Chapter | 11 |

The Relevance of Control Beliefs for Health and Aging

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INTRODUCTION

Control is a pervasive concept in popular culture and in the psychological literature. On a daily basis we encounter opportunities to take control in a multitude of life domains. Advertisements promise that the best cars will give you maximum control over the road, fancy investment firms will help you to control your financial assets, and medications will allow you to control ailments and symptoms from acne, allergies, asthma, bladder problems, to high blood pressure, high blood sugar, pain, sexual dysfunction, and sleeplessness. A multitude of spiritual messages (e.g., the serenity prayer) advocate the importance of knowing what you can and cannot change. There are numerous psychological theories about control and countless treatments designed to help control behavioral problems such as gambling, excessive drinking, smoking, and overeating.

Application of the control construct to the field of aging is more recent, but the notion that one can "take control over the aging process" is now widespread. The lucrative anti-aging industry, which offers products and treatments designed to prevent, slow, reverse, or compensate for aging-related changes in the face, body, and mind, counts on the consumer to accept that there are things we can do to control aging-related changes and losses. Control over the aging process is heralded not only in the popular media and advertising industry, but also in professional journals and books such as *Successful Aging* by Rowe and Kahn (1998) and *Aging Well* by Vaillant (2002). A key message conveyed is that although aging is influenced to some degree by genetic factors, there is a large component that is determined by lifestyle choices and behavioral factors; that is, the nature of aging is to some extent under one's own control.

In stark contrast is the common notion that with aging we lose control over many aspects of life. This view is prominently embedded in stereotypes and attitudes about aging (Hess, 2006; Levy et al., 2009), with important consequences for behavior and health. These stereotypic views include images of older adults as helpless and deteriorating, and assumptions that aging-related declines are inevitable and irreversible. Such conceptions are promoted and reinforced by societal views and treatment of aging manifested in the negative views of getting older presented, for example, in birthday cards.

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In this chapter we focus on control beliefs, also referred to as perceived control or the sense of control. All involve expectancies about personal mastery and environmental contingencies that influence outcomes and performance. Individuals hold different views about whether and how much they can influence outcomes. Some believe there are things they can do to make a difference in the course of aging, and others see their influence as more limited. Such beliefs about control over aging may have their origins in childhood experiences and observations of parents' and grandparents' approaches and attitudes to aging, or through educational and occupational experiences with mastery or failure. The sense of control plays a pivotal role across the life span, functioning both as an antecedent and consequence of aging processes. Beliefs about control over the environment and abilities for self-regulation can serve a protective role and affect behaviors throughout life. As an outcome, a strong sense of control is an indicator of an adaptive set of beliefs about personal agency and effectiveness. Of particular interest in this chapter is to what extent control beliefs diminish or remain intact in response to aging-related changes. A sense of control also functions as a mechanism linked to performance in various domains, and may serve as a buffer for the deleterious effects of aging. Individual differences in conceptions of control are relatively stable throughout adulthood, yet they are malleable and responsive to situational influences (Hooker & McAdams, 2003), making them a viable target for interventions.

This chapter is concerned with the beliefs that individuals hold about how much they can control various outcomes in their life including the nature of their own aging. Our key focus is individual differences in multiple components of perceived control (self-efficacy, mastery, ability, or competence; and outcome expectancies, contingency, or constraints) and how such appraisals are related to behaviors and outcomes. More specifically, the goal of this chapter is to characterize the relationship between control beliefs and health, and to examine the relevance to aging. Our review of the theoretical and empirical literature suggests that attention to the sense of control can enrich the work by researchers, policy makers, clinicians, and other scientists and practitioners interested in promoting good health and well-being in adulthood and later life.

Notably, this is the first time the *Handbook of the Psychology of Aging* contains a full chapter devoted to beliefs about control. Now, more than 30 years after the first edition of this *Handbook*, there is sufficient information about the role of control beliefs in relation to aging to warrant a separate chapter. This likely reflects the enormous surge in research on this topic and the demonstrated utility of the construct with its far reaching importance across domains related to health and aging (Lachman, 2006).

In this chapter we examine four broad issues about the perceived sense of control that are relevant in the context of health and aging: (a) control is an aspect of the self that shows declines in adulthood, yet there are wide interindividual differences within age groups and variations in intra-individual change over time; (b) control shows sociodemographic variations by gender, income, education, culture, and race, which may affect the nature of health and aging; (c) control is associated with psychological well-being, cognitive functioning, and physical health, and there is emerging evidence regarding the mechanisms that link control with these outcome domains; and (d) control is an aspect of the self that can be modified, and thus is amenable to interventions that could optimize health and aging. Before addressing these topics, we begin with a summary of the theoretical and empirical origins of the control construct.

BRIEF HISTORY AND CONCEPTUAL OVERVIEW OF THE CONSTRUCT OF CONTROL

In psychology and related fields, control is studied in many different forms with many different labels and subtle variations, including self-efficacy, sense of control, personal mastery, perceived control, locus of control, learned helplessness, and primary and secondary control, just to name a few (Pearlin & Pioli, 2003; Rodin, 1990). One important distinction is between objective control and subjective perceptions of control. In this chapter we focus on the latter, with an emphasis on beliefs about control over aging and outcomes relevant to aging (e.g. health, memory). The perceptions and expectations individuals hold about their ability to control outcomes may or may not be veridical, and they may vary across domains and time. Within this framework, it is the expectancies that matter, and in many cases the actual amount of control one has is unknown. With the focus on perceived control in this chapter, what is especially of interest is that people vary in the amount of control they perceive over the same situation (independent of actual control), and these individual differences in beliefs make a difference for functioning (Lachman, 1986). We will later discuss some of the possible mechanisms involved in linking these beliefs to aging-related and health outcomes.

