantiate the evidence described in the previous section on the changes that occur in neuroendocrine and stress hormones, especially the decrease of serum cortisol and epinephrine and the increase in spontaneous lymphocyte blastogenesis (Berk, Tan, Nehlsen-Cannarella, Napier, Lee et al., 1988; Berk, Nehlsen-Cannarella, Napier, Lewis 1988). It was found that as laughter stimulates the immune system, it offsets the immunosuppressive effects of stress.

Another line of research has examined the relationship of natural killer cell activity (NKA), which is responsible for the early recognition and removal of virus and tumor activity cells, and mirthful laughter

(Berk, Tan, Eby, Carmonan, & Vorce 1984; Berk, Tan, Napier, & Eby, 1989). Natural killer cells are a type of immune cell that attacks viral and cancerous cells. Laughter moderates NKA and increases the number of activated T lymphocytes (also called T4 or CD4 cells, a type of white blood cell). This helps coordinate the immune system's defense against a variety of infectious diseases (Locke 1984). These effects are especially important in the prevention of cancer.¹

All of the research reviewed in this section indicate that laughter can increase the immune system's ability to fight viral and bacterial infections and buffer the immunosuppressive effects of stress.

Increases the Production of Endorphins

One of the most frequently reported benefits of laughter is the release of endorphins that results in decreased pain and a sense of euphoria. Unfortunately, there doesn't seem to be a shred of physiological evidence that quantifies any significant change in endorphin levels with laughter (Fry, 1992). This is due primarily to difficulties in measuring endorphins (W. F. Fry, Jr., personal communication, August 30, 1999). For example, there are problems in drawing spinal fluid through a needle stuck in your back while engaging in convulsive laughter.

The physiological effect related to the production of endorphins is inferred from anecdotal evidence that has been collected from the personal pain reduction experiences of patients. The first significant evidence of this type was reported by the late Norman Cousins, a former editor of the *Saturday Review*. He described how he used humor for healing and controlling pain in his 1979 autobiographical book, *Anatomy of an Illness as Perceived by the Patient*. He suffered from a painful disease, ankylosing spondylitis, that involved severe inflammation of his spine and joints. When he started watching films of "The Three Stooges" and "The Marx Brothers," he said it decreased his pain and helped him sleep easier without any analgesic medications. He recounted that "10 minutes of genuine belly laughter had an anesthetic effect and would give me at least 2 hours of pain free sleep" (1979, p. 39). Cousins also observed that a drop of at least five points in the sedimentation rate (an indicator of the severity of

¹These positive effects of laughter are the opposite of the negative effects of the human immunodeficiency virus (HIV), which infects and destroys T4 cells, thereby gradually weakening immune system functions. In fact, the decreases in the T4 cell count provide an index of the progression of the infection. For example, symptoms typically begin when the count is below 500 (a normal count is 700–1300/mm³ of blood) and the average count for an AIDS-defining diagnosis is 50–100.

inflammation or infection) occurred during episodes of laughter. He used laughter to heal himself, leading to his complete recovery from the disease.

Cousins' (1979) documented experiences provided compelling evidence that brought the therapeutic effects of humor and laughter to the attention of the medical community. They suggested that laughter may have a stimulatory effect on endorphins and other endogenous substances within the brain. Subsequent studies have demonstrated positive relationships between humor and increased discomfort thresholds (Cogan, Cogan, Waltz, & McCue, 1987; Hudak, Dale, Hudak, & DeGood, 1991) and pain tolerance (Nevo, Keinan, & Teshimovsky-Arditi, 1993). In fact, laughter has been systematically used as a pain management technique for terminally ill cancer patients and persons with AIDS (Peterson, 1992). Kuhn (1994), who regularly employs laughter therapy with his patients, states that endorphins are released simply by smiling.

Interestingly, the preceding physiological benefits of laughter are similar to those experienced during intense exercise. The reduction of pain and the sense of euphoria felt at a certain point in aerobic exercise, such as running, has been referred to as a high, as in runner's high. Fry (1992) claims that several minutes of intense laughter produce results similar to those of exercising on a rowing machine or stationary bicycle for about 10–15 minutes. That laughter also produces a high. That's why we feel so great after a belly laugh. It's those endorphins. For older adults who refuse to exercise or simply can't, laughter provides a limited proxy for exercise that is within everyone's reach. Older adults can produce endorphins without even putting down the remote control. Although the aerobic value of laughter pales by comparison to full-blown exercise, it can probably be increased by engaging in convulsive laughter (see Kuhn's Stage 14) for sustained periods of 20–30 minutes at least three times a week (Berk, just kidding!).

