Chapter 18

Health, Stress, and Coping

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Jim works at a tech company, and he just had a major argument with a co-worker over their company's diversity policies. To help him manage his anger, Jim steps outside and smokes a cigarette (Baker, Brandon, & Chassin, 2004). The nicotine in that cigarette contributes to changes in his mesolimbic dopaminergic system that furthers his dependence on nicotine, and the cancer-causing compounds in cigarette smoke cause molecular changes to cells throughout his body that, over time, increase the chances that he could develop lung cancer or cardiovascular disease.

This example highlights several key points. First, health is inherently social. Jim's argument with his co-worker increased the probability that he would become upset and subsequently smoke to reduce his negative emotions. Second, health is inherently biopsychosocial (Engel, 1977), involving the interplay between biological, social, and psychological factors. Nicotine from previous smoking experiences caused changes to reward circuits in Jim's brain, such as the mesolimbic dopaminergic system. Those changes increased the likelihood that Jim uses smoking as a strategy to reduce negative emotions, thus exposing cells in his body to cancer-promoting molecular changes.

This chapter focuses on health, stress, coping, and health behaviors, which constitute the major intersections between health and social psychology. Readers interested in learning more about connections between health and substantive areas within social psychology and health can turn to a review by Klein, Shepperd, Suls, Rothman, and Croyle (2014) and a special issue of *Health Psychology* on theoretical innovations in social and personality psychology and their implications for health edited by Klein, Rothman, and Cameron (2013). Both reviews note that the strong experimental tradition within social psychology is in line with recent shifts in biomedical research that favor incorporating basic experimental research as a testing ground for interventions. This "experimental medicine" approach draws on laboratory studies that target plausible mechanisms of behavior (or biological change) to home in on intervention targets that can be deployed in later intervention studies (Riddle & Science of Behavior Change Working Group, 2015). Thus, a theme throughout this chapter is that social psychology is valuable in furthering experimental medicine efforts to refine and effectively target interventions to improve public health. But before continuing, this chapter must answer a key question . . .

What Is Health and How Should It Be Measured?

One widely cited definition is the half-century-old World Health Organization (2006) definition that health is "a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity" (p. 1; for more nuanced discussion of this definition, see Huber et al., 2011). Health involves the ability to maintain physical, social, and mental functioning in the face of internal (i.e., disease states) and external changes (i.e., stressful life event). What "functioning" is and how to measure it poses a major challenge for health psychology research because biopsychosocial models of health and illness emphasize the importance of measurement at multiple levels. In addition, operationally defining health and health-related constructs is critical for applied settings including public health and medicine, where measurement is intimately tied with health care decision-making at the level of standards of care, individual practitioners, and patients. Thus, determining what types of measures are clinically relevant for diagnostic, prognostic, and treatment decision-making is of paramount importance.

Fortunately, there appears to be triangulation around approaches to defining and measuring health. In 2001, the National Institutes of Health (NIH) Biomarkers Definitions Working Group distinguished between *clinical endpoints* and *surrogate endpoints,* for the purposes of regulating approval of biomedical treatments. Consistent with the functioning-related definitions of health previously described, clinical endpoints are considered the "most credible characteristics used in the assessment of the benefits and risks of a therapeutic intervention in randomized clinical trials" and constitute "how a patient feels, functions, or survives" (Biomarkers Definitions Working Group, 2001, p. 91). That definition can include patient-reported outcome measures like health-related quality-of-life (Cella et al., 2007), objective ratings of physical function or observed events like hospitalization and mortality. Importantly, clinical endpoints are directly relevant to healthcare providers and patients, and increased recognition of the importance of patient-reported outcomes opens the door for social psychologists to incorporate such measures in research.

In both medicine and social psychology there has been considerable inclusion of biological measures (biomarkers) in research. The nonself-report nature of those measures, their ease of collection (particularly in saliva), and their direct links to biology have made biomarkers highly appealing. Some biomarkers have direct health relevance in that the evidence base suggests they can "potentially substitute for a clinical endpoint in clinical trials" (Biomarker Definitions Working Group, 2001, p. 91). Such *surrogate endpoints* like cholesterol levels or blood pressure have value because they can identify early indicators of benefit or harm in clinical trials when clinical endpoints like cancer recurrence or death may take years to emerge (Biomarkers Definitions Working Group, 2001). However, most of the biomarkers that have been examined in social/health psychology research are *not* surrogate endpoints. Instead, they are better described as *biological mediators* that explain links between psychosocial factors and underlying biological processes of disease (Miller, Chen, & Cole, 2009) but would not, in and of themselves, be considered a substitute for clinical endpoints. In other words, those biomarkers should not be construed as measures of health. Finally, just like any other type of measurement, objective biomarkers are often used as imperfect indicators of constructs like "stress," "inflammation," or "health," and just like any other psychological measure, attention to theory, reliability, and validity are critical. Objective measures are by no means perfect measures of any construct, despite their objectiveness. In addition, reverse inferences like "people with higher cortisol levels are more stressed" are tempting but are ultimately incorrect and ill-advised (Cacioppo & Tassinary, 1990) for reasons that are described in the next section. Thus, researchers interested in incorporating biomarkers into research should develop close collaborations with biomarker content experts and be well-informed about current theory related to biomarkers of interest. As discussed in the next section, ascribing meaning to stress biomarkers has been particularly problematic.

What Is Stress?

Consider this common sequence: (a) "something bad" happens to you, and (b) you respond to that "something bad" with physiological, cognitive, and emotional changes that are under conscious and nonconscious control. Which one should be considered *stress*: (a), (b), or both? Can measuring (b) inform us as to whether and what kind of (a) happened?

In many ways the "original sin" of stress research is that the word *stress* is used colloquially and scientifically to refer to (a), (b), or both, creating significant challenges for theory, measurement, applications, and communication among researchers and with the public. Moreover, within (b), *stress* has been used to exclusively refer to physiological (Selye, 1955), cognitive, and emotional changes (Lazarus & Folkman, 1984), contributing to expectations that changes in these different channels should meaningfully covary when they often, perhaps normatively, do not covary. Thus, this section will avoid use of the singular term *stress* as much as possible and will differentiate concepts (a), (b), and concepts within (b).