The control beliefs construct first emerged as the locus of control, under the rubric of social learning theory (Rotter, 1966). This work focused on the sources of control, as either internal (e.g., abilities, effort) or external (e.g., chance, fate, powerful others) to the person. Although a highly fruitful line of work, the internal-external distinction was limited especially due to a confound between the source of

control and the degree of controllability. Internal sources were assumed to be within the person's control, yet some internal sources are not highly controllable (e.g., genetic influences). Other concerns raised about the early locus of control work were that (a) internal and external control was seen as opposite poles of a continuum rather than as separate dimensions that are relatively independent; and (b) control was considered a general, stable individual difference variable that applied across domains, rather than acknowledging that control beliefs also vary across time (Eizenman et al., 1997) and specific areas of life (Lachman, 1986; Lefcourt, 1984).

As the roots of the sense of control construct are in social learning theory (Rotter, 1966), control is usually considered a learned view of the self and the environment rather than a fixed personality trait, and as such it is subject to change with aging (Abeles, 1991; Hooker & McAdams, 2003; Pearlin & Pioli, 2003). Much of the locus of control work was correlational, using personality trait type items. This early work was focused on college students and children, but was not developmental. It was in the late 1970s that control was first studied in relation to aging, with the initial focus on enhancing control among institutionalized older adults (Langer & Rodin, 1976; Rodin & Langer, 1977; Schulz, 1976; Schulz & Hanusa, 1978). Studies on the control construct in relation to aging led to advancements in both theory and measurement, and have contributed to understanding the role of beliefs and expectancies for aging. This work was in large part inspired by sociologists (Brim, 1974) and social psychologists (Abeles, 1991; Rodin, 1986), and adopted by life span developmental psychologists (Heckhausen et al., 2010; Lachman, 1986, 2006; Skinner, 1996) and gerontologists (Krause & Stryker, 1984). Those interested in adult development and aging began to think about the control construct in developmental and contextual terms (Lachman, 1986). This includes work on the motivational and behavioral self-regulatory functions of control via self-efficacy and outcome expectancies (Miller & Lachman, 2000) and theories such as the life span theory of control (Heckhausen et al., 2010) and the dual process model of assimilation and accommodation (Brandtstädter & Renner, 1990).

One of the most prolific control theories focuses on self-efficacy, or the perceived ability to carry out specific goals or tasks (Bandura, 1997). Self-efficacy and control beliefs play an important role in adaptation and regulate human functioning through cognitive, motivational, affective, and selection processes (Bandura, 1990). Lowered expectancies for self-efficacy and control likely have their origin in negative stereotypes about aging and are reinforced through experiences of loss and decline (Bandura, 1997). Other related theories such as the life span developmental theory of motivation and control (Heckhausen et al., 2010), with a focus on primary (change the environment) and secondary control (change the self) and the model of assimilation (tenacious goal pursuit) and accommodation (flexible goal adjustment; Brandtstädter & Renner, 1990), focus on control strivings and strategies for exercising control, and describe approaches to goal attainment. These control strategies are best studied in time-ordered processes in which it is possible to observe responses in different circumstances (e.g., achieving a goal or after goal failure) rather than as a general predisposition. Theoretically, those with a higher sense of control should be more likely to adopt a variety of adaptive control strategies depending on the circumstances (Wrosch, Heckhausen & Lachman, 2000). Although much of the work on control has focused on stable individual differences, we now turn to consider whether and how control beliefs and strategies vary or change with age.

AGE DIFFERENCES AND CHANGES IN CONTROL BELIEFS

The general pattern of research findings suggests that with aging the sense of control declines (Lachman & Firth, 2004; Lachman & Weaver, 1998a; Mirowsky & Ross, 2007). It is perhaps not surprising that in the face of increased losses and decreased gains associated with aging (Baltes, 2006), the sense of control would wane. Indeed, many of the changes that accompany aging are not controllable. The age trends for control beliefs typically show an increase in early adulthood, with a peak in midlife, and a leveling off with a subsequent decline in later life (Lachman, 2009; Mirowsky & Ross, 2007). What is also noteworthy is the wide range of individual differences in beliefs about control over aging within age groups (Lachman, 2006) as well as the intraindividual variability in beliefs over time (Eizenman et al., 1997).

Older adults on average seem to maintain their overall sense of mastery (beliefs about one's ability or self-efficacy), perhaps because they adjust the salient domains or the standards that they use to define their competence (Bandura, 1997). With aging, we see mainly a loss of perceived control associated with an increasing acknowledgement of the constraints and limitations due to uncontrollable factors or to reduced contingency between actions and outcomes (Lachman & Firth, 2004). These age differences in control beliefs seem to occur mainly because older adults experience fewer opportunities for control and more control-limiting situations.

Although the sense of control generally shows a downward trajectory with aging, a more nuanced view shows the story is more complex, and what changes and when depends on multiple factors such

as what control dimension is measured, the ages and other characteristics of the sample, the specific domains examined, and the study designs. Many of the studies about control and aging have used cross-sectional data, in which age and cohort differences are confounded, thus limiting conclusions about direct age-related changes. Longitudinal studies are helpful to move beyond the limitations of cross-sectional designs, and there is a good deal of evidence for longitudinal stability in perceived control into old age (Gatz & Karel, 1993; Grover & Hertzog, 1991; Lachman, 1985, 1986). However, findings have been mixed, as some studies report declines in perceived control late in life (Rodin & Langer, 1980).

Goal relevance may be an important contributing factor for the maintenance of control beliefs into old age. For example, Brandtstädter and Rothermund (1994) proposed a model where sense of control is maintained in later adulthood through shifts in the subjective importance of developmental goals. The degree to which perceptions of control within a particular goal domain affected an individual's general sense of control depended on the personal importance of that domain, and losses of control within a goal domain affected general perceptions of control to a lesser degree if the importance of the respective domain was downscaled within the same longitudinal interval. Within Brandtstädter's (1990) model, assimilative forms of control decline with age, whereas accommodative forms of control show increases with aging. These patterns are similar to those found by Wrosch and colleagues (2006) guided by the life span theory of control. They reported that primary control strategies remain relatively stable across adulthood, but are more likely to be replaced by secondary control strategies in later life when older adults are faced with greater obstacles to goal attainment.