Laughter does offer sedentary elderly folk an alternative. Even those who exercise regularly should seriously consider adding a daily dose of laughter to their routine. Many older people walk or jog, take exercise classes, or hop on their favorite piece of equipment, such as a treadmill, stairclimber, stationary bike, pommel horse, or mechanical bull. This equipment is usually next to the water heater in the basement, being used as a clothes rack in the bedroom, or housed in an exercise room of a senior center. Some even exercise while watching Richard Simmons sweat his guts out. Maybe older people should consider inserting their favorite comedy video into the VCR or flipping on Comedy Central and laughing themselves silly to experience a jocular high. As my mother (now 81 years old) advises still, "It couldn't hurt." Or could it?

PHYSIOLOGICAL RISKS

Despite all of the benefits described previously, the profound physiological effects of laughter on the body can also be risky for older adults with serious medical conditions. A few risks cautioned by Fry (1992) relate to the central nervous, muscular, respiratory, circulatory, and cardiovascular systems. For example, a small number of people have experienced neurological reactions to laughter, including seizures and cataplectic and narcoleptic attacks. Large increases in abdominal and thoracic pressure are ill-advised following abdominal or pelvic surgery, after acute orthopedic distress, such as rib or shoulder girdle fractures, and acute respiratory diseases, such as asthma (Fry, 1986). The strong sudden increase in blood pressure of relatively brief duration can produce cerebrovascular accidents and even myocardial infarction.

Despite the anecdotal evidence of these negative effects of laughter, which have occurred in only rare cases, it is highly unlikely that a warning label will appear on a prescription for laughter anytime soon. Except in the extreme conditions just identified, the benefits seem to provide overwhelming evidence in favor of laughing. In fact, the late veteran radio comedian, Fred Allen, cautioned against not laughing. In other words, you should not stifle, suppress, or internalize the impulse to laugh. He warned: If you do, "it goes back down and spreads to your hips." Probably none of us needs that.

STRATEGIES FOR DISSEMINATING BENEFITS AND RISKS

How can the preceding benefits and risks be transmitted to older adults to empower them to take an active role in their own health and well-being? Older adults have been able to make decisions about their intake of fat and cholesterol and smoking because of the information provided. Rather than wait until they end up in the hospital or short- or long-term care facility to hear about laughter's pain-reduction effects, the benefits of humor and laughter should be communicated to them in their current living environment.

There are at least two major vehicles to transmit this information: (1) formal presentations and (2) publications.

Presentations

The most direct means of communicating the benefits and risks of humor and laughter is through presentations at educational programs or clubs in retirement communities, senior centers, recreation centers, health fairs, and churches and synagogues. Health educators should consider making either short featured presentations on the benefits

and risks or integrating the content into existing exercise and health-related programs and courses. Certainly these presentations should be delivered humorously so that the recipients can get a taste of the mirthful effects.

A suggested curriculum outline might include the following:

1. *Introduction*: Teaser questions, such as:
 - How many of you saw the movie *Patch Adams*?
 - What was the message?
 - How many of you believe humor and laughter can make you feel better?
 - How many of you don't like quizzes like this by your speaker?
2. *Psychological benefits*:
 - Reduces anxiety
 - Reduces tension
 - Reduces stress
 - Reduces depression
 - Reduces loneliness
 - Improves self-esteem
 - Restores hope and energy
 - Provides a sense of empowerment and control

And there's a smidgen of research evidence (that's about two table-spoons) that laughter reduces whining, complaining, bickering, and body-piercing
3. *15 stages of laughter*
4. *Physiological benefits* (see Table 1) (*Note*: Benefit 8 and the examples are for entertainment only; I made them up.)
5. *Warning about the physiological risks*

It is strongly recommended that handouts containing the substance of components 2–5 be distributed to guide the presentation and to stimulate questions and discussion of the various issues raised.

Publications

Another strategy to disseminate benefits and risk information is to prepare brief articles or inserts in newsletters, bulletins, brochures, and magazines that are regularly mailed to senior citizens. These may be local publications circulated to all residents of a retirement facility or community or nationally distributed magazines, such as *Modern Maturity*. Similar to the delivery of the presentation, the articles should be written humorously, if possible.