Theoretical Frameworks and Broad Conceptual Considerations

The predominant psychological framework used to conceptualize stress concepts (a) and (b) is the transactional model of stress and coping outlined by Lazarus and Folkman (1984). In that model, individuals are exposed to events and interpret the meaning of those events (appraisals), and cognitive, emotional, and physiological responses to those events follow from those interpretations. This conceptualization recognizes the dynamic interaction between situations and individual differences in appraisals in determining how individuals adapt to events. For instance, being fired from a job can be appraised as a drastic harm to personal, social, and financial well-being, leading to depression and anxiety. The same event could also be appraised as an opportunity to pursue new personal, social, and work interests, leading to benefits for psychological well-being. While these distinctions have been present in stress research for three decades, conflating situations, appraisals, and responses in conceptualization and measurement continues to be a problem. Moreover, the time course of situations leading to interpretations and responses is often rapid, and with greater understanding of the role of nonconscious cognitive, affective, and physiological processes, temporally sequencing appraisals as taking place before and determining responses is problematic (Moors, Ellsworth, Scherer, & Frijda, 2013). Thus, this chapter adopts the distinction described by Harkness and Monroe (2016) between stress exposures (the situation; often described as stressors) and stress responses—that is, everything in (b)—where appraisals are one of many channels through which the organism responds to exposures.

Another key consideration is the duration and course of exposures and responses. A central theme in research on the health impacts of stress exposures is that psychological and physiological responses to stress exposures are evolutionarily programmed to help organisms engage with the situation or disengage from the situation to maintain survival; the highest intensity responses would be considered fight or flight, respectively. The adaptations broadly involve heightened vigilance to psychological and physical threats across numerous functions and systems (McEwen 1998; Robles & Carroll, 2011). Psychological, physiological, and behavioral responses to events that resolve within a short amount of time (minutes to weeks) and have a clear onset and offset within that duration could generally be viewed as adaptive, as long as those responses do not cause immediate harm to the self or others. On the other hand, stress exposures (and their subsequent activation of responses) that transpire over long durations (months to years), and/or where the course is unremitting lead to changes in stress-responsive biological systems as well as behavior (coping)

that have deleterious health consequences over the long term (McEwen 1998). Accordingly, understanding the impact of *chronic stressors* (exposures and/or responses) like poverty, discrimination, and living with a chronic illness (for patients and caregivers) are major topics in health psychology (Schneiderman, Ironson, & Siegel, 2004). In addition, such work is highly informed by when in the life course such exposures take place. For example, stress exposures that take place in early childhood may program the neurobiology and immunology of the stress response in ways that impact health throughout the life course (Miller, Chen, & Parker, 2011).

Exposures

Stress exposures can be manipulated experimentally, measured via interview, self-report, or selected-for in assembling a sample (e.g., recruiting caregivers for a family member with chronic illness or recruiting people who experienced a specific event like a terrorist attack). Current approaches to measuring exposures involve distinguishing among daily occurrences or hassles, discrete events, and chronic difficulties (Harkness & Monroe, 2016). Approaches to measuring exposures vary along many dimensions, including degree of participant and investigator burden (in terms of training, time, and cost); who defines and rates severity of exposure (participant vs. researchers); how well precise dating, duration, time course, and event sequencing can be ascertained; and whether ratings can be standardized across raters. Careful attention to measurement is critical, as using methods with less reliability may explain the inconsistent patterns of results in research linking stressful events to health outcomes. For example, one of the most well-known findings linking stressful events to depression is that individuals with a particular polymorphism in the promoter region of the serotonin transporter gene are more likely to develop depression following stress exposures, although this finding has also failed to replicate across multiple studies, including in meta-analytic reviews (Karg, Burmeister, Shedden, & Sen, 2011). However, Karg et al. (2011) noted that almost all the replication failures involved studies that used checklist measures of stress exposures.

Concretely, checklist approaches to assessing stress exposures have been criticized for sacrificing validity and reliability in favor of low investigator and participant burden (Harkness & Monroe, 2016). Such approaches involve having participants select exposures (e.g., divorce, personal injury or illness, change in financial state) that have happened within a particular timeframe (e.g., today, past year) from a larger list of possible exposures. Although debate persists, some scholars have argued that checklist measures of stress exposure are so problematic that having no checklist measure in a given study is preferable to including a checklist measure (Harkness & Monroe, 2016). One concern is that different people experiencing very different events, such as a mild flu compared to a heart attack, can check off the same event (personal injury or illness). Another concern is that people can provide false positives, where they indicate an event has happened when it actually has not, because of faulty recall (misremembering) or even biased recall, such as recalling more stressful events. By contrast, interview approaches that involve trained interviewers and potentially rating teams mitigate many of the validity and reliability problems that are noted in checklist measures, regardless of time frame. Newer approaches that combine detailed follow-up questions and precise dating/timing with electronic administration can help reduce participant and researcher burden in assessing daily hassles, events, and circumstances (Harkness & Monroe, 2016; Shields & Slavich, 2017).

Manipulating stress exposures in laboratory settings has been a mainstay of social and health psychology research, allowing for frequent sampling of cognitive, affective, physiological, and behavioral responses that are challenging to observe in naturalistic settings. For example, the Trier Social Stress Test, which involves performing a speech and mental arithmetic in front of a neutral audience, has been used in over 700 studies to examine changes in threat appraisals, self-reported mood, circulating hormones, cardiovascular responses, and speech-related behaviors (Campbell & Ehlert, 2012; Goodman, Janson, &

Wolf, 2017). In addition, manipulating stressor exposures in the laboratory has allowed for determining objective features of stress exposures that may have differential associations with stress responses. As previously mentioned, hundreds of studies have used laboratory stress like the Trier Social Stress Test to stimulate responses in the hypothalamic–pituitary–adrenal (HPA) axis, which is a cascade of neuroendocrine hormones that eventually leads to production of cortisol by the adrenal cortex (which sits on top of the kidneys). Cortisol plays critical roles throughout the body when faced with challenges, including increasing energy availability in the form of glucose and making the heart more sensitive to stimulation signals from the brain, and can be easily measured in saliva (Sapolsky, Romero, & Munck, 2000). Cumulative meta-analyses across over 200 studies show that laboratory stressors that involve motivated performance, uncontrollability, and the threat of social evaluation were associated with larger HPA axis responses, suggesting that social threat plays a key role in activating the HPA axis (Dickerson & Kemeny, 2004).