Other longitudinal investigations have documented a mix of gains and losses in control beliefs. For example, Lachman et al. (2009) found evidence for changes in the sense of control over time in a national sample of adults in the United States studied over a 10-year period. The 10-year, cross-sectional differences mapped directly onto the 10-year period change data for many of the control dimensions. Average patterns of change showed both gains and losses across different dimensions and domains of control, and these patterns also varied by age cohort group. Those in midlife looked particularly strong in terms of reporting the lowest levels of perceived constraints and greatest declines in perceived constraints over time. In contrast, those in later life not only experienced increases in perceived constraints but also declines in health control. Thus, adulthood is characterized by a combination of ups and downs in the sense of control across different domains of life. Those who had a more adaptive personality profile (e.g., high in agreeableness, low in neuroticism), better quality of social relationships, better health, and higher cognitive functioning were more likely to maintain or increase control beliefs in general and in multiple domains. It is desirable to maintain a favorable balance of gains to losses in perceived control across life domains (Baltes et al., 2006). Or, as suggested by Krause (2007), what may be important is to maintain control in the domains that are most meaningful or central for the individual.

In addition to mean levels, considering and modeling intraindividual variability and within-person change has received increased attention as evidence of the processes involved in psychological adaptation (Nesselroade & Salthouse, 2004; Sliwinski et al., 2003). Based on repeated assessments within days or across days, intraindividual variability over the short term has important predictive value for aging-related outcomes (e.g., fluid intelligence, mortality; Martin & Hofer, 2004). Some studies suggest that older adults show greater intraindividual (within-person) variability in cognitive performance domains (Hultsch et al., 2002; Nesselroade & Salthouse, 2004), but less in the affective domains (Röcke et al., 2009).

Although much of the work on intraindividual variability has focused on cognitive and affective functioning, a few studies have shown that locus of control operates not just as a stable individual difference variable, but also has an important dynamic aspect (Eizenman et al., 1997; Roberts & Nesselroade, 1986). The degree of consistency of control beliefs is as important, if not more so, than the level of the beliefs (Eizenman et al., 1997), as variability in control beliefs was found to predict mortality to a greater degree than level of control. Eizenman et al. (1997) examined weekly fluctuations in general control beliefs over 25 occasions for seven months in a sample of older adults. Significant within-person fluctuations in control beliefs were found, and, importantly, these fluctuations were associated with mortality five years later.

More work is needed to examine how variability in control is linked with behavioral and physiological outcomes. One way of accomplishing this would be through the use of measurement burst designs (Nesselroade & Salthouse, 2004). These designs gather estimates of intraindividual variability within a longitudinal design by nesting daily diary measurements of control beliefs (e.g., assessing control beliefs each day for a series of consecutive days) to capture intra-individual variability within long-term longitudinal assessments of behavioral and physiological outcomes. This approach has great potential for representing the dynamics of the aging individual and addressing the relationships between fluctuations in daily control beliefs and long-term behavioral and health outcomes as people age.

Given the benefits of a high sense of control for affect and action, whether or not veridical (Thompson, 1999), a decline in perceived control

with aging or fluctuations within persons may have a negative impact on health and well-being. Shupe (1985) suggested that feeling a loss of control does not cause disease, but it "alters the physiological state of the individual and leads to an increased physical and mental vulnerability" (p. 184). It is an important goal of aging research to identify those factors that enable adults to remain resilient and to maintain their sense of control in the face of aging-related declines.

SOCIODEMOGRAPHIC VARIATIONS IN CONTROL BELIEFS

In addition to variations by age, the sense of control shows systematic differences in relation to other sociodemographic variables including sex, socioeconomic status (SES; educational attainment, income), culture, and race/ethnicity. Of particular interest is whether these patterns of variation are consistent across multiple age/cohorts, or whether the course of aging differs as a function of sociodemographic characteristics. Although sex differences are not typically large, the overall pattern in surveys with representative samples shows that women have a lower general sense of control than men, although these sex differences appear to be somewhat less pronounced among the college-educated (Lachman & Weaver, 1998a), and there are some domains (e.g., social) in which women report higher control (Lachman & Weaver, 1998a). SES is also related to sense of control. Those in lower income brackets report less control over their lives, which likely reflects the constraints associated with their circumstances and environments (Adler et al., 1993; Lachman & Weaver, 1998b; Wolinsky & Stump, 1996).

A good deal of work has investigated education in relation to control beliefs during adulthood and old age, and there is consistent evidence that those with higher educational attainment have higher control beliefs on average (Lachman & Weaver, 1998a; Mirowsky & Ross, 2007). We do not know definitively if those with higher education develop a greater sense of control or whether those with greater control are more likely to seek out and achieve advanced education. Those with higher educational attainment may develop control on the basis of what they learn about solving problems, or because they have more resources (both material and psychological, e.g., coping skills) available, or greater exposure to situations in which they have the opportunity to make choices and see a contingency between their actions and outcomes. With longitudinal data and statistical controls, some have reached tentative conclusions about directionality. For example, Mirowsky and Ross (2007) found an increase in control of about 0.60 SDs with each four years of education in early adulthood. They also adjusted for the status of origin using parental education and found one's own level of education contributed additional variance to control beliefs. Although firm conclusions about directionality are not possible based on current knowledge, the results suggest that education affects control beliefs, and it is less likely that changes in control produce changes in education. In future studies, it will be interesting to consider whether providing opportunities for control of resources or stimuli (e.g., control over word presentation rate or sound volume, choice of words to recall) in experimental paradigms will help to illuminate mechanisms that can reduce educational disparities in important aging outcomes. Another important consideration for future research is whether obtaining advanced education in midlife and beyond has an effect on sense of control in later life.

