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The Effects of Humor on the Mind and Body

Previous chapters reviewed how humor is influenced by many different factors. In contrast, this chapter examines how humor influences other factors, including an individual's health and well-being. A growing body of research shows that experiencing humor and other forms of positive mood influence the body and the mind for the better. The majority of these studies reflect a subfield within psychology known as positive psychology. This relatively young field of psychology is focused on investigating aspects of normal and extraordinary functioning, which contrasts with the focus on atypical functioning in mainstream psychology (Maslow, 1954; Seligman & Csikszentmihalyi, 2000). Without the growing number of scientific studies on the topic, we might mistakenly conclude that the idea that humor benefits health is too good to be true. This chapter reviews studies showing links between humor and health and discusses studies that detail humor's multiple effects on the body. Last, the chapter takes a look at studies that have attempted to demonstrate that brief humor interventions produce measurable improvements in health.

HUMOR AND HEALTH

Over the last several decades, a consensus has emerged that there are links between humor and health (Allport, 1961; Carroll, 1990; Carroll & Shmidt, 1992; Cousins, 1985; Dillon & Totten, 1989; Dyck & Holtzman, 2013;

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P. S. Fry, 1995; J. H. Goldstein, 1982; Pressman & Cohen, 2005; Ruch & Köhler, 1999; Stewart & Thompson, 2015; Walsh, 1928). Nevertheless, the research on the topic has yielded conflicting results. In studies examining the relationship between humor and measures of physical health, some studies have failed to find that higher levels of sense of humor are related to better health (A. Clark et al., 2001; Kerkkänen et al., 2004) or have found significant trends in which humor explained only a small amount of the overall variance in outcome variables (Svebak et al., 2004). L. R. Martin et al. (2002) found evidence that trait cheerfulness was significantly related to longevity. However, in a study in which the biographies of professional comics were examined, Rotton (1992) found no support for the possibility that they lived longer than others.

In the largest study of its kind, Svebak et al. (2004) investigated the relationship between sense of humor and health. They surveyed over 65,000 Norwegians, asking them questions about their sense of humor, health status, health satisfaction, health complaints, body mass index, and blood pressure. Overall, higher health satisfaction was found among those who rated their own sense of humor as high. Those with higher senses of humor had lower blood pressure. In statistical analyses that controlled for age of the respondents, Svebak et al. found that these significant correlations ultimately explained a relatively small amount of the variance in blood pressure and health satisfaction scores. They concluded that the results were fairly weak in supporting a link between sense of humor and health.

More recent studies using similar methods produced stronger evidence for the link between humor and health (Romundstad et al., 2016; Svebak et al., 2006, 2010). Svebak et al. (2006) examined possible health benefits from individual differences in sense of humor among a sample of patients diagnosed with kidney failure who received regular dialysis. The study was carried out over 2 years. After controlling for sex, age, education, and disease severity measures, sense of humor was found to significantly predict quality of life and likelihood of survival from the beginning of the study to the end of the study. In a larger study, Svebak et al. (2010) investigated the relationship between sense of humor and mortality among a sample of adults in Norway. They included measures of sense of humor in a public health survey of over 50,000 respondents. The results showed that the likelihood of living to retirement age increased with self-reported sense of humor even when self-reported health status was controlled. The relationship was similar for men and women. Romundstad et al. (2016) investigated the relationship between humor and mortality in a large population-based study involving 53,556 individuals living in Norway with a follow up after 15 years. Multiple facets of individuals' sense of humor (i.e., affective, social, and cognitive) were assessed. The cognitive facet of sense of humor predicted overall mortality, cardiovascular deaths, and deaths caused by chronic obstructive pulmonary disease (COPD), cancer, and infections.

The benefits of humor on well-being and/or mental health have been demonstrated in a growing number of studies, many of them documenting

the positive relationship between humor and measures of well-being (Doosje et al., 2010, 2012; Lockwood & Yoshimura, 2014), life satisfaction (Lockwood & Yoshimura, 2014; Peterson et al., 2007; Ruch et al., 2010), purpose in life (Mak & Sörensen, 2018), zest for life (Celso et al., 2003), and greater morale (Simon, 1990). There is a fairly large literature demonstrating that humor may be useful to those coping with stress (Bizi et al., 1988; Kuiper et al., 1993, 1998; R. A. Martin et al., 1993; Marziali et al., 2008). Other studies have shown that higher levels of humor predict lower levels of depression (C. A. Anderson & Arnoult, 1989; Nezu et al., 1988; Overholser, 1992; Porterfield, 1987; Safranek & Schill, 1982; Thorson & Powell, 1994; Thorson et al., 1997). However, other studies have failed to find benefits of humor among patients with serious physical illness (Merz et al., 2009) and psychiatric disorders (Freiheit et al., 1998).