While the role of social threat in HPA axis activation has been corroborated in real-life exposures, such as competitive ballroom dancing (Rohleder, Beulen, Chen, Wolf, & Kirschbaum, 2007), concerns remain regarding the generalizability of other physiological responses to specific types of laboratory tasks to exposures in real life (Zanstra & Johnston, 2011). In one study, for example, 66 undergraduates went through five different laboratory stress exposures: challenging cognitive tasks, watching a six-minute clip from a suspense/horror film, giving a two-minute speech about a current stressor, and holding one's hand in ice water for one minute (Johnston, Tuomisto, & Patching, 2008). The researchers measured changes in heart rate in response to each task. Within several weeks of the laboratory stress exposures, participants were fitted with an ambulatory monitor that continuously recorded heart rate as they went through seven hours of daily activities, which included giving an oral presentation during a class. Only heart rate responses to the ice water task were correlated with variations in ambulatory heart rate during the day ($r = 0.35$), and heart rate responses to only two of the five tasks (the ice water task and using a mirror to trace a star pattern) were correlated with heart rate responses to the oral classroom presentation (*r*s between 0.27 and 0.29).

Psychological and Physiological Responses

Responses to stress exposures take place simultaneously across multiple levels, shown in Figure 18.1. First, stress exposures that originate outside the person (rather than disturbances to the organism that occur within the person, like an infection or a stroke), are encoded by sensory and perceptual inputs to the central nervous system and processed by circuits involved in affective and social-cognitive information processing (Erickson, Creswell, Verstynen, & Gianaros, 2014; Lane & Wager, 2009; Ulrich-Lai & Herman, 2009). Such circuits are implicated in evaluating the threat, safety, and reward value of stress exposures, computing degree of certainty in the environment, inferring the mental states of others, and determining the degree of fit between the current environmental state and one's motivations and goals. Moreover, those circuits also incorporate information about one's internal environment, such as blood pressure, inflammation, and energy state. For simplicity, responses to stress exposures are subdivided into three output channels: subjective experience, referring to internal cognitive/affective states; physiological, referring to stress response signals sent to the rest of the body; and behavioral, referring to externally observed behaviors that are reviewed in the subsequent section on coping. In keeping with a biopsychosocial model, both the underlying neurobiology and psychological constructs are reviewed together.

In the transactional model, external events are evaluated based on their meaning in terms of implications for one's goals and degree of fit with the environment (Lazarus & Folkman, 1984). The core evaluations are *primary appraisals*: the degree to which the event may have positive, neutral, or detrimental effects on

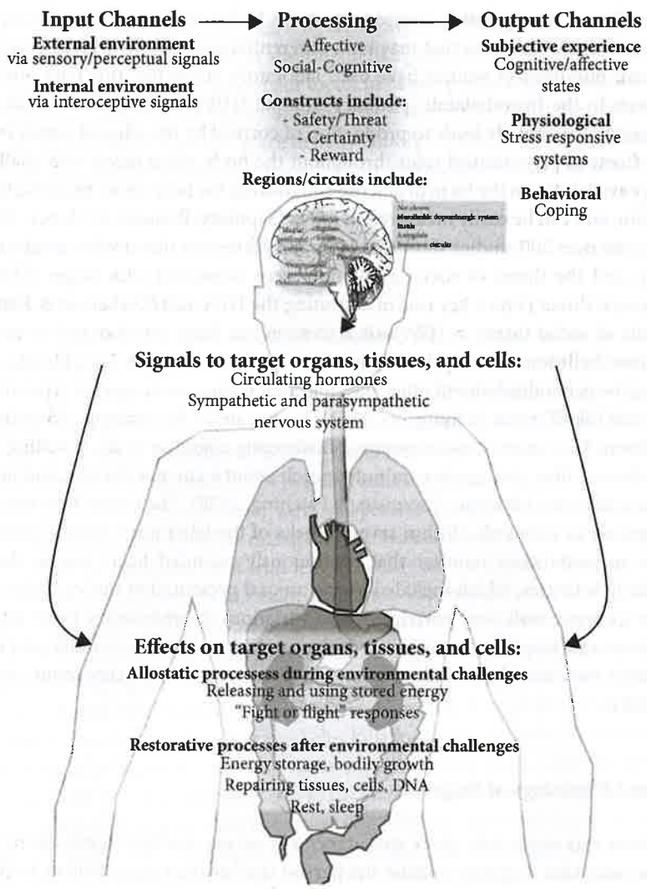

FIGURE 18.1. Conceptual diagram of how stress exposures are processed by the brain and accompanying output channels. The top portion illustrates the different input channels that relay information about the external and internal environment, the types of processing that takes place and associated constructs and neural regions/circuits, and the output channels that constitute stress responses. The middle and bottom portion illustrate the types of signals sent by the brain to the rest of the body and a conceptual summary of their effects on target organs, tissues, and cells.

personal well-being. Appraisals of detrimental effects could include damage already done (harm), potential future damage (threat), or the possible harm/threat coupled with potential benefits and growth given sufficient resources (challenge). Research linking appraisals to neurobiology has focused on paradigms that elicit fear, such as threat of electric shock, and identified regions within the amygdala, dorsal anterior cingulate, and dorsomedial prefrontal cortex in threat appraisal-related phenomena including catastrophizing and worry (Kalisch & Gerlicher, 2014). Other regions involved in primary appraisal processes include insular cortex, which processes representations of subjective affective states (Singer, Critchley, & Preuschoff, 2009), and ventromedial prefrontal cortex, which is implicated in processing the affective meaning of external events (Roy, Shohamy, & Wager, 2012).

Secondary appraisals refer to the individual's assessment of the abilities and resources that can be used to maintain functioning during the stress exposure (Lazarus & Folkman, 1984). Abilities refer to skills and available strategies, and resources refer to personal assets that have developed over time and that exist both internally and externally. Internal resources can be protective during stress exposures, such as high self-esteem, perceived mastery, and optimism; or detrimental, such as a high level of negative affectivity (Taylor & Stanton, 2007). External resources include socioeconomic status and social resources, the latter of which is described in the subsequent section on coping. As noted by Taylor and Stanton (2007), high coping resources may be associated with less activation in the previously described threat-related regions or greater activation of regions that can downregulate responses in threat-related regions, such as the ventrolateral prefrontal cortex.

The neural circuitry described thus far and shown in Figure 18.1 overlaps with circuits that govern the signals that are transmitted to the rest of the body though paths that include circulating hormones (i.e., the HPA axis and other endocrine axes) and the sympathetic and parasympathetic nervous systems (Gianaros & Hackman, 2013). Signals from the brain to peripheral target tissues and organs like the heart, liver, skin, lymph nodes, and endocrine glands can be transmitted quickly (on the order of milliseconds) through sympathetic and parasympathetic nerves or more slowly (on the order of seconds to minutes) through endocrine hormones including adrenocorticotropic hormone, oxytocin, or follicle stimulating hormone (Carter, 2014; Ulrich-Lai & Herman, 2009). Once signals reach target organs, they initiate effects on target organs such as modulating heart rate, stimulating sweating, stimulating glucose release, and secreting additional hormones (e.g., cortisol, androgens, estrogens) that have effects on target organs throughout the body and altering the function of immune cells.