There are also cultural variations in the nature and meaning of control (Ashman et al., 2006; Skaff & Gardiner, 2003). Thus, it is important to have a contextual model of control to consider variations by culture as well as by race and ethnicity. More so than citizens of any other country, Americans believe that they are in control of outcomes in their lives. A 2002 Pew Center poll of 38,000 people in 44 countries presented a typical control-belief item: "Success in life is pretty much determined by forces outside our control" (Leland, 2004). In the United States, about 65% disagreed with the statement, as did 60% in Canada. In other countries, disagreement ranged from about 10% (Bangladesh) to 50% (Japan). Variations in control beliefs across countries are likely tied to different economic conditions, values, and religious beliefs, or world views about fatalism.

Asian Americans and Asians in Asia report lower levels of perceived control than non-Asians (Sastry & Ross, 1998). When comparing Western and Eastern cultures, it is not only the level of perceived control but the salience of control that varies by individualistic (Western) and collective (Eastern) cultures (Markus & Kitayama, 1991). The importance of personal control over outcomes is more closely tied to health and well-being in Western cultures (Markus & Kitayama, 1991). Japanese men are more optimistic about their ability to control a chance event collectively, whereas American men are more optimistic about their personal ability to control such events (Yamaguchi et al., 2005). Primary control may be more central for achieving goals in Western cultures, and secondary control more common as a strategy in Eastern cultures (Schulz & Heckhausen, 1999), yet both are ways to achieve control with different emphases, as a function of variations in cultural prescriptions for independence and interdependence (Ashman et al., 2006).

There is a small body of work examining differences in control beliefs by race and ethnicity in later life (Fiorri et al., 2006; Mirowsky et al., 1996).

In general, African Americans seem to have a lower overall sense of control (Shaw & Krause, 2001), and this may be tied to level of discrimination (Bruce & Thornton, 2004), which can hinder personal efforts to reach goals. In a study of adults with type 2 diabetes, European Americans displayed significantly higher levels of global mastery than Latinos (Skaff et al., 2003). These findings have important implications for health, especially in terms of the impact of attitudes about self-regulation and control of diabetes, which has a high prevalence among Latinos.

Although there are differences in control as a function of sociodemographic factors, they are largely main effects and do not typically interact with aging effects. There is little evidence to suggest that the patterns of change in control beliefs vary by gender, education, income, culture, or race/ethnicity. Nevertheless, these group differences are relevant to aging because those who start out with lower levels of perceived control may be more vulnerable in the face of declines and less resilient. Even if patterns of decline in control are similar across sex, SES, culture, and race groups, those who start out at a disadvantage may reach a critical low point sooner than others who start out higher on control. Thus, a low sense of control may be a risk factor for those groups who already have a poor prognosis for aging outcomes, and promoting a high sense of control may be a valuable protective factor.

RELATION OF CONTROL BELIEFS TO AGING-RELATED DOMAINS

Although a majority in the United States may believe that the decrements associated with aging are preventable or modifiable (Lachman, 2006), there are many adults, especially in later life, who believe some aging-related declines are largely inevitable or irreversible. There is a great deal of evidence that such individual differences in control beliefs are associated with key aging outcomes including cognitive and physical health (Rowe & Kahn, 1998). Indeed, many studies show that a high sense of control is associated with being happy, healthy, wealthy, and wise. A high sense of control is linked to psychological and emotional well-being (Kunzmann et al., 2002; Lachman et al., 2008; Rodin, 1986). Based on cross-sectional findings from the first wave of the Midlife in the United States Study (MIDUS) national sample, those with a higher sense of control had greater life satisfaction and a more optimistic view of adulthood; they reported that things were going well and expected them to either stay that way or even to get better in the future (see Lachman & Firth, 2004). Persons with higher control were less depressed and had better self-rated health, fewer chronic conditions, and less severe functional limitations. Overall, the results suggest that a sense of control may be a key protective factor for subjective well-being in the face of declining health and other losses in later life.

Older adults are more likely than the young to believe that their memory is poor (low memory self-efficacy; MSE), and not controllable in that it has gotten worse over time and will continue to deteriorate (low memory control beliefs; Hultsch et al., 1998). Such concerns about memory emerge in middle age (Lachman & Firth, 2004; Willis & Schaie, 1999), have consequences for functioning, and may be a risk factor for accelerated decline. Control beliefs about memory and other cognitive abilities are linked to performance (Windsor & Anstey, 2008), behaviors such as strategy use (Lachman & Andreoletti, 2006) and computer use (Czaja et al., 2006), and effectiveness of cognitive training (Rebok et al., 1996). Although much of this work has been cross-sectional and correlational, there is longitudinal evidence that those who have higher control beliefs improve more on cognitive tests with practice and also are less likely to show aging-related declines in cognitive functioning over time (Caplan & Schooler, 2003).

Control beliefs are also related to health and health behaviors. Beliefs about control over aging are one key ingredient in stereotypes, which promote the view that older adults are helpless (Levy et al., 2009). Previous work has found that such stereotypes about aging affect health, including blood pressure (Levy et al., 2000), and cardiovascular events (Levy et al., 2009). Believing that one has control over outcomes is associated with better reported health, fewer and less severe symptoms, and faster recovery from illness (Lachman, 1986; Rodin et al., 1985). In the British Whitehall studies, results showed those who reported lower control in the work domain, including lower decision latitude and less autonomy, had poorer health, with higher fibrinogen levels, a risk factor for cardiovascular disease (Marmot, 2004).

Greater variability in control beliefs is associated with poorer health, poorer functional status, and more physician visits and hospital admissions, even after statistically controlling for mean perceived control level and direction of change in perceived control (Chipperfield et al., 2004). These findings suggest that health and well-being among very old individuals may be compromised by fluctuating levels of perceived control. Further research is needed to explore whether maintaining a stable sense of control is always advantageous, or whether there are circumstances when lowering or raising control expectancies may be useful.

Is High Control Always Adaptive?