There have been studies exploring the relationship between the use of positive and negative humor styles and depression in adults (Frewen et al., 2008; Schneider et al., 2018) and adolescents (C. L. Fox et al., 2016). For example, Frewen et al. (2008) found that individuals who reported greater use of the self-defeating humor style and less use of the affiliative and self-enhancing humor styles reported more depression than others. Dyck and Holtzman (2013) showed that there were links between positive humor styles and well-being related to perceived increases in social support. Similar results have been observed by Sirigatti et al. (2016). In a meta-analysis that examined 37 studies in which humor styles were correlated with mental health variables (e.g., depression, life satisfaction, optimism, self-esteem), Schneider et al. (2018) found that the use of the self-defeating humor style predicted lower levels of mental health. However, the strength of the relationship appeared to vary by sex and by geographical region of the United States in which participants were residing.

Research also shows that greater use of positive humor styles (i.e., affiliative and self-enhancing) and less use of negative humor styles (i.e., aggressive and self-defeating) may facilitate social relationships (Yip & Martin, 2006). Supportive social relationships have been shown to be related to better health (Holt-Lunstad & Uchino, 2015). Boyle and Joss-Reid (2004) examined the relationships between humor and health in college students, adults from the community with no health issues, and adults with a health issue. The results indicated that individuals reporting higher levels of humor reported better health.

Tucker, Judah, et al. (2013) investigated whether humor styles would moderate the relationship between anxiety and depression, and found that two of the humor styles (affiliative and self-defeating) confirmed this theory. In a follow up study, Tucker, Wingate, et al. (2013) explored how humor styles were related to factors known to predict suicidal ideation (e.g., perceived burdensome and thwarted belongingness). Interestingly, they found that when participants' level of depression was considered, self-defeating and affiliative humor styles moderated the relationship between these factors and suicidal ideation.

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PHYSIOLOGICAL EFFECTS OF HUMOR

Over the last 100 years, researchers have documented how experiencing humor affects our bodies. This section reviews the evidence that experiencing humor leads to increased arousal in the sympathetic nervous system (Ulrich-Lai & Herman, 2009), activating the adrenal glands and processing in the brainstem. Second, the chapter reviews evidence that humor leads to activation of the hypothalamic–pituitary–adrenocortical (HPA) axis, which is involved in our responses to stress. Last, the chapter covers the growing body of research documenting humor's effects on the immune system and the research on humor's effects on pain perception, which appear to be related to increases in the release of endorphins in the brain during humorous experiences.

Activation of the Sympathetic Nervous System

The sympathetic nervous system (e.g., the "fight-or-flight" system; Sapolsky, 1994) is activated during episodes of anger or fear, as well as amusement, which leads to changes in breathing, muscle tone, heart rate, and skin conductance (e.g., increased physiological arousal; Mauss & Robinson, 2010) and changes in the levels of some hormones (e.g., epinephrine, norepinephrine). Among the earliest observations about the effects of humor on bodily function related to the expansion of the lungs and increases in breathing that occurs during laughter (W. F. Fry, 1992, 1994; W. F. Fry & Rader, 1977; W. F. Fry & Stoft, 1971; Lackner et al., 2013, 2014; Lloyd, 1938; Svebak, 1975). Lloyd (1938) pointed out that during laughter, there is an initial strong exhalation that is followed by smaller ones, often accompanied by a sequence of vocalizations (e.g., *ha ha*). Because the exhalations during laughter empty a majority of the air in the lungs, there is increased breathing immediately following the laughter. The increase in breathing is estimated to be over twice the level of normal breathing. The increased exhalation is brought about by muscle contractions in the body's trunk, which do not occur during normal breathing (Ruch & Ekman, 2001). W. F. Fry and Stoft (1971) found that levels of oxygen in the blood were higher following a humor experience. W. F. Fry (1994) compared vigorous laughter with a brief session of aerobic exercise (see also Szabo, 2003; Szabo et al., 2005).