TABLE 1 Physiological Benefits of Laughter

Benefits	Examples
Improves mental functioning	Increases interpersonal responses, alertness, and memory
Exercises and relaxes muscles	Exercises facial, chest, abdominal, and skeletal muscles; improves muscle tone, decreases muscle tension, and relieves discomfort from neuralgias and rheumatism
Improves respiration	Exercises the lungs and improves breathing and blood oxygen levels; relieves chronic respiratory conditions; reduces chances of bronchial infection and pneumonia
Stimulates circulation	Exercises the heart like aerobic exercise, followed by decreases in heart rate and blood pressure
Decreases stress hormones	Reduces stress
Increases immune system's defenses	Fights viral and bacterial infections
Increases production of endorphins	Decreases pain and produces a euphoric state without liquor, drugs, or aerobic exercise
Kills common viruses and bacteria	Relieves hemorrhoids, psoriasis, gangrene, gingivitis, anthrax, and malaria

CONCLUSIONS

This review indicated that the psychophysiological benefits and risks of humor are significant to the health and well-being of all humans, but especially to older adults. The eight psychological and seven physiological benefits have an accumulated research base of scientific thought that dates back nearly a century and empirical evidence from the past 30 years. Clearly what is known is not new, but its dissemination to healthcare professionals and those persons seen most frequently by these professionals, older adults, has lagged far behind. Only recently has the therapeutic value of humor been recognized and applied in practice. The senior members of our society have just been teased by the media about its benefits.

It is hoped that some of the strategies for communicating these benefits suggested in this article will be implemented by health educators working in gerontology. Maybe the health benefits of humor and laughter will eventually be as familiar to our senior citizens as the risk factors associated with heart disease and smoking.

REFERENCES

Allport, G. W. (1950). *The individual and his religion*. New York: Macmillan.

- Bellert, J. L. (1989). Humor: A therapeutic approach in oncology nursing. *Cancer Nursing, 12*(2), 65–70.
- Berk, L. S., Tan, S. A., Eby, W. C., Carmona, M., & Vorce, D. (1984). Modulation of human natural killer cells by catecholamines. *Clinical Research, 32*, 38A.
- Berk, L. S., Tan, S. A., Nehlsen-Cannarella, S., Napier, B. J., Lee, J. W., Lewis, J. E., Hubbard, R. W., Eby, W. C., & Fry, W. F., Jr. (1988). Mirth modulates adrenocortico-medullary activity: Suppression of cortisol and epinephrine. *Clinical Research, 36*, 121A.
- Berk, L. S., Tan, S. A., Nehlsen-Cannarella, S., Napier, B. J., Lewis, J. E., Lee, J. W., & Eby, W. C. (1988). Humor associated laughter decreases cortisol and increases spontaneous lymphocyte blastogenesis. *Clinical Research, 36*, 435A.
- Berk, L. S., Tan, S. A., Fry, W. F., Jr., Napier, B. J., Lee, J. W., Hubbard, R. W., & Lewis, J. E. (1989). Neuroendocrine and stress hormone changes during mirthful laughter. *American Journal of the Medical Sciences, 298* (December), 390–396.
- Berk, L. S., Tan, S. A., Napier, B. J., & Eby, W. C. (1989). Eustress of mirthful laughter modifies natural killer cell activity. *Clinical Research, 37*, 115A.
- Berk, R. A. (1999). Laughter therapy. *The Johns Hopkins Health Insider, 2*(4), 1, 8.
- Bizi, S., Keinan, G., & Beit-Hallahmi, B. (1988). Humor and coping with stress: A test under real-life conditions. *Personality and Individual Differences, 9*, 951–956.
- Brill, A. A. (1940). The mechanism of wit and humor in normal and psychopathic states. *Psychiatric Quarterly, 14*, 731–749.
- Cann, A., Holt, K., & Calhoun, L. G. (1999). The roles of humor and sense of humor in responses to stressors. *HUMOR: International Journal of Humor Research, 12*(2), 177–193.
- Cogan, R., Cogan, D., Waltz, W., & McCue, M. (1987). Effects of laughter and relaxation on discomfort thresholds. *Journal of Behavioral Medicine, 10*(2), 139–144.
- Cousins, N. (1979). *Anatomy of an illness as perceived by the patient*. New York: W. W. Norton.
- Cushner, F. D., & Friedman, R. J. (1989). Humor and the physician. *Southern Medical Journal, 82*, 51–52.
- Danzer, A., Dale, J., & Klions, H. L. (1990). Effects of exposure to humorous stimuli on induced depression. *Psychological Reports, 66*, 1027–1036.
- Deaner, S. L., & McConatha, J. T. (1993). The relationship of humor to depression and personality. *Psychological Reports, 72*, 755–763.
- Derks, P., Bogart, E., & Gillikin, L. (1991). *Neuroelectrical activity and humor*. Address presented at the 9th International Conference on Humour and Laughter, Brock University, St. Catherines, Canada.
- DeSpelder, L., & Strickland, A. (1983). The last dance: Encountering death and dying. *Death Studies, 9*, 201–216.
- Dillon, K., Minchoff, B., & Baker, K. (1985). Positive emotional states and the enhancement of the immune system. *International Journal of Psychiatry in Medicine, 15*(1), 13–17.
- Dixon, N. F. (1976). *On the psychology of military incompetence*. London: Cape.
- Dixon, N. F. (1980). Humor: A cognitive alternative to stress? In I. G. Sarason & C. D. Spielberger (Eds.), *Stress and anxiety* (Vol. 7, pp. 281–289). Washington, DC: Hemisphere.
- Doris, J., & Fierman, E. (1956). Humor and anxiety. *Journal of Abnormal and Social Psychology, 53*, 59–62.
- Dworkin, E. S., & Efran, J. S. (1967). The angered: Their susceptibility to varieties of humor. *Journal of Personality and Social Psychology, 6*, 233–236.
- Elgee, N. J. (1990). Norman Cousins' sick laughter redux. *Archives of Internal Medicine, 150*, 1588.