Although a high sense of control is usually found to be desirable, there are some indications that a low sense of control may be protective in some circumstances,

especially those in which there are limited opportunities for control (Skaff, 2007). Bisconti et al., (2006) found that recent widows with greater levels of perceived control over their social support had poorer overall adjustment across the first four months of widowhood. Further longitudinal analyses over longer periods are needed to investigate whether a high sense of control may be more beneficial for resilience and coping over the long run. Those who have a strong sense of control would be expected to be more resourceful and better at finding ways to cope with uncontrollable events or unattainable goals or outcomes by using secondary rather than primary control strategies (Wrosch et al., 2006).

In some cases, realistic assessments of control may be more beneficial than optimistic or overestimations of control, but little is known about these conditions. As Brim (1974, pp. 16–17) put it, knowing when to "shuck off responsibility over matters clearly outside one's span of control," may be a form of wisdom, and associated with increased personal well-being.

In institutional settings, relinquishing control and reducing agentic behaviors in favor of behavioral dependency may be adaptive, especially in cases of health vulnerabilities and reduced capacity (Baltes, 1995). In part, this may be because some staff inadvertently promote and reward dependency because it is easier and more efficient for them to take control of feeding, bathing, dressing, than to encourage older adults to take responsibility for these activities of daily living, and older adults may welcome this as attention and support (Baltes, 1995).

Mechanisms and Processes Linking Control Beliefs and Aging-Related Outcomes

The relationships between control beliefs and health in later life are fairly well established (Lachman, 2006). Yet, one of the most promising areas of research involves identifying the mechanisms and processes involved in linking control beliefs with aging related outcomes such as illness or memory (Carstensen & Hartel, 2006; Hess, 2006). There are wide individual differences in multiple components of perceived control (self-efficacy or competence, contingency or constraints), and such appraisals are related to behaviors and outcomes including use of adaptive compensatory memory strategies and health-promoting behaviors (Lachman, 2006). A lowered sense of control may have affective, behavioral, motivational, and physiological effects, including greater levels of stress and anxiety, lower levels of effort, and persistence and strategy use, as well as less frequent engagement in memory tasks or physical activities, which can influence aging outcomes in multiple domains. Self-efficacy and control beliefs have been postulated as a mediator of the relationship between stereotypes about aging and physiological activity and performance (Levy et al., 2000).

Miller and Lachman (1999) considered some of the possible mechanisms involved in control processes and proposed a conceptual model (see Figure 11.1) of the self-regulatory role of adaptive beliefs (e.g., control) and behaviors (e.g., strategy use, physical activity) in relation to aging-related changes. In this conceptual framework, derived from cognitive-behavioral theory (Bandura, 1997), the processes are assumed to be reciprocal and cyclical in that outcomes and experiences (e.g., memory or physical declines) can have an impact on control beliefs, which in turn can affect behavioral or physiological mediators as well as future outcomes (Bandura, 1997; Miller & Lachman, 1999). Those with a high sense of control are more likely to mobilize social support in times of need (Antonucci, 2001). However, having or giving social support can also promote a sense of control over one's life (Midlarsky & Kahana, 1994). Thus, sense of control is considered to be an antecedent and consequence of age-related losses, for example, in memory (Lachman et al., 1994; Miller & Lachman, 1999, 2000) and health (Skaff, 2007). In other words, this model depicts a multidirectional process in which control beliefs are influenced by prior performance outcomes and beliefs about control also have an influence on subsequent performance and outcomes through their impact on behavior, motivation, and affect (Lachman, 2006). For example, older adults who experience memory lapses or declines in physical strength may respond with a lowered sense of control in these domains, especially if these changes are attributed to uncontrollable factors. Such beliefs in low control can be detrimental if they are associated with distress, anxiety, inactivity, and giving up without expending the effort or using the strategies needed to support optimal outcomes (Agrigoroaei & Lachman, 2010).

In the cognitive domain, the sense of control is tied to better memory and intellectual functioning, especially among older adults (e.g., Hertzog et al., 1998; Seeman et al., 1996). Control is likely beneficial for cognitive performance by providing a necessary motivational resource for the development of effortful strategies used to compensate for cognitive limitations or losses (de Frias et al., 2003; Miller & Gagne, 2005). Control beliefs are related to effective strategy use (Hertzog et al., 1998, 2003; Lachman & Andreoletti, 2006) and goal setting (West & Yassuda, 2004). Older adults typically need to use strategies to compensate for memory losses, but past research has found that older adults are less likely to use memory strategies effectively than the young (Touron & Hertzog, 2004). Even if older adults use strategies they are less likely than the young to attribute their