Physiological responses to stress exposures can be broadly classified as allostatic—changing physiological "set points" to help the organism survive during changes in the environment (McEwen 1998; Robles & Carroll, 2011)—or restorative, which respond after environmental challenges have abated to restore and repair the organism. Canonical allostatic processes include acute increases in sympathetic nervous system and HPA axis activity during stress exposures, and restorative processes include energy storage and growth-related activities, repair (from wounds all the way to the level of DNA), and sleep, which organizes restorative processes throughout the body (Robles & Carroll, 2011). Ultimately, the biological processes described in Figure 18.1 may explain how psychosocial factors influence health and could be potential candidate outcomes in experimental medicine research and targets for interventions.

Stress responses across the three output channels described in Figure 18.1 unfold over multiple timeframes, from milliseconds to minutes to hours. Unfortunately, the "original sin" of stress research combined with the inherent challenges of measuring stress responses frequently leads to assuming coherence or a high degree of correlation between stress responses across output channels. Drawing from the opening example, a common assumption is that if Jim's blood pressure and cortisol levels are elevated during his argument with a co-worker, he will also report high self-reported appraisals of stress ("I feel stressed") or negative emotions, like anxiety or anger. However, the picture is much more complicated; for example, in a systematic review of studies using the Trier Social Stress Test and similar exposures, self-reported negative emotional responses to the stress exposure were correlated with cortisol and cardiovascular responses in roughly 25% of studies (Campbell & Ehlert, 2012). In studies that showed statistically significant correlations between emotional and physiological responses, the degree of correlation was modest (*r*s between 0.3 and 0.5).

Assuming coherence between stress response output channels can lead to superficial reverse inferences—inferring stress exposures from physiological stress responses, which runs counter to both formal inference principles (Cacioppo & Tassinary, 1990) and the actual architecture of the neural circuitry that regulates stress responses. Different stress response channels are subject to different degrees of modulation and processing at multiple levels (Ulrich-Lai & Herman, 2009). Thus, responses in a particular

channel, such as affective experience or skin conductance, result from multiple stages of processing that incorporate top–down information about the situation and bottom–up information about physical states (like pain).

Behavioral Responses: Coping

Coping broadly refers to how individuals adapt to changes in the environment, both internally (in terms of cognitive and affective changes) and in their externally observed behavior (Skinner, Edge, Altman, & Sherwood, 2003; Taylor & Stanton, 2007). One of the main challenges in theory and research on coping is that any behavior that is causally related to the stressful event (in that it would not have occurred had it not been for the event) is an instance of coping. While the possible responses to a given stressful event are not infinite (flying and turning invisible are not options when faced with a stress exposure), they are numerous, and this has led to a proliferation of possible categorizations. The most concrete demonstration of this proliferation is from a comprehensive review of coping and its underlying structure by Skinner et al. (2003, Table 4) which lists 15 different classification systems. The three most prominent types of coping categorizations are

- Based on *function* (purpose of the behavior): Problem- versus emotion-focused coping. Problem-focused coping involves strategies to change the stress exposure situation. Emotion-focused coping involves strategies that regulate emotions generated by the stress exposure.
- Based on *motivation* to move psychologically and/or physically toward (approach) or away from (avoidance) the stress exposure.
- Based on *types of action*: Changing the stress exposure situation (primary control), accommodating the exposure (secondary control), and giving up attempts to cope (relinquished control).

All three types of categorizations have been highly generative in terms of theory, measurement, and empirical contributions to our understanding of coping. At the same time, no categorization method has emerged as fully comprehensive, and no method has escaped criticisms regarding conceptual clarity.

In their comprehensive review and critique of coping classification systems, Skinner et al. (2003) proposed a hierarchical conceptualization that proceeds from lower- to higher-order categories. Specific *coping instances* like "I got the notice that my poster was accepted for presentation at a conference in three months, so now I am making a schedule for when I need to complete each part of my poster" were grouped into lower-level ways of coping (e.g., making plans), which were then grouped into higher-order families of coping (e.g., problem-solving). Finally, specific families were categorized under the highest level: adaptive processes that encompass broad sets of evolutionary functions. While multiple adaptive processes may exist, three were explicitly identified: (a) coordinating the individual's actions with contingencies in the environment, which is consistent with the poster example; (b) coordinating the individual's reliance on others with social resources in the environment; and (c) coordinating an individual's preferences with options available in the environment. Ultimately, having a conceptually clear taxonomy of how individuals respond to stress exposures aids efforts to identify what ways or families of coping, or adaptive processes more broadly, are related to effective coping outcomes in experimental studies in the laboratory and which could be incorporated in future interventions.

Coping takes place within stress exposure contexts, and, thus, the effectiveness of particular coping strategies will depend on that context (Lazarus & Folkman, 1984). *Effectiveness* is typically defined in terms of psychological well-being (low distress), behavior (activity and function returned to pre-exposure levels), and degree of fit with changes in the environment (Taylor & Stanton, 2007). Importantly, effectiveness or

outcome measures must be disentangled from coping measures to avoid confounding ways of coping with outcomes. One example is the overlap of psychological distress items (e.g., "I feel restless or more wound up than usual") with emotion-focused coping items (e.g., "I become very tense"), which led to preliminary conclusions that engaging in emotion-focused coping was normatively related to greater psychological distress (Austenfeld & Stanton, 2004). Removing overlapping items allowed for greater insight into the value of emotion-approach coping for psychological and physical adjustment in chronic illness.

In general, the field now has evidence that different families of coping can be adaptive depending on the context and that flexibility in deploying strategies is beneficial (Bonanno, Romero, & Klein, 2015). For instance, while avoidance is generally maladaptive over the long term for psychological and physical health, it can be protective during short-term, uncontrollable stressors like waiting to hear about a highly self-relevant outcome like college admissions (Taylor & Stanton, 2007). One example is receiving a questionable outcome during screening mammograms (low-dose X-ray pictures to look for signs of breast cancer in women without breast symptoms or problems); such screenings are not 100% accurate, and the rate of screening showing there is cancer when, in fact, there is no cancer (false-positive results) after 10 yearly mammograms is around 50% to 60% (Susan G. Komen', 2017). A woman who receives a questionable screening result must go through additional testing to definitively determine whether she has breast cancer. Thus, the time between the initial mammography screening and finding out results of additional test is highly uncertain, including the potential for being diagnosed with breast cancer. In a study of 98 women in this exact circumstance, women who reported higher levels of cognitive avoidance (items included "I tried to forget the whole thing") after receiving a questionable screening mammogram result showed lower anxiety symptoms four weeks later, after they were notified that they tested negative for breast cancer (Heckman et al., 2004).