- Ewers, M., Jacobson, S., Powers, V., McConney, P., & Krauss, J. (Eds.). (1983). *Humor: The tonic you can afford—A handbook on ways of using humor in long-term care*. Los Angeles: University of Southern California, Ethel Percy Andrus Gerontology Center.
- Frecknall, P. (1994). Good humor: A qualitative study of uses of humor in everyday life. *Psychology: A Journal of Human Behavior, 31*, 12–21.
- Freud, S. (1959). Humour. In J. Strachey (Ed.), *Collected papers of Sigmund Freud* (Vol. 5). New York: Basic Books.
- Freud, S. (1960). *Jokes and their relation to the unconscious*. New York: Norton.
- Fry, W. F., Jr. (1971). Mirth and oxygen saturation levels of peripheral blood. *Psychotherapy and Psychosomatics, 19*(1), 76–84.
- Fry, W. F., Jr. (1984). *Learning with humor*. Paper presented at the annual meeting of the International Conference on Humor, Tel Aviv, Israel.
- Fry, W. F., Jr. (1986). Humor, physiology, and the aging process. In L. Nahemow, K. A. McCluskey-Fawcett, & P. E. McGhee (Eds.), *Humor and aging* (pp. 81–98). Orlando, FL: Academic.
- Fry, W. F., Jr. (1992). The physiological effects of humor, mirth, and laughter. *Journal of the American Medical Association, 267*(4), 1857–1858.
- Fry, W. F., Jr. (1994). The biology of humor. *HUMOR: International Journal of Humor Research, 7*(2), 111–126.
- Fry, W. F., Jr., & Rader, C. (1977). The respiratory components of mirthful laughter. *Journal of Biological Psychology, 19*, 39–50.
- Fry, W. F., Jr., & Savin, W. M. (1988). Mirthful laughter and blood pressure. *HUMOR: International Journal of Humor Research, 1*(1), 49–62.
- Fry, W. F., Jr., & Stoft, P. E. (1971). Mirth and oxygen saturation levels of peripheral blood. *Psychotherapy and Psychosomatics, 19*, 76–84.
- Galloway, G., & Cropley, A. (1999). Benefits of humor for mental health: Empirical directions for further research. *HUMOR: International Journal of Humor Research, 12*(3), 301–314.
- Goldstein, J. H. (1976). Theoretical notes on humor. *Journal of Communication, 26*, 104–112.
- Goodheart, A. (1994). *Laughter therapy*. Santa Barbara, CA: Stress Less.
- Hedl, J. J., Jr., Hedl, J. L., & Weaver, D. B. (1981, April). *The effects of humor on anxiety and performance*. Paper presented at the meeting of the American Educational Research Association, Los Angeles, CA.
- Hudak, D., Dale, J., Hudak, M., & DeGood, D. (1991). Effects of humorous stimuli and sense of humor on discomfort. *Psychological Reports, 69*, 779–786.
- Johnson, H. A. (1990). Humor as an innovative method for teaching sensitive topics. *Educational Gerontology: An International Journal, 16*, 547–559.
- Klein, A. (1998). *The courage to laugh: Humor, hope, and healing in the face of death and dying*. New York: Tarcher/Putnam.
- Kline, L. W. (1907). The psychology of humor. *American Journal of Psychology, 18*, 421–441.
- Kuhlman, T. (1984). *Humor and psychotherapy*. Homewood, IL: Dorsey.
- Kuhn, C. C. (1994). The stages of laughter. *Journal of Nursing Jocularly, 4*(2), 34–35.
- Kuiper, N. A., & Martin, R. A. (1993). Humor and self concept. *HUMOR: International Journal of Humor Research, 6*(3), 251–270.
- Kuiper, N. A., Martin, R. A., & Dance, K. (1992). Sense of humor and enhanced quality of life. *Personality and Individual Differences, 13*, 1273–1283.
- Labott, S. M., & Martin, R. B. (1987). The stress-moderating effects of weeping and humor. *Journal of Human Stress, 13*, 159–164.
- Lefcourt, H. M., Davidson-Katz, K., & Kueneman, K. (1990). Humor and immune system functioning. *HUMOR: International Journal of Humor Research, 3*(3), 305–322.