Muscles are also acutely affected during experiences leading to mirth and laughter. In some languages, a common descriptor of people having a good time is that they were "weak with laughter" (Overeem et al., 1999). Research suggests that the expression has a basis in fact. As early as the 1930s, there was evidence supporting the link between mirth and muscle weakness during laughter (Paskind, 1932; Prerost & Ruma, 1987; Wagner et al., 2014). Recent studies have shown that there is reduced muscle tone during mirth and laughing (Overeem et al., 1999, 2004), specifically the Hoffman's reflex, which was produced in participants by nerve stimulation using electromyography. Participants experiencing humor or mirth showed a nearly 90% reduction in

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muscle response. Overeem et al. (2004) examined whether the muscle effects were due to mirth only or the breathing and movement occurring during the mirth response. Their results confirmed that the cause was mirth alone. Reductions in Hoffman's reflex can also be observed when pressure is applied to a muscle, as in manual massage (Goldberg et al., 1992).

Changes in blood pressure during and following humor have been examined (W. F. Fry & Savin, 1988; Lefcourt et al., 1997; White & Camarena, 1989). W. F. Fry and Savin (1988) observed increases in blood pressure following a bout of laughter accompanied by mirth, which were rapidly followed by reductions in blood pressure that were lower than individuals' baseline blood pressure level. In contrast, White and Camarena (1989) found no evidence for significant changes in blood pressure following a humor experiment. They randomly assigned participants to one of three groups: a relaxation training group, a laughter group, or a control group. Each group met weekly over 6 weeks for 90 minutes. Compared with the control group, the laughter group showed lower levels of self-reported stress but did not differ in physiological measures (i.e., heart rate and blood pressure).

Numerous studies have examined possible changes in heart rate as the result of experiencing humor (Averill, 1969; Fiacconi & Owen, 2015; Foster et al., 2002; Giuliani et al., 2008; Godkewitsch, 1974, 1976; J. H. Goldstein et al., 1975; Herring et al., 2011; Hubert & de Jong-Meyer, 1990, 1991; J. M. Jones & Harris, 1971; Lackner et al., 2013, 2014; Langevin & Day, 1972; Marci et al., 2004). Averill (1969) showed that humor processing was associated with increases in heart rate and skin conductance. The results suggest that humor processing involves an increase in arousal within the sympathetic nervous system. Langevin and Day (1972) demonstrated that the increases in heart rate and skin conductance were greater when participants rated the stimuli as more humorous. Godkewitsch (1974, 1976) measured heart rate and skin conductance as participants comprehended simple jokes with punchlines. He found that during the processing of the setup of the joke and the punchline, skin conductance increased as rated humorousness increased. There was an increase in heart rate related to the humorousness of jokes during the processing of the punchlines.

Giuliani et al. (2008) investigated the effects of brief movie clips involving amusement. Participants were randomly assigned to one of three groups. The first group was asked to watch the clips with no further instruction. The second group was instructed to try to increase the amusement that they experienced by watching the film by using cognitive reappraisal. The third group was instructed to try to decrease their amusement also using cognitive reappraisal. Compared with the no-instructions group, participants' physiological responses to the film clips differed as a function of the instructions that they were given. Physiological responses (i.e., heart rate, respiration, sympathetic nervous system activation) were higher in the condition in which participants were instructed to increase amusement and lower in the condition in which participants were instructed to decrease amusement.

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Foster et al. (2002) examined participants' physiological responses while experiencing humor, imagining a humorous scenario, or recalling a humorous scenario. Interestingly, imagined and recalled humor resulted in greater physiological changes (i.e., heart rate and galvanic skin response) than experiencing humor in the moment. In addition, they found that the increased arousal occurs even when an individual does not laugh in response to funny material, rather experiences only the feeling of mirth. The greater the mirth experience, the higher the level of arousal.

More recently, Lackner and colleagues (2013, 2014) examined participants' cardiovascular responses as they watched humorous and emotionally neutral film clips. Lackner et al. (2013) asked participants to press a button as soon as they understood a humorous film's meaning. The results indicated that cardiac changes (i.e., cardiac output and heart rate) occurred approximately 500 ms before participants pressed the button to confirm their comprehension of the humorous clip. The researchers suggested that the changes in heart functioning were temporally linked to the participants' "moment of insight" involved in understanding the humor of each clip (see also Fiacconi & Owen, 2015). Lackner et al. (2014) also had participants watch comedy films and emotionally neutral films while their cardiovascular responses were recorded. They found evidence for increased arousal of the sympathetic nervous system when amusement levels were high. They were able to rule out the possibility that the observed changes were due to changes in breathing during the humor experience. Experiencing humor was not found to lead to changes of the parasympathetic nervous system.