Interpersonal Influences on the Development of Individual Differences in Coping

Life histories play key roles in modifying how people adapt in the face of stress exposures. Greater conflict and less support in the family environment is related to greater negative emotional reactivity to stress exposures (Repetti, Robles, & Reynolds, 2011; Repetti, Taylor, & Seeman, 2002). Children in those environments exhibit less effective coping strategies, such as using aggression in response to daily stress exposures, which may then develop over time into behavioral, cognitive, and affective components of hostility, depression, and loneliness later in adulthood (Miller et al., 2011). In addition, stressful family environments can contribute to youth turning to unhealthy behaviors (substance use, risky sexual behavior, unhealthy eating) as a method of coping with stress exposures and regulating emotion, which may then persist into adulthood (Miller et al., 2011; Repetti et al., 2011).

Life histories also play a role in the development of the attachment behavioral system, which promotes safety, survival, and security by regulating closeness to nurturing caregivers (ideally) in childhood (e.g., Bowlby, 1979/2005). According to attachment theory (see Chapter 10), early family environments contribute to mental representations of the self and others (i.e., working models) that influence the development of the attachment system and, in particular, how individuals relate to close others (e.g., caregivers, romantic partners). During stress exposures, we tend to seek close others as a safe haven for support and comfort, and during more certain times, the actual or symbolic presence of close others can provide a secure base from which to explore new environments and pursue goals.

Over time, individual differences in attachment orientations develop through interactions with the early environment and with close others throughout life, which how individuals view others (as trustworthy or not), the self (as being worthy of closeness; desired degree of overlap between self and other), and how individual regulate their emotions. Those individual differences are conceptualized along two dimensions: anxiety and avoidance (see Chapter 10). The anxiety dimension involves degree of concern

about rejection and abandonment by close others, and the avoidance dimension involves degree of comfort with being close to others.

In the context of coping, individuals who are characterized by low anxiety and avoidance (described as securely attached) have greater confidence in the responsiveness of their attachment figures, turn to those figures for help, and in doing so may adopt more approach-focused strategies including both problem-focused and emotional-approach coping (Simpson & Rholes, 2012). Individuals with high anxious attachment, being less certain about having responsive attachment figures, monitor those relationships for signs of threat. In doing so, they may turn to hyperactivating strategies (Mikulincer, Shaver, & Pereg, 2003) that serve the goal of coordinating the individual's reliance on others with social resources in the environment but do so in a manner that Skinner et al. (2003) might characterize as maladaptive help-seeking such as complaining or whining or seeking reassurance in a hostile, angry way. Individuals with avoidant attachment, characterized by a lack of comfort with closeness and greater preference for independence in relationships, may cope with stressful exposures by maintaining distance from close others through avoidance or defensiveness.

Individual differences in attachment orientations clearly have origins that stem from early life interpersonal experiences. Likewise, characteristics that coping researchers view as intrapersonal, like optimism, a sense of mastery or control over the environment, and self-esteem, also stem from early experiences. Having more intrapersonal resources is generally protective and is related to more effective coping, whereas greater negative affectivity is a risk factor for maladaptive coping (Taylor & Stanton, 2007).

Interpersonal Modifiers

The importance of the attachment behavioral system for coping suggests that social relationships are a critical modifier of the links between stress exposures and responses. Social relationships can be conceptualized in multiple ways (Cohen, Underwood, & Gottlieb, 2000; Uchino, 2003). The actual structure of social networks in terms of number of contacts and the types of roles (co-worker, friend, neighbor, etc.) constitute one's degree of *social integration*. The functions people provide to one another, including tangible, emotional, and informational support, and the degree to which those functions match or are responsive to an individual's needs are also key determinants of how social relationships benefit others. In addition, beliefs and attitudes about one's social network play key roles in modifying the effects of stress exposures on coping, including how much an individual believes his or her social network is available to him or her during times of need (i.e., perceived available social support); views people in his or her network as understanding, validating, and caring (*perceived responsiveness*); and views people as close or distant (*closeness*). In the context of coping theory and research, much of the work has focused on how individuals coordinate reliance on others with social resources that are available (i.e., support seeking) and its association with outcomes like psychological distress (Skinner et al., 2003). At the same time, the structure and functions of social networks and interactions between people during support exchanges may also influence how individuals deploy specific ways of coping.

The aforementioned neural circuits involved in affective, cognitive, and social information processing evolved in a social context, and social baseline theory proposes that the social context is the expected default in which the brain functions (Coan & Sbarra, 2015). The primary implication is that the brain's true baseline state is when individuals are in proximity to others (i.e., social resources), and that proximity has benefits for individuals—namely, that any risks to safety are distributed among others and that any efforts needed to adapt to the environment are shared among others. Consequently, the degree of energy used by the brain and effort expended by the individual to adapt to stress exposures is less in the context of social resources, and the more that those social resources are indeed beneficial (i.e., trusted, closer, more responsive), the more benefit to the individual. Outside of those social contexts, such as during

separation or isolation, our ability to cope with stress exposures is diminished because we are no longer in the default state. One corollary phenomenon related to social baseline theory is communal coping, which encompasses both the degree to which a stress exposure is appraised as shared between more than one person and the degree to which multiple individuals work together to adapt to the stress exposure (Lyons, Mickelson, Sullivan, & Coyne, 1998). Communal coping has been of particular interest in couples where one partner is facing a chronic illness (Berg & Upchurch, 2007). For example, among couples in which one partner has type 2 diabetes, higher self-reported communal coping (whether by questionnaire, daily diary, or based on greater "we-language" use) is related to lower patient psychological distress and better medication adherence (reviewed in Helgeson, Jakubiak, Van Vleet, & Zajdel, 2017). Taken together, the structure of social networks in terms of their availability and closeness as well as their support functions could be considered the default mode through which the brain and individuals adapt to stress exposures by involving others in the adaptation process.