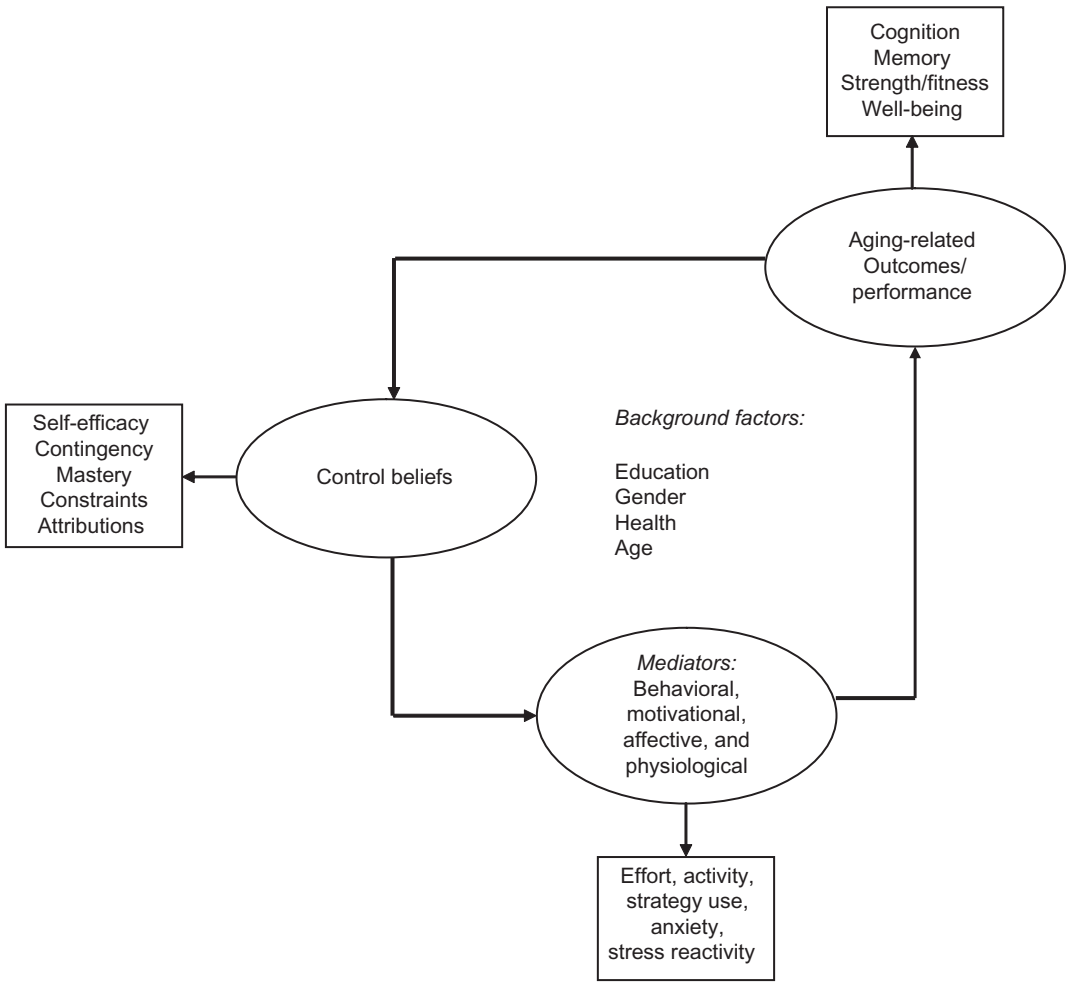

Figure 11.1 Conceptual model of the relationship between control beliefs and aging-related outcomes and performance with postulated mediators (based on Lachman, 2006; Miller & Lachman, 1999).

performance to strategies (Blatt-Eisengart & Lachman, 2004).

There are also findings regarding stress level or stress reactivity as a mediator between control beliefs and memory performance and health (Müller et al., 1998; Seeman, 1991). Experiencing personal control in a challenging situation has been shown to reduce stress-related neuroendocrine responses such as in the hypothalamic-pituitary-adrenal (HPA) axis response (Seeman & Robbins, 1994). Cognitive appraisal of challenge and threat as well as perceived controllability have an impact on response and recovery (Dickerson & Kemeny, 2004). Other results reveal that stressors can activate responses in the HPA and autonomic nervous system (e.g., slowing or increasing in heart rate), especially if the stimulus is appraised as threatening and not under personal control. Moreover, when stressors are seen as uncontrollable and the goal is important or desirable, the reactivity level is higher (Dickerson & Kemeny, 2004). Those with low control are more likely to show high levels of stress, which in turn affects memory performance among younger (Kirschbaum et al., 1996) as well as older adults (Lupien et al., 1997). The evidence suggests that acute stress affects memory performance by causing hippocampal damage (Kirschbaum et al., 1996; Lupien et al., 1997). Similarly, prolonged exposure to stress has also been associated with a loss of hippocampal neurons (McEwen & Sapolsky, 1995). Thus control may play a role in brain aging through stress mechanisms.

Self-reported anxiety is related to memory performance for older adults more so than for the young (Andreoletti et al., 2006) and may be another mediator between control and memory performance. For MSE and control beliefs, low levels may result in reduced memory performance (Berry & West, 1993); for example, by increasing the level of anxiety and

arousal (Bandura, 1997), or by creating an expectation of failure (Desrichard & Köpetz, 2005) that may lead individuals to put forth less effort and be less persistent (Berry & West, 1993) in memory situations. Hultsch et al. (1998) reported a consistent small negative correlation between an individual's MSE and scores on a mnemonics usage scale, but several studies have shown that MSE is not significantly linked to the tendency to use such strategies (McDonald-Miszczak et al., 1999; Wells & Esopenko, 2008). Furthermore, in a recent study, Wells and Esopenko (2008) did not find a relationship between MSE and the amount of time participants spent on a free-recall task. MSE, however, has been shown to impact goal systems and the choice of activities (Berry & West, 1993; West et al., 2009). According to the results obtained by Bagwell and West (2008), MSE also predicts investment in memory intervention programs.

A potential mechanism linking control beliefs to better health is engagement in beneficial health-related behaviors. Those who have a higher sense of control are more likely to exercise regularly, eat a healthier diet, and therefore have better health (Lachman & Firth, 2004). According to the social-cognitive model of physical activity by Bandura (1997), self-efficacy is a primary determinant of consistent, health-promoting levels of physical activity. It is important to note, however, that the relationship between exercise self-efficacy beliefs and exercise behaviors is reciprocal. Behavior change is also determined by outcome expectations or sense of controllability; that is, whether one expects one's actions to lead to desirable outcomes. One might have high self-efficacy for exercise, but if one believes that exercise does not do anything to prevent or remediate aging-related losses, there would be little motivation to continue exercising (Lachman, 2006; Lachman et al., 1997). In a longitudinal investigation of exercise self-efficacy and control beliefs in a sample of previously sedentary older adults with at least one disability, Neupert, Lachman & Whitbourne (2009) found that exercise beliefs and exercise behavior were associated with one another and that beliefs developed during an intervention were important for maintenance of an exercise regimen. Those with higher control beliefs chose to use higher intensity and resistance levels during the intervention, and were more likely to continue exercising 9 to 12 months after the intervention program ended.