Activation of the Hypothalamic–Pituitary–Adrenocorticol Axis

The processing of humor also activates the human stress responses (e.g., HPA axis; Acevedo-Rodriguez et al., 2018), resulting in the release of the stress hormone cortisol. Following the experience of a stressor, the hypothalamus releases hormones that act on the pituitary gland (see Figure 1.7, Chapter 1, this volume) and the adrenal glands, which are located near the kidneys. The pituitary gland and adrenal glands also produce hormones. The most studied stress-related hormone is cortisol (Heim et al., 2000). Long-term stress leading to elevated levels of cortisol over a long period has been associated with negative health outcomes. There have been cases in which individuals report using humor to cope with extreme circumstances involving long-term stress (C. V. Ford & Spaulding, 1973). The term "black humor" or "gallows humor" refers to humor that arises in adverse situations (Obrdlik, 1942). Some studies have measured the levels of cortisol, which can be measured in saliva and in blood, and found increased levels of cortisol after watching comedy films (Hubert & de Jong-Meyer, 1990, 1991; Hubert et al., 1993; Lai et al., 2010). Hubert and de Jong-Meyer (1990) found that watching 90 minutes of a comedy film resulted in significant increases in salivary cortisol levels in participants, whereas watching a shorter film lasting 9 minutes did not. Hubert et al. (1993)

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observed increased cortisol in about half of the participants tested when measurements were taken 1 hour after participants began viewing a comedy film. Interestingly, their results showed that higher levels of humorousness resulted in higher levels of cortisol.

Other research has shown that experiencing humor is associated with lower levels of cortisol (Berk, Tan, Fry, et al., 1989; Lai et al., 2010). Lai et al. (2010) found evidence that higher levels of humor in daily life was related to lower cortisol levels in a sample of older men between the ages of 64 years old and 86 years old. Still another study observed a more complex relationship between positive emotions and cortisol. Human et al. (2015) investigated the relationship between individual differences in positive emotions across days (Study 1) or weeks (Study 2) and cortisol levels. The results of both studies revealed that those reporting the lowest and the highest levels of positive emotions had higher cortisol levels.

Effects on the Immune System

The immune system functions to defend the body from foreign substances (e.g., parasites, viruses, bacteria; Kusnecov & Anisman, 2014). The immune system can be weakened through malnutrition, prolonged exposure to illness, long-term stress, and the normal aging process. In studies investigating the effect of humor and immune system function, researchers have measured salivary secretory-IgA (also called S-IgA), which has been shown to reflect the body's immune system response to minor infections (e.g., colds, flu) and has been shown to increase during short-term stress and decrease in response to long-term stress (Neale & Stone, 1989).

Dillon et al. (1986) compared salivary S-IgA collected from participants who had watched a comedy video or a video with neutral context. They found that levels of S-IgA were significantly higher for those who had viewed comedy. Similar results have been observed in several other studies (Dillon & Totten, 1989; Harrison et al., 2000; Hucklebridge et al., 2000; Lambert & Lambert, 1995; Lefcourt et al., 1990; McClelland & Cheriff, 1997; Perera et al., 1998). Inconsistent findings have been reported in at least three studies (Harrison et al., 2000; Labott et al., 1990; Njus et al., 1996).

R. A. Martin and Dobbin (1989) investigated the effect of humor on immune system function. Participants provided information about their daily hassles and their sense of humor, and a saliva sample from which levels of S-IgA was obtained. The results showed that those who reported more hassles had lower levels of S-IgA in their saliva. For three of the four aspects of sense of humor, there were significant moderations of this relationship with sense of humor functioning as a buffer against the negative effects of hassles on the immune system. In contrast, Hucklebridge et al. (2000) found that S-IgA was increased in individuals following negative moods states as well as positive mood states.