- Lefcourt, H. M., Davidson-Katz, K., Shepherd, R., & Phillips, M. (1995). Perspective-taking humor: Accounting for stress moderation. *Journal of Social and Clinical Psychology, 14*, 373–391.
- Lefcourt, H. M., & Martin, R. A. (1986). *Humor and life stress*. New York: Springer-Verlag.
- Lefcourt, H. M., & Thomas, S. (1998). Humor and stress revisited. In W. Ruch (Ed.), *The sense of humor: Explorations of a personality characteristic* (Humor Research Series, Vol. 3). Berlin, Germany: Morton de Gruyter.
- Leiber, D. B. (1986). Laughter and humor in critical care. *Dimensions of Critical Care Nursing, 5*(3), 162–170.
- Liechty, R. D. (1987). Humor and the surgeon. *Archives of Surgery, 122*, 519–522.
- Lloyd, E. L. (1938). The respiratory mechanism in laughter. *Journal of General Psychology, 10*, 179–189.
- Locke, S. E. (1984). Life change stress, psychiatric symptoms, and natural killer cell activity. *Psychosomatic Medicine, 6*, 441–453.
- Martin, R. A., & Dobbin, J. P. (1988). Sense of humor, hassles, and immunoglobulin A: Evidence for a stress-moderating effects of humor. *International Journal of Psychiatry in Medicine, 18*, 93–105.
- Martin, R. A., Kuiper, N. A., Olinger, L. J., & Dance, D. A. (1993). Humor, coping with stress, self-concept, and psychological well-being. *HUMOR: International Journal of Humor Research, 6*(1), 89–104.
- Martin, R. A., & Lefcourt, H. M. (1983). Sense of humor as a moderator of the relation between stressors and moods. *Journal of Personality and Social Psychology, 45*, 1313–1324.
- May, R. (1953). *Man's search for himself*. New York: Norton.
- McGuire, A., & Boyd, K. (1993). The role of humor in enhancing the quality of later life. In J. R. Kelly (Ed.), *Activity and aging: Staying involved in later life* (pp. 164–173). Newbury Park, CA: Sage.
- McGuire, A., Boyd, K., & James, A. (1992). Therapeutic humor with the elderly. *Activities, Adaptations, and Aging, 17*(1), 1–96.
- Milsum, J. H. (1985). A model of the eustress system for health/illness. *Behavioral Science, 30*, 179–186.
- Nahemow, L., & McClusky-Fawcett, K. A. (1986). (Eds.). *Humor and aging*. Orlando, FL: Academic.
- Nevo, O., Keinan, G., Teshimovsky-Arditi, M. (1993). Humor and pain tolerance. *HUMOR: International Journal of Humor Research, 6*(1), 71–88.
- Nezu, A. M., Nezu, C. M., & Blissett, S. E. (1988). Sense of humor as a moderator of the relation between stressful events and psychological distress: A prospective analysis. *Journal of Personality and Social Psychology, 54*, 699–714.
- O'Connell, W. E. (1960). The adaptive function of wit and humor. *Journal of Abnormal and Social Psychology, 61*, 263–270.
- O'Connell, W. E. (1976). Freudian humour: The Eupsychia of everyday life. In H. C. Foot & A. J. Chapman (Eds.), *Humour and laughter: Theory, research and applications* (pp. 313–330). London: Wiley.
- Overholser, J. C. (1992). Sense of humor when coping with life stress. *Personality and Individual Differences, 13*, 799–804.
- Paskind, H. A. (1932). Effects of laughter on muscle tone. *Archives of Neurological Psychiatry, 28*, 623–628.
- Peterson, K. (1992). Use of humor in AIDS prevention, in the treatment of HIV positive persons, and in the remediation of care-giver burnout. In M. R. Seligson & K. E. Peterson (Eds.), *AIDS prevention and treatment: Hope, humor, and healing*. Bristol, PA: Hemisphere.