One mechanism through which social relationships can influence coping is through interpersonal influences on one's emotion regulation (Marroquin, 2011; Reeck, Ames, & Ochsner, 2016). While emotion regulation through strategies that include situation selection/modification, attention deployment, cognitive changes (e.g., reappraisal), and response modulation have been conceptualized as intraindividual processes (Gross, 2015), other people can play key roles in influencing those emotion regulation processes (Reeck et al., 2016). As previously described, social baseline theory suggests that emotion regulation attempts may be less energetically costly in the presence of others. Thus, even the mere presence of a familiar person can alter attention deployment (e.g., distraction) or modulate how individuals experience or express negative emotion. Those in-the-moment influences may then influence the strategies that are used to adapt to the stress exposure. Surprisingly, work on the social and interpersonal regulation is a relatively new area of inquiry but has implications across a number of areas within social psychology including implications for health (Marroquin, 2011).

Finally, while social relationships have been described as resources that can promote adaptive coping, our relationships can also function as risk factors for maladaptive coping. Effective support during times of need, companionship during times of less need, and social control over health behaviors can all promote effective coping during stress exposures (Rook, 2015), although the actual empirical evidence for some effects, like reducing distress, remains elusive (Uchino, Bowen, Carlisle, & Birmingham, 2012). In contrast, conflict with others, having insensitive and nonresponsive support, and having network members that interfere with accomplishing goals may add additional stress exposures and thwart attempts to cope with pre-existing exposures (Brooks & Dunkel Schetter, 2011).

Health Behaviors

The major public health challenges of the 21st century, including obesity, opioid dependence, and sleep deprivation share one major common feature: knowledge and awareness of the problems, and even what to do to prevent such problems, is not enough to motivate most people to adopt healthy behaviors. Indeed, most of the behaviors reviewed in the following discussion have generally accepted and widely promulgated guidelines for individuals. Unfortunately, despite having widely accepted guidelines, achieving those behavior targets has been a significant public health challenge. For example, the *Healthy People 2010* goal for fruit consumption was to increase the percent of individuals aged two and up consuming at least two daily servings of fruit from the mid-1990s baseline of 39% to 75% by the mid 2000s. Ultimately, there was no change over 10 years—40% met the fruit consumption goal in the mid-2000s. That many people know what to do, but are not maintaining such behaviors, clearly suggests the need for

scientists with expertise in understanding and changing cognitions, emotions, and behavior and the role of the social environment in influencing behavior. Much of the gap between knowledge/awareness and behavior is filled with processes and constructs that are the bread-and-butter of social psychology. This section highlights key processes and constructs and points out behaviors that may be worth incorporating into social psychology research.

Health-Compromising Behaviors: Substance Dependence and Unhealthy Eating

How people start, continue, and have difficulty stopping health-compromising behaviors like substance use and health eating has been a major focus of psychology research, due in part to psychological and neurobiological overlap (Volkow, Wang, Tomasi, & Baler, 2013). Substances where continued use can lead to dependence, including tolerance (requiring greater doses to achieve desired effects) and withdrawal (unpleasant symptoms when not taking a substance) include nicotine, alcohol, opiates, and other drugs (American Psychiatric Association, 2013). While nicotine use has declined significantly due to population- and community-level policy changes (e.g., advertising and indoor/outdoor smoking bans, cigarette taxes; Cummings, Fong, & Borland, 2009), among individuals who are nicotine dependent, only 1 out of every 10 people that attempt to quit on their own is successful (Schlam & Baker, 2013). At the same time, psychological interventions that incorporate skills training to cope with cessation-related challenges and social support are effective in increasing the likelihood of sustained abstinence (Schlam & Baker, 2013). Newer efforts to improve the efficacy of psychosocial interventions for nicotine dependence have focused on using insights from laboratory experiments to build empirically informed interventions that can then be tested in the field (Collins et al., 2011). More generally, efforts to understand and intervene in substance dependence has contributed to our understanding of basic social psychological processes, including dual-process models of cognition, reward processing, self-regulation, decision-making, and stress and coping (Klein et al., 2013, 2014).

More recent health-compromising behavior challenges include unhealthy eating and the opioid epidemic (Kolodny et al., 2015; Volkow et al., 2013). The last 30 years have seen considerable interest in the social psychology of unhealthy eating (Mann, Tomiyama, & Ward, 2015). At the same time, concerns have been raised about the validity of weight status (i.e., obesity) as a risk factor for health, especially when compared to surrogate markers of cardiometabolic health (e.g., fasting glucose, blood pressure). Moreover, efforts to reduce overweight/obesity through negative messaging (i.e., "fat-shaming") fuel already pre-existing stigma against overweight individuals, leading to prejudice, discrimination, and internalized negative emotions like shame that may short-circuit attempts to engage in healthy eating and physical activity (regardless of whether weight reduction is the end goal; Hunger, Major, Blodorn, & Miller, 2015).

Similar to substance dependence, understanding psychological influences on eating provides a highly relevant context for understanding fundamental social psychological processes. Research on the role of food advertising and placement and availability in the environment (e.g., eye-level, labeling) is informed by dual-process models of cognition (Gearhardt et al., 2012). Neural systems regulating the hedonic drive for food have considerable overlap with other social–cognitive–affective processes including reward learning, associating food with other cues (e.g., stress regulation via "comfort eating," eating with others), and decision-making (Volkow et al., 2013). Social psychologists working in health psychology have encouraged others in their field to move into arenas of intervention and prevention, including helping to identify optimal persuasion techniques to aid with primary prevention, and develop theoretically driven and easily scalable interventions to shift food preferences toward those that benefit long-term health and environmental sustainability (Rothman et al., 2015).

While the opioid epidemic is often considered more in the professional realm of clinical psychology, psychiatry, and public health, embedded within the epidemic are many basic and applied research questions of relevance to social psychologists. For example, substance dependence is a highly stigmatized behavior, and stigma from friends, family, health providers, and the community can derail intervention efforts (Major, Mendes, & Dovidio, 2013).

Health-Promoting Behaviors

Healthy eating (Katz & Meller, 2014), getting regular moderate to vigorous physical activity (Haskell et al., 2007), at least seven hours of sleep per night (for adults; Watson et al., 2015), and adhering to health provider recommendations are all health-promoting behaviors that have several things in common. Individuals who perform those behaviors consistently show better quality of life, reduced risk of chronic illness, and reduced risk of mortality. While the specific macronutrient composition of the "ideal diet" (how much fat, protein, and carbohydrates) will be disputed in perpetuity, one common theme across all healthy diets is an emphasis on maximizing the proportion of fruit and vegetable intake relative to other foods ("Mostly plants;" Katz & Meller, 2014). Efforts have focused on modifying availability of plant foods through placement and subsidizing, as well as increasing the hedonic value of plant foods through advertising and visual messaging (Mann et al., 2015). Many of these approaches take advantage of dual-process models of cognition by delivering interventions that do not require significant cognitive effort, such as modifying default options (i.e., having plant-based protein sources the predominant protein source in cafeterias or mandatory placement of vegetables in school lunches).