Others have examined blood samples in search of support for the view that experiencing humor has positive effects on the immune system (Bennett

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et al., 2003; Berk et al., 1984, 1988, 2001; Berk, Tan, Napier, & Eby, 1989; Itami et al., 1994; Kamei et al., 1997; Locke et al., 1984; Mittwoch-Jaffe et al., 1995; Yoshino et al., 1996; cf. Kamei et al., 1997). For example, Berk et al. (2001) had 52 men who reported being in good health watch a comedy film for an hour. Blood was sampled before the film, after the film had been played 30 minutes, and 12 hours after the film ended. Blood was analyzed for numerous immune system markers. Significant increases were observed for many of these markers, including natural killer cell activity, immunoglobulins, and activated T-cells, as well as others. Several markers were significantly higher 12 hours following the film. In a similar study with 33 women, Bennett et al. (2003) found that participants who watched a comedy film were later found to have lower levels of stress and higher levels of natural killer cells than those in the control group. Participants who scored higher on a humor appreciation measure showed the largest reduction in stress and largest increases in natural killer cells.

In multiple studies, Kimata (2001, 2004a, 2004b) showed that experiencing humor reduced allergic responses to an allergen. In the earliest study, Kimata (2001) investigated how individuals with dermatitis responded to skin prick test in which they were exposed to multiple allergens. Exposure to the allergens occurred after participants either watched a humorous film or nonhumorous documentary film. The results showed that allergic reactions were less severe when performed after the humorous film. In follow up studies, Kimata (2004a, 2004b) demonstrated similar reductions in allergic reactions following humor experiences in participants with allergic conjunctivitis and bronchial asthma. The results suggest that experiencing humor reduces the likelihood of an overreaction by the immune system. In other research by Atsumi et al. (2004), blood samples of participants had higher levels of antioxidant-like substances that served to reduce free radicals after they had watched humorous videos as compared with blood samples taken before they had watched the videos.

Increased Pain Tolerance

Numerous studies have shown that humor experiences (including play states) can increase pain tolerance (Cogan et al., 1987; Dunbar et al., 2012; H. L. Fritz et al., 2017; Mitchell et al., 2006; Nevo et al., 1993; Panksepp, 1993, 1998; Weaver & Zillmann, 1994; Weisenberg et al., 1995; Zillmann et al., 1993, 1996; Zweyer et al., 2004). Cogan et al. (1987) measured pain thresholds for participants who listened to audiotapes containing humorous, relaxing, or dull content. Pain thresholds were measured using pressure-induced discomfort in which participants who could tolerate higher levels of pressure on an arm were viewed as having higher pain threshold. The results showed that pain thresholds were higher when participants listened to humorous or relaxing content than when they listened to dull content. A second experiment showed that pain thresholds were higher when participants experienced humor versus doing a short math activity.

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A number of studies have induced pain in participants using a cold pressor task, in which participants are asked to keep a hand or arm submerged in ice water (Nevo et al., 1993; Zweyer et al., 2004). Participants who can keep their hand in cold water the longest are viewed as having a higher pain tolerance (MacLachlan et al., 2016; Patanwala et al., 2019). Nevo et al. (1993) investigated to what extent experiencing humor reduced pain in college students. Participants were instructed to hold their hands in cold water while watching either a humorous film or a nonhumorous documentary film. Participants in both groups spent more time in the cold water than participants in a "no film" control group. In the humor group, individual differences in participants' sense of humor and ability to produce humor were related to task performance with higher levels of humor ability related to more pain tolerance. In a later study Zweyer et al. (2004) showed that experiencing humor increased participants' pain tolerance in a laboratory task. Participants (all women) watched a humorous film and carried out the cold pressor task before the film, immediately following the film, and 20 min after the film ended.

In a study of different types of laughter, Dunbar et al. (2012) investigated pain reduction following unforced laughter using two methods for inducing pain: exposing participants to intense cold using a frozen wine cooler sleeve that was −16 degrees Celsius or exposing participants to a maximally inflated cuff used to measure blood pressure. Dunbar et al. claimed that unforced laughter is spontaneously produced in response to a stimulus and is associated with positive emotion. In their study, they examined the pain-reducing effects of unforced laughter in naturalistic and laboratory experiments. Participants either viewed humorous or emotionally neutral videos or stage performance and then carried out a pain tolerance task. The results showed that there was increased pain tolerance in the humorous condition. They concluded that the reduction of pain following laughter stems from the effects of endorphins, which are released during social laughter.