Findings about control as a moderating or buffering factor are also promising. Lachman and Weaver (1998b) found that the relationship between SES and health was moderated by a sense of control. The social gradient of health is well-documented; those with lower SES, either measured by income or educational attainment, are more likely to have poor health (Adler et al., 1993). What is less well known is under what conditions the gradient can be reduced. Findings suggest that a sense of control is one psychosocial factor that can buffer the effects of low SES. Although those in the lower SES groups, on average, have a lower sense of control, there are individual differences, and indeed overlapping distributions. Most interesting is that among middle-aged and older adults with lower SES, those who also manage to have a high sense of control have health levels comparable to their high education counterparts (Lachman & Weaver, 1998b). This is promising in that it suggests that sense of control is one modifiable factor that can help those in lower SES groups to break the cycle of poor health. One challenge is to determine how it is that some in the lower SES groups are able to develop a high sense of control in the face of the real difficulties of making ends meet. This issue is similar to the challenge of helping older adults to maintain a sense of control in the face of real changes and losses associated with aging. In future work, it would be useful to consider whether older adults with a high sense of control have health and cognitive functioning more comparable to young adults.

Rodin et al. (1985) proposed physiological explanations for the stress buffering effect of control beliefs. They argued that external control beliefs may have certain immunosuppressive tendencies that reduce the number of helper cells and lower the ability of T cells to function properly, which may lead to health problems. Bollini et al. (2004) found that locus of control moderated the relation between *control* and *cortisol* (a stress hormone); participants with more internal locus of control, who also *perceived* themselves to have *control* over the stressor, showed a reduced *cortisol* response. Higher control beliefs are also associated with physiological changes such as reduced heart rate reactivity and increased blood pressure in stressful situations (Baker & Stephenson, 2000; Sanz & Villamarín, 2001). In a study of older adults, Rodin (1983) found that those who received self-regulation/coping skills training showed a significant relationship between decreased *cortisol* level and increased *perceived control* and ratings of improved physical health. Wrosch, Miller, & Schulz (2009) found that adaptive control strategies minimized cortisol secretions associated with functional disabilities among older adults.

Whereas these summarized studies have provided insight into physiological reactions to stressors in the laboratory and individual differences in the buffering effects of control beliefs on the relationship between stressor exposure and well-being (e.g., Krause & Stryker, 1984), other recent studies have begun to examine these relationships as they unfold over time within the context of daily experiences. For example, greater personal control is related to reduced reactivity to stressors in daily life (e.g., Ong et al., 2005). When faced with stressful situations, a strong sense of control has also been linked to low levels of

self-reported perceived stress and lower risk of depression (Yates Tennstedt, & Chang, 1999). Higher levels of perceived control also buffered recently bereaved wives from anxiety when they confronted daily stressors (Ong et al., 2005). Age and control beliefs played an important role in reactivity to daily interpersonal, network, and work stressors in the National Study of Daily Experiences subproject of the MIDUS survey (Neupert et al., 2007). Older age and lower perceived constraints were each related to lower emotional and physical reactivity to interpersonal stressors. High personal mastery buffered the physical effects of work stressors for younger and older adults and was important for middle-aged adults' emotional reactivity to network stressors. Those who had low perceived control, as indicated by reports of high levels of environmental constraints, had the strongest physical reactivity to network stressors for younger and older adults.

Another promising area of future research involves the examination of intraindividual variability in control beliefs as they relate to responses to stressors. Neupert, Ennis et al. (2009) examined the role of daily fluctuations in control beliefs regarding daily stressors with respect to emotional reactivity to daily stressors among older adults over eight days. Results indicated that a majority (66%) of the variance in daily control beliefs regarding stressors was due to within-person fluctuations over time, highlighting the importance of examining control beliefs with a process-oriented approach (e.g., Eizenman et al., 1997). Reactivity to stressors was heightened on days with decreased control beliefs and was buffered on days with increased control beliefs. These results suggest that fluctuations in daily control beliefs play an important role in minimizing the affective response to daily stressors in older adults, but future work examining additional responses such as physical and cognitive outcomes as well as comparisons with younger and middle-aged adults is needed.

Much of the research on physiological mechanisms linking control beliefs and health has focused on the HPA axis. Other areas showing promise for a more complete understanding of mind-body processes include immune functioning, inflammatory responses, and the autonomic nervous system (Cacioppo, 1994; Seeman, 1991).

INTERVENTIONS TO MODIFY CONTROL BELIEFS

Given the apparent benefits of high control beliefs and the likelihood of declines in sense of control in later life, it is worthwhile to consider whether and how control beliefs can be enhanced. There are a number of studies that examined whether it is possible to modify control beliefs among older adults and if this would affect outcomes in a given domain. Many adults assume they are too old to improve performance or functioning or to make up for losses in areas associated with aging, such as memory or physical ability. Given these widespread beliefs, interventions to change memory and health behaviors may be more successful if beliefs about control (abilities and contingencies) are also directly addressed in conjunction with skills training. Just focusing on performance experience does not seem to be enough to result in behavior change for older adults, perhaps because maladaptive beliefs about aging interfere (Bandura, 1997). Thus, interventions with a joint focus on modifying control beliefs (e.g., for memory or falls) and acquiring new skills and behaviors (e.g., strategy use, physical activity) may be most effective (Lachman et al., 1997). A key assumption of this multifaceted approach is that enduring behavior change is unlikely without first instilling confidence that aging-related declines can be controlled. For example, a fear of falling is relatively common among older adults and results in reduced activity. This is typically manifested as a low sense of efficacy for engaging in activities without falling and a sense that falling is uncontrollable (Tennstedt et al., 1998).

Several studies have shown that perceptions of personal control can be manipulated experimentally. They can be modified using different procedures such as presenting participants with scenarios in which they do or do not have control over the outcome (Laurin et al., 2008), asking them to recall recent events over which they did or did not have control (Kay et al., 2008), providing random feedback or feedback contingent on participants' responses (Whitson & Galinsky, 2008), or cognitive restructuring (Lachman et al., 1992). Perceived leisure control (the extent to which the individual perceives control of events and outcomes in his or her leisure experiences), but not the general sense of control, was increased in older adults by a leisure education program (Searle et al., 1995). However, over the long run (16-18 week follow-up), there also was significant improvement in the generalized measure of locus of control (Searle et al., 1998).