Similar to increasing plant food consumption, efforts to understand social psychological levers to increase physical activity have more recently involved making situational modifications: changing the built physical environment and modifying default options (Bauman et al., 2012). Recognizing that conscious self-regulatory processes may not lead people to take the stairs instead of elevators, researchers in this arena have been examining the effectiveness of point-of-decision prompts (i.e., elevator signage advertising a free workout by taking the stairs) and ways to change social norms to promote what was previously considered nonnormative physical activity, such as exercise breaks in meetings or classes. Understanding the types of environmental modifications that promote physical activity, and the psychological processes that explain and predict uptake and maintenance of physical activity in the context of those modifications, represents an excellent opportunity for social psychologists to further evidence that situations shape behavior. One lever that will likely play an important role is social influence (Scarapicchia, Amireault, Faulkner, & Sabiston, 2017; also see Chapter 7). For instance, participating in moderate to vigorous activity with others may amplify the hedonic (e.g., making physical activity feel less strenuous combined with opportunities for social interaction) and even eudaimonic rewards of physical activity (e.g., working with others to build or repair homes for disadvantaged people or sorting foodstuffs at a food bank).

Sleep health is characterized by "subjective satisfaction, appropriate timing, adequate duration, high efficiency, and sustained alertness during waking hours" (Buysse, 2014, p. 12). Poor sleep health, broadly speaking, is related to worse physical and mental health including risk for chronic illnesses like cardiovascular disease, diabetes, and depression as well as mortality. Sleep researchers have long recognized the roles of attitudes and beliefs about sleep, the built environment (ranging from bedroom furnishing to proximity to outside noise), and self-regulatory capacity (most notably, emotion regulation) in contributing to sleep health. More recently, the fact that the majority of adults sleep with another person in the same bed has led to numerous studies combining relationship science with sleep research (Troxel, Robles, Hall, & Buysse, 2007). Moreover, strained intergroup relations, characterized by stereotyping, stigma, and discrimination, have been linked to poor sleep health (Slopen, Lewis, & Williams, 2016). Sleep health can be measured through brief self-reports, as well as objective measures like actigraphy (inferring sleep-related variables by

using wearable physical activity monitors), and is excellent low-hanging fruit for social psychologists who want to expand into examining health outcomes.

The major health burdens of the 21st century are chronic illnesses such as cardiovascular disease, diabetes, and many cancers. At this particular time, there are no cures for those conditions, and all require regular management through the aforementioned health-promoting behaviors and regular medication use. Half of adults in the United States have a chronic illness (Centers for Disease Control and Prevention, 2017), and, not surprisingly, the most frequently prescribed medications in the world target those chronic illnesses. Most of those medications must be taken daily, but it is widely recognized that around three out of every five individuals are not taking medications according to provider recommendations (nonadherent; Osterberg & Blaschke, 2005). Broadly speaking, adherence is determined by interactions among four parties: the healthcare system, providers (i.e., physicians, nurse practitioners), patients, and the drug itself (effects on reducing symptoms and side effects). Fundamental social psychological processes, including attitudes and beliefs, stereotypes and prejudice in patient–provider interactions, and self-regulation, play critical roles for all of the parties involved (even the drug itself, as it may have effects on patient self-regulatory capacity, as well as on attitudes and beliefs about one's self, others, and the drug!). The primary challenge is assessing adherence, as objective measures are considered the gold standard compared to self-report (Osterberg & Blaschke, 2005), but 21st century technologies such as Bluetooth-enabled pill boxes are making objective monitoring of medication adherence more accessible than at any point in the history of biomedical science.

Conceptual Frameworks and Integration

Numerous frameworks have been advanced to understand, predict, and change health behaviors. Concretely, Michie and colleagues (2014) described 83 theories developed over 50 years, with over 1,000 constructs among those theories that have been developed in the context of health behaviors and health behavior change. The proliferation of theoretical frameworks and constructs poses a major challenge to health behavior research, as many new terms describe similar constructs, and multiple measures exist for a given construct. Highlighted in the following discussion are recent attempts to identify commonalities among different health behavior theories, associated constructs and targets, and behavior-change techniques based on expert consensus and analysis (Sheeran, Klein, & Rothman, 2017). First, numerous health behavior theories implicate cognitions about a health threat, such as perceptions of risk for future health problems and perceived severity of those problems, in modifying the likelihood of performing a health behavior. In addition, cognitions about the health behavior, such as descriptive norms (beliefs about how frequently a behavior occurs) like "I think most graduate students sleep less than seven hours per night" play a role in influencing behavior. More recent conceptualizations incorporating dual-process models of cognition include the role of conscious volitional factors that promote motivation or action, such as the degree to which thinking and concentration are impaired by fatigue, and the role of implicit cognition. Health-relevant examples of implicit cognition include attentional bias, implicit attitudes about the health threat or behavior, and approach/avoidance goals.

In addition to constructs and associated treatment targets, numerous intervention techniques have been developed and tested in the health behavior change literature. The proliferation of techniques has historically been a challenge for integration, replication, and dissemination. However, recent attempts at developing taxonomies for health behavior intervention techniques have made significant inroads. To date, the most recent widely endorsed taxonomy is the Behavior Change Technique Taxonomy (v1) developed by experts in the United Kingdom, with input from dozens of international experts on health behavior change (Michie et al., 2013). Table 18.1 shows the 16 clusters of intervention techniques and

TABLE 18.1 Behavior Change Technique Taxonomy Groupings

Behavior Change Technique Taxonomy (v1) Grouping	*Example Behavior Change Techniques*
1. Goals and planning	Setting goals, problem-solving, behavioral contracts
2. Feedback and monitoring	Self-monitoring behavior, getting feedback on self-monitoring
3. Social support	Practical and/or emotional support
4. Shaping knowledge	Learning how to perform behavior, conducting behavioral experiments
5. Natural consequences	Learning about consequences of changing/not changing behavior
6. Comparison of behavior	Social comparisons, demonstrating behavior in front of others
7. Associations	Introduce cues or prompts for behavior, discriminative stimuli; associative learning-based techniques
8. Repetition and substitution	Practice/rehearse behavior repeatedly
9. Comparison of outcomes	Weighing pros and cons of changing behavior, imagine future outcomes
10. Reward and threat	Material incentives, positive reinforcement, future punishment
11. Regulation	Pharmacological treatment, stress management
12. Antecedents	Changing physical, social environment
13. Identity	Framing/reframing behavior, activating valued self-identities
14. Scheduled consequences	Removal of something valued, punishment, rewarding completion of behavior
15. Self-belief	Mental rehearsal, positive self-talk, remind of past success
16. Covert learning	Imagine rewards or punishments, vicarious consequences