In at least one study, the effect of humor on pain was suggested to be related to endorphin levels in the brain. Manninen et al. (2017) used positron emission tomography to measure the activation of opioid release following laughter. Participants sat alone in a room for 30 minutes after which a baseline scan was obtained. Then, they had participants watch a 30-minute comedy film with others, after which a second scan was obtained. The scan taken after the comedy film revealed that there was release of endogenous opioid in multiple brain areas (i.e., anterior insula, caudate nucleus, and thalamus). The results suggest that humor may be a useful therapeutic intervention for individuals who have health conditions causing debilitating pain. H. L. Fritz et al. (2017) surveyed individuals with fibromyalgia, a condition that can cause widespread body pain. They found that participants reporting higher levels of humor appreciation reported lower levels of pain in daily life. The next section reviews numerous studies investigating the use of humor-based therapies to improve a variety of medical conditions.

It is important to remember that there are other studies that have not shown that humor affects pain (Bruehl et al., 1993; Dixey et al., 2008; Rotton & Shats, 1996). Research with children investigated whether humor could reduce pain during injections (Dixey et al., 2008; B. Goodenough & Ford, 2005). B. Goodenough and Ford (2005) found that children who described themselves as appreciating humor were better able to cope with the unpleasantness of pain. No relationship was found between humor and the intensity of the pain. In a compelling application of these results, Dixey et al. (2008) investigated whether children between the ages of 3 years old and 5 years old who received an injection would experience less discomfort when the injection was preceded by a humorous cartoon sticker (versus no sticker). Unfortunately, the results failed to show a decrease in reported pain in the humorous sticker condition.

THE EFFECTIVENESS OF HUMOR INTERVENTIONS

Given the impressive number of research studies documenting the positive effects of humor on physical and mental health, it is not surprising that some researchers have begun developing and testing the extent to which short-term humor interventions improve mental and physical health outcomes. Calls for this type of research are decades old (McGhee, 1999; Salameh & Fry, 2001). Before discussing the studies that have yielded encouraging results, it should be noted that there are studies in which interventions involving humor have not produced significant outcomes (Adams & McGuire, 1986; Gelkopf et al., 1993; Ko & Youn, 2011; Lapierre et al., 2019; Low et al., 2013; Walter et al., 2007; White & Camarena, 1989).

Among the studies that have demonstrated significant outcomes, the targeted populations include middle-age women (Cha & Hong, 2015), older adults living in care facilities (Boyd & McGuire, 1996; B. Goodenough et al., 2012; Houston et al., 1998; Hsieh et al., 2015; Kuru & Kublay, 2017), older adults living independently (Ghodsbin et al., 2015; Ko & Youn, 2011; Mathieu, 2008; Morse et al., 2018; Prerost, 1993; Proyer et al., 2013; Tse et al., 2010; Yoshikawa et al., 2019), older adults with depression (Konradt et al., 2013), patients with dementia (Brodaty et al., 2014; Kontos et al., 2016; Takeda et al., 2010; Walter et al., 2007), individuals with Parkinson's disease (Bega et al., 2017), adults with schizophrenia (Cai et al., 2014; Rosenheim et al., 1989; Witztum et al., 1999), adults with Type 2 diabetes (Hirosaki et al., 2013), adults with mental illness (Rosenheim & Golan, 1986; Rudnick et al., 2014), women following childbirth (Ryu et al., 2015), patients with cancer (S. H. Kim et al., 2015), individuals with COPD (Lebowitz et al., 2011), hospitalized children (Sánchez et al., 2017), and college undergraduates (Foley et al., 2002; Neuhoff & Schaefer, 2002).

McGhee (1999, 2010) developed a humor regime for the purposes of promoting health in daily life. He referred to it as the Seven Humor Habits

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Program, which was later expanded to include eight habits (McGhee, 1999; see Figure 8.1). The effectiveness of training people to use the eight habits for the purposes of well-being has been examined in two studies (S. A. Crawford & Caltabiano, 2011; Falkenberg et al., 2011). Falkenberg et al. (2011) reported a pilot study involving six adults hospitalized with a diagnosis of major depression. There was no control group. At weekly sessions, participants were introduced to one of the habits. Measures of mood and general functioning were administered before and after the introduction of the humor program. Significant improvement was observed in the majority of measures.