A classic intervention study was carried out by Langer and Rodin (1996) with nursing home residents. They were given more control over the environment (e.g., taking care of a plant, choosing activities), and this had positive long-term effects on well-being, activity, and health. Schulz (1976) found that nursing home residents who were given predictability and control over the timing of visits from student volunteers had higher well-being in the short run compared to those who did not have an influence on the visiting schedule. However, after the visiting program ended, those who had been given the most control and predictability suffered the most negative consequences, suggesting that providing control temporarily and

removing it can have deleterious effects (Schulz & Hanusa, 1978).

Consistent with a cognitive behavioral framework, in which performance and beliefs interact over time, the best predictor of self-efficacy and control with respect to falling is previous fall status, and low falls self-efficacy is associated with maladaptive behavioral changes such as activity restriction, which can lead to increased risk of falling through muscle atrophy and deconditioning (Lachman et al., 1997). A multifaceted intervention, "A Matter of Balance," targeted beliefs about control over falls with older adults who reported fear of falling and were randomly assigned to an intervention or a contact comparison condition (Tennstedt et al., 1998). Cognitive-restructuring strategies were used to reframe control beliefs. This entailed analysis and challenge of maladaptive beliefs (e.g., "I can't do this," "I am too old," "It won't do any good," "I will get hurt") and information that efforts (e.g., using fall-prevention strategies; engaging in strength and balance exercises, which were also taught to participants) can make a difference for outcomes. Those who completed the treatment increased their falls self-efficacy, sense of control over falls, level of intended activity, and physical mobility functioning significantly more than the comparison group did (Tennstedt et al., 1998).

Another intervention study with older adults administered a home-based resistance training program in conjunction with cognitive restructuring of beliefs about the ability to engage in exercise and whether doing exercise would make a difference for health and well-being (Jette et al., 1999). The subjects had at least one functional limitation, and the goal was to determine if those who had already suffered some disability could break the cycle of decline. They found improvements in strength, and participation and adherence rates were higher than in previous studies, but exercise control beliefs did not increase significantly more in the treatment group. Nevertheless, those who had higher exercise control beliefs during the intervention increased their exercise intensity and resistance level significantly more than those with lower control beliefs and were more likely to be exercising three to six months after the intervention was completed (Neupert et al., 2009b).

Although there is some promise for modifying control beliefs, the effects of control interventions seem to be moderated by preexisting control beliefs (Reich & Zautra, 1990) or level of cognitive functioning. For instance, Anderson-Hanley et al. (2003) showed that following a control-enhancing intervention, those with an internal locus of control and higher levels of cognitive functioning benefitted the most in terms of perceived health efficacy. Further work is needed to develop interventions to promote a sense of control, especially among those who are most vulnerable to losing a sense of control, such as those suffering from hip fracture or memory problems or those from disadvantaged socioeconomic and minority groups.

SUMMARY, CONCLUSIONS, AND FUTURE DIRECTIONS

Adults and those in later life with a high sense of control appear better off on many indicators of health and well-being. However, those who have a lower sense of control may be at increased risk for a wide range of negative behavioral, affective, and functional outcomes, including higher levels of depression, anxiety, and stress, use of fewer health protective behaviors (e.g., exercise) and compensatory memory strategies (e.g., internal or external memory aids), and have poorer health and memory functioning. The apparent decline of the sense of control associated with aging is of concern especially given the adaptive value of maintaining beliefs in one's control over outcomes. We have presented a wealth of information about control beliefs, but there is much to explore before we understand the dynamic processes involved in changes and the linkages with outcomes. Sense of control is a promising dimension because it is amenable to change unlike more traditional stable personality traits (Hooker & McAdams, 2003). This can potentially lead us in the direction of new interventions to promote optimal aging.

Although age and education differences in health are pervasive and account for much of the variance in functioning, the sense of control has the potential to mediate or moderate some proportion of the differences. It is not just that beliefs play out as a self-fulfilling prophecy or through wishful thinking. A sense of control is a fundamental core set of self-regulatory beliefs that affects how situations are perceived and provides motivation for whether or not to exert effort or attempt new tasks (Bandura, 1997). The sense of control is a powerful psychosocial factor that influences health and well-being through behavioral and physiological means. Having a sense of control puts those from different levels of SES on a more common ground in terms of health and well-being (Lachman & Weaver, 1998b). The linkages identified between control and stress show promise for improving health and aging outcomes. Those who have a low sense of control may experience more stress with physical consequences because of the feeling that there is nothing that can be done, which goes against the basic human needs for agency and motives to be effective.

The sense of control may dwindle with age, yet it is important to note that some are able to maintain control especially in selected domains. Thus, an important direction for future research is to understand how to harness the sense of control and to widen the net of control in later life. This may lead

to developing prevention-oriented interventions for young and middle-aged adults, to promote a sense of control over aging before declines and losses become salient (Lachman, 2004). Previous research has looked primarily at the consequences of control beliefs and relatively few studies have focused on their sources or directly addressed issues of causality and directionality (Lachman, 2006). Further understanding of the distal and proximal antecedents of control beliefs could reveal how to create optimal conditions for promoting a resilient sense of control.

Research on the sense of control can also teach us important lessons about the psychology of aging, more generally. Of utmost importance is that expectancies make a difference for the course of aging, and sense of control is chief among them. Despite the apparent value of perceived control, a recognition that some aspects of life are not under personal control is a key part of adaptive aging. This requires a delicate balance of knowing when to persist and when to switch gears, with the healthy realization that some aspects of aging are out of one's hands. Throughout the chapter we have made suggestions about new directions for work on control beliefs and aging. As more researchers continue to incorporate this construct in their work, it will give us the opportunities to learn more about the power and potential of control beliefs for understanding aging-related changes and for enhancing performance and functioning throughout adulthood and old age.

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