- Porterfield, A. L. (1987). Does sense of humor moderate the impact of life stress on psychological and physical well-being? *Journal of Research in Personality, 21*, 306-317.
- Prerost, E. (1988). Use of humor and guided imagery in therapy to alleviate stress. *Journal of Mental Health Counseling, 10*(1) 16-22.
- Reynes, R. L., & Allen A. (1987). Humor in psychotherapy: A view. *American Journal of Psychotherapy, 41*, 260-270.
- Richmond, J. (1995). The lifesaving function of humor with the depressed and suicidal elderly. *The Gerontologist, 35*(2), 271-273.
- Robinson, V. M. (1977). *Humor and the health professions*. Thorofare, NJ: Charles B. Slack.
- Rosenberg, L. (1991). A qualitative investigation of the use of humor by emergency personnel as a strategy for coping with stress. *Journal of Emergency Nursing, 17*, 197-203.
- Rosenheim, E., & Golan, G. (1986). Patients reaction to humorous interventions in psychotherapy. *American Journal of Psychotherapy, 40*, 110-124.
- Sherman, K. M. (1998). Healing with humor. *Seminars in Perioperative Nursing, 7*(2), 128-137.
- Simon, J. J. (1988). Humor and the older adult: Implications for nursing. *Journal of Advanced Nursing Practice, 13*, 441-446.
- Simon, J. J. (1990). Humor and its relationship to perceived health, life satisfaction, and morale in older adults. *Issues in Mental Health Nursing, 11*(1), 17-31.
- Singer, D. L. (1968). Aggression arousal, hostile humor, and catharsis. *Journal of Personality and Social Psychology Monograph Supplement, 8*, 1-14.
- Smith, R. E., Ascough, J. C., Ettinger, R. F., & Nelson, D. A. (1971). Humor, anxiety, and task performance. *Journal of Personality and Social Psychology, 19*, 243-246.
- Sullivan, J., & Deane, D. M. (1988). Humor and health. *Journal of Gerontological Nursing, 14*(1), 20-24.
- Svebak, S. (1982). The effect of mirthfulness upon the amount of discordant right-left occipital EEG alpha. *Motivation and Emotion, 6*, 133-143.
- Thorson, J. A. (1985). A funny thing happened on the way to the morgue: Some thoughts on humor and death, and a taxonomy of the humor associated with death. *Death Studies, 9*, 201-216.
- Tomasi, T. B. (1976). *The immune system of secretions*. Englewood Cliffs, NJ: Prentice Hall.
- Tooper, V. O. (1988). Humor as an adjunct to occupational therapy. *Journal of Nursing Education, 27*(2), 89-90.
- White, S., & Camarena, P. (1989). Laughter as a stress reducer in small groups. *HUMOR: International Journal of Humor Research, 2*(1), 73-79.
- Wooten, P. (1996). Humor: An antidote for stress. *Holistic Nursing Practice, 10*(2), 49-56.
- Yoder, M. A., & Haude, R. H. (1995). Sense of humor and longevity: Older adults' self-ratings compared with ratings for deceased siblings. *Psychological Reports, 76*, 945-946.
- Yovetich, N. A., Dale, J. A., & Hudak, M. A. (1990). Benefits of humor in reduction of threat-induced anxiety. *Psychological Reports, 66*, 51-58.