In a larger study involving participants recruited from a community, S. A. Crawford and Caltabiano (2011), compared three groups of individuals over a period of 8 weeks. The humor group learned how to use the eight humor habits. A second social group met weekly and engaged in conversation but did not receive any humor training. A third group served as the control group, completing the same measures as the other two groups after 8 weeks and also 3 months following the completion of the study, but did not receive any additional training or contact. A variety of measures were used to assess well-being, emotions, and self-efficacy. The same questions were asked at the end of the program as well as 3 months after participants completed the program. Participants in the humor group experienced decreased stress, anxiety, and depression and increased optimism, positive affect, perceptions of control, and self-efficacy. Outcomes for the social and control groups were similar and did not show the patterns of the humor group.

Recently, the Second City Comedy Troup based in Chicago, which is well known for producing many professional comedians, has developed partnerships with researchers to develop interventions for populations who might benefit in terms of mental and/or physical functioning (Bega et al., 2017; Morse et al., 2018). In a qualitative study, Morse et al. (2018) investigated the effectiveness of a humor intervention associated with Second City for adults over age 55 years. Among the benefits of the program described by participants were increase levels of comfort, positivity, self-awareness, and feelings of acceptance by others in the group. Participants also indicated that following the intervention, they experienced improvements in social functioning and ability to solve problems. In a similar study, Bega et al. (2017) tested 22 individuals

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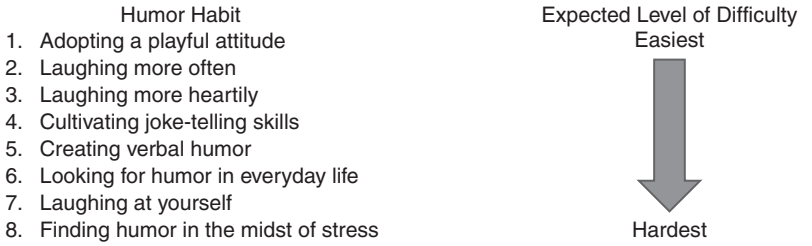
FIGURE 8.1. The Eight Humor Habits



Note. Data from McGhee (1999)

with Parkinson's disease who met once a week for 12 weeks with a member of the Second City faculty. The results indicated that participants enjoyed the intervention, all participants completed it, and most participants attended at least 80% of the meetings. Measures of daily functioning in terms of Parkinson's symptoms were taken before and after the program. On average, participants' scores reflected significance improvement.

Wellenzohn and colleagues (2016a, 2016b) tested the effectiveness of a brief online humor intervention. Wellenzohn et al. (2016b) tested the benefits five humor activities: focusing on three funny things; counting funny things from the day; collecting funny things, which involved selecting the funniest experience in their life and writing it down in as much detail as possible; applying humor during the day; and considering how humor could have reduced stress during a prior event. For each activity, there was a placebo control group in which participants were asked to reflect on early childhood memories. The results showed that participants reported lower levels of depression and higher levels of happiness. Three of the interventions led to higher happiness 6 months later. Further, Wellenzohn et al. found that some individuals liked the intervention more than others and that the benefits of the intervention may have been higher for those who liked the program more.

Wellenzohn et al. (2016a) tested the effectiveness of the three funny things humor-based intervention. Participants were randomly assigned to one of three intervention conditions or to a condition that served as a placebo control. For 1 week, participants were instructed to write about three funny things with either a past, present, or future focus. In the control condition, participants wrote about memories from early childhood. Participants completed pretest and posttest measures of depression and happiness. Increased happiness and decreased levels of depression were observed in all three humor conditions.

Using a similar approach, Maiolino and Kuiper (2016) investigated whether participants writing briefly (for 5 minutes) about their own positive experiences after a couple weeks would increase well-being. Participants in another group were asked to write about things that made them feel grateful or examples of positive life experiences that they savored. Participants in a control group wrote about daily life experiences. Participants in all groups reported their well-being in a variety of measures before and after the writing exercise. Writing about humor, experiences leading to gratitude, and savored positive life experiences lead to increased well-being, but writing about daily life experiences did not. Overall, individuals reported using affiliative and self-enhancing humor types more often in daily life had higher levels of well-being. In addition, those who reported using self-defeating and aggressive humor styles more often had lower levels of well-being.