From "The Behavior Change Technique Taxonomy (v1) of 93 Hierarchically Clustered Techniques: Building an International Consensus for the Reporting of Behavior Change Interventions," by S. Michie, M. Richardson, M. Johnston, C. Abraham, J. Francis, W. Hardeman, . . . C. E. Wood, 2013, *Annals of Behavioral Medicine, 46,* 81–95.

examples of techniques within each cluster. Such taxonomies allow for identifying active ingredients in previously tested interventions, selecting specific techniques to test in laboratory experiments, developing interventions based on the results of experimental studies, and disseminating potentially effective techniques to practitioners. In addition, such taxonomies are included in recently developed systematic efforts to develop new interventions that are informed by theory (including theories from social psychology) and tailored to the level at which interventions might operate (e.g., individual, group, community; Michie, Atkins, & West, 2014).

Social Contexts

While performed by individuals, health behaviors are embedded in a social context and, in many cases, interdependent with the social context. People often consume alcohol, use tobacco, eat, and exercise in groups; the majority of Americans sleep with a bed-partner. Our closest social network members can influence how we behave in numerous ways; married partners often show similar health behavior patterns and partners that are initially dissimilar tend to converge over many years together (Kiecolt-Glaser & Wilson, 2017). Similarly, concordance in unhealthy behaviors like tobacco and alcohol consumption are observed between parents and children and between siblings (Smith & Christakis, 2008). Concordance in close relationships can be attributed to several factors, including assortative mating, shared resources, shared stress exposures, and social influence factors that are described in the following discussion. Accordingly, partners can be facilitators of behavior change if relationship satisfaction is high and/or health behaviors are mutually valued or shared, or partners can be obstacles to attempts to change (Fitzsimons, Finkel, vanDellen, 2015).

Extending beyond dyadic relationships, entire social networks can be a source of positive influence including support, companionship, and control, as well as negative influence including conflict, insensitivity,

and interference (Rook, 2015). Accordingly, spread of health conditions related to health behaviors, such as obesity and sexually transmitted disease transmission (including HIV), have been observed in social network analyses (Smith & Christakis, 2008). At the same time, characteristics of the social network, such as the tendency for similar individuals to cluster together (Centola, 2011), or highly connected members of a social network (Kim et al., 2015) may be useful targets for intervention with the aim of increasing spread of health promoting behaviors.

There are several avenues of positive and negative influences on health behaviors (DiMatteo, 2004). Modeling involves the role that other people play in showing an individual how to perform a given behavior, demonstrating the positive and negative consequences of that behavior, and providing information about what to think about the behavior in terms of what is approved/disapproved by others (injunctive norms) and how frequently the behavior occurs (descriptive norms). Social control can occur both directly and indirectly. Direct forms involve other people explicitly communicating positive (e.g., encouragement) or negative (e.g., shaming) messages to the individual in an effort to change his or her behavior. Indirect forms involve the influence of injunctive and descriptive social norms combined with an individual's desire or obligation to behave in accordance with those norms in shaping behavior. Increasing health-compromising and reducing health-promoting behaviors often occur during stressful life events; thus, stress buffering related to social support may help reduce such maladaptive responses. Similarly, people in our social network can help enhance personal resources, including self-efficacy and self-regulatory capacity that can be used to maintain health behaviors. The flip side of stress buffering and enhancing personal resources is that social conflict, insensitivity, and interference can hinder attempts to change behavior (Brooks & Dunkel Schetter, 2011).

Putting It All Together: How to Move Your Work into the Health Arena

This chapter provided a brief overview of how to conceptualize and measure health, stress, coping, and health behaviors, with the ultimate aim of illustrating how accessible research in these domains can be to social psychologists. Readers convinced that health is social and biopsychosocial are encouraged to seek out the references in this chapter to learn more. Most important, readers are encouraged to seek out collaborators in public health, nursing, medicine, and other fields that focus on understanding and solving health problems. Incorporating health measures, particularly patient-reported outcomes like health-related quality-of-life or symptom reporting, is highly feasible. The same considerations for incorporating psychological constructs and measures apply to health-related constructs: careful attention to theory, conceptualization, and measurement as described in the What Is Health? section. Social psychologists have historically played important roles in theory and research on stress and coping, and a key future direction will be merging that work with contemporary questions and issues revolving around intergroup relations, culture, and interpersonal relationships. Finally, all the health behaviors described in this chapter are everyday observable behaviors that are subject to social psychological processes, and all represent excellent low-hanging fruit for social psychologists who want to expand into understanding how social psychological phenomena of interest can impact behavior and ultimately health.

In their review advocating for increased intersections between social psychology and health psychology/public health, Klein and colleagues (2014) wrote: "Social psychologists possess the skills and conceptual expertise to address many public health challenges. At the same time, research in a health context offers the reciprocal benefit of enriching social-psychological theories and advancing the reach, impact, and visibility of the discipline" (pp. 77–78). If health is biopsychosocial, then as Klein et al. describe, social psychologists can play key roles in public health. Doing so requires several things, including

incorporating community and patient samples, engaging in multidisciplinary collaborations, including health outcomes in research, and considering applications of basic research. Fortunately, certain funders are now recognizing the importance of basic social and behavioral research (such as the Behavioral Research Program in the Division of Cancer Control and Population Sciences at the National Cancer Institute; https://cancercontrol.cancer.gov/brp/), and changes in biomedical research in the direction of experimental medicine may favor incorporating basic experimental research as a testing ground for later interventions.

Conducting social psychological science with clear public health implications and applications requires heightened attention to replicability and open science practices. The potential for research to inform interventions that may be disseminated in a for-profit manner—such as through books, workshops, and apps, as well as through policy—makes transparency in documenting potential benefits and harms for people and patients a paramount value. While major concerns about replicability in psychology and social psychology emerged during the 2010s, the alarm bells for medicine began ringing a decade earlier (Ioannidis, 2005). Thus, in addition to bringing rich theory and research methods to studying social psychological influences on health behavior, the continued development of solutions to improve replicability and foster open science in social psychology (Spellman, 2015) has much to offer health psychology, medicine, and public health.

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