Researchers have begun to demonstrate that humor-related interventions can produce benefits for individuals with a range of health statuses. Relatively few of these studies have used the most rigorous of methods, which involves randomly assigning participants to an intervention or a control condition. Randomized clinical trials of humor-based interventions are rare, as there are

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multiple obstacles in conducting them, including cost, availability of capable staff, and research volunteers (Djurisic et al., 2017). In one of the few studies using a randomized clinical trial design, S. H. Kim et al. (2015) investigated the effect of a laughter intervention for a group of patients treated for breast cancer. There were four sessions in the intervention, which were completed by 31 participants. Twenty-nine additional participants were included in the control group. Both groups completed assessments of stress, anxiety, and depression at the start of the study and after each session. Participants in the intervention group showed significant reductions in all three measures following the intervention, with significant reductions observed as soon as after the first session. Those in the control group showed no significant change.

Among the most compelling research on the benefits of humor interventions on health are those involving individuals with Type 2 diabetes. (Hayashi et al., 2006; Hirosaki et al., 2013). Hirosaki et al. (2013) found that laughing after eating resulted in lower glucose levels in a group of healthy older adults. Two groups, which assigned randomly, were given an exercise program involving laughter. Hayashi et al. (2006) investigated whether positive emotion expressed through laughter affected changes in individuals' gene expression. They collected blood samples of individuals with Type 2 diabetes. One group had heard a humorous story, and the control group had listened to a nonhumorous lecture. They analyzed the expression of over 18,000 genes from blood leukocytes, which are cells that participate in the human immune response. The results showed that the expression of 23 genes differed in the humor intervention group. Hayashi et al. urged caution in interpreting the results, suggesting that the study merely showed that there may be a link between positive emotion and gene expression.

Among the most impressive studies is the Sydney Multisite Intervention of LaughterBosses and ElderClowns study (Brodaty et al., 2014; B. Goodenough et al., 2012; Low et al., 2013), which was conducted across multiple healthcare settings in Australia. Low et al. (2013) reported results from 418 participants from 35 nursing homes regarding the effectiveness of a humor intervention in reducing depression, quality of life, or social engagement. The results showed that there was a greater reduction in participants' levels of agitation for those receiving the humor intervention as compared with participants who did not receive the humor intervention. Brodaty et al. (2014) analyzed the data for those individuals who received the humor interventions (i.e., 189 participants from 17 nursing homes) as well as responses from staff at the facilities, finding the higher commitment by the staff predicted higher engagement on the part of the participants. Further, when participants' engagement was high, there were lower levels of depression, agitation, and neuropsychiatric symptoms.

Not every study has found benefits to humor-based interventions. In some cases, humor-related interventions may not be ideal, as in cases where it may lead to adverse side effects. At least one study has demonstrated that humor therapy inducing laughter may not be ideal for some patient groups.

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For example, Lebowitz et al. (2011) investigated the effects of a humor intervention on a group of patients diagnosed with COPD. They found that when patients laughed, they experienced hyperinflation of their lungs, which severely reduces breathing ability. For other populations, which have been shown to have deficits in comprehending humor, there may be little or no benefits of therapeutic uses of humor, such as with individuals with schizophrenia (Gelkopf et al., 1993; Gelkopf & Sigal, 1995).

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SUMMARY

This chapter reviewed the large and growing literature on the topic of the effects of humor on the body and mind. Correlational studies have found some evidence that higher levels of sense of humor are related to better physical and mental health. Large studies from Norway provide some of the strongest evidence for the link between humor and better physical health. Greater use of the positive humor styles (i.e., self-enhancing and affiliative) has been found to be related to lower levels of depression and higher levels of well-being. The health benefits of humor may stem from the effects of humor experiences on the body, including activation of the sympathetic nervous system affecting breathing, heart rate, the release of hormones (e.g., epinephrine, norepinephrine, cortisol), and the production of endorphins in the brain. Studies have also found that experiencing humor leads to increases in immune functioning, as indicated by increases in immune markers in saliva and blood. A growing number of clinicians have tested the feasibility and effectiveness of humor interventions for a variety of target populations. Many of these studies show that humor interventions can produce positive outcomes in healthy individuals and those dealing with illness. One study showed that laughter therapy may produce adverse outcomes for individuals with COPD. The benefit of humor-related interventions in populations that have been found to have deficits in comprehending humor (e.g., individuals with schizophrenia) may be smaller than with other populations.

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