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Manuscript accepted for publication: In J. W. Reich & F. J. Infurna (Eds.), *Perceived control: Theory, research, and practice in the first 50 years*. Oxford University Press.

Control Strategies for Managing Physical Health Problems in Old Age:
Evidence for the Motivational Theory of Life-Span Development

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Author Note

Preparation of this chapter was supported by grants from the Canadian Institutes of Health Research (CIHR) and Social Sciences and Humanities Research Council of Canada (SSHRC) to Carsten Wrosch, grants from National Institutes of Health to Richard Schulz, and a doctoral fellowship from Fonds de recherche du Quebec (FRQS) to Meaghan Barlow. Correspondence concerning this article should be addressed to Carsten Wrosch, Department of Psychology, Concordia University, 7141 Sherbrooke Street West, Montreal, Quebec, Canada, H4B 1R6. E-mail: carsten.wrosch@concordia.ca.

Abstract

This chapter addresses how older adults manage the occurrence of physical health threats. Based on the motivational theory of life-span development (Heckhausen, Wrosch, & Schulz, 2010), we show how an opportunity-adjusted use of control strategies prevents older adults from experiencing the adverse psychological and physical consequences of confronting age-related declines in their physical health. We begin this chapter by outlining some of the basic theoretical assumptions of the motivational theory of life-span development, proposing a model for managing physical health threats in older adulthood. Next, we review the empirical literature on the effects of using control strategies for addressing physical health declines in the elderly. We finally suggest promising avenues for future research.

Key words: aging, control, physical disease, goal engagement, goal disengagement.

Introduction

How can older adults avoid the adverse psychological and physical consequences associated with the onset and development of physical health declines? A body of theory and research that may be useful in answering this question relates to the motivational theory of life-span development (Heckhausen & Schulz, 1995; Heckhausen, Wrosch, & Schulz, 2010; Schulz & Heckhausen, 1996). This theory was developed to explain how individuals adapt to age-related challenges across the lifespan and maintain their psychological and physical health. It postulates that specific control strategies, associated with goal engagement and goal disengagement processes, represent important motivational responses that can facilitate an individual's adaptation to the occurrence of age-related challenges. These control strategies are adaptive if they are used in close correspondence to a person's opportunities for attaining a personal goal or overcoming a problem. On the basis of these assumptions, we review in this chapter the literature on the use of control strategies for managing physical health declines in older adulthood.

Control Striving and Successful Development Across the Lifespan

A central tenet in the life-span developmental literature is that the interplay between individual agency and contextual factors shape people's development across the life course (Baltes, 1987, 1997; Brandtstädter & Renner, 1990; Heckhausen, 1999; Lerner & Busch-Rossnagel, 1981). On the one hand, individuals actively influence their development by identifying, pursuing, and regulating personal goals. From this perspective, goals represent the building blocks of successful life-span development. On the other hand, individuals' actions are embedded in their developmental context and can be constrained or facilitated by biological, sociocultural, and age-normative factors (Heckhausen, 1999; Schulz & Heckhausen, 1996).

The motivational theory of life-span development (MTD) addresses the interplay between

individual agency and contextual factors to explain life-long patterns of successful development (Heckhausen & Schulz, 1995; Heckhausen, Wrosch, & Schulz, 2010; Schulz & Heckhausen, 1996). This theory postulates that age-normative fluctuations in developmental constraints, opportunities, and personal resources result in age-graded changes in an individual's control capacity across the life course (i.e., a person's ability to produce desired effects in the environment; Heckhausen, 1999). Overall, biological maturation, societal norms and scaffolding, and variable personal resources create an inverted U-shaped trajectory of control capacity across an individual's lifespan (Heckhausen & Schulz, 1995; Schulz & Heckhausen, 1996). During early childhood through young adulthood individuals typically experience a marked increase in their control capacity as biological maturation and social structures enable them to achieve a number of developmental tasks and overcome constraints on the pursuit of their personal goals. For many individuals, control capacity peaks in midlife when constraints on controlling the environment are reduced due to relatively rich personal and social resources (Lachman, 2004). Finally, control capacity declines steeply in older adulthood based on increasing constraints placed on goal attainment by a limited lifetime (Carstensen, Issacowitz, & Charles, 1999; Schulz & Heckhausen, 1996) and age-related decreases in biological, social, and motivational resources (Heckhausen & Schulz, 1995).

MTD further explains how individuals can adapt to age-related changes in control capacity across the lifespan and maintain their psychological well-being and physical health. This approach provides a general theory about motivation focused on explaining human development. Within this context, MTD views control as a fundamental motivational force driving specific behaviors that shape individuals' developmental trajectories. It further states that developmental outcomes can be optimized if individuals adjust their behavioral and cognitive control strategies to age-related changes in control capacity (e.g., by investing effort in attainable

goals or by reducing commitment to unfeasible goals, Heckhausen & Schulz, 1995). This perspective on control is different from models of perceived control that take an individual difference approach by focusing on how relatively stable inter-individual variations in control beliefs shape behavior across life circumstances (see research on self-mastery or internal versus external locus of control, Pearlin & Schooler, 1978; Rotter, 1966). Note, however, that there may be functional associations between both conceptualizations of control. Since generalized perceived control can influence the way people appraise and respond across situations (Rotter, 1966), it could also play a role in the use of specific control strategies (Wrosch, Heckhausen, & Lachman, 2006). For example, while high levels of perceived control may facilitate the use of control strategies needed to attain a desired goal, a low sense of control may result in the withdrawal of commitment and efforts from the pursuit of a goal (for a more comprehensive discussion including different aspects of perceived control, see Villarreal & Heckhausen, in press).

MTD has conceptualized different types of control strategies that individuals can use to regulate their development (Heckhausen & Schulz, 1995). These strategies map theoretically and empirically onto two broader categories of control striving: goal engagement and goal disengagement (Haase, Heckhausen, & Wrosch, 2013). Goal engagement refers to strategies aimed at attaining personal goals and overcoming goal-related problems, such as the investment of time and effort (selective primary control), maintenance or enhancement of motivational commitment (selective secondary control), and enlistment of external resources (compensatory primary control; Heckhausen & Schulz, 1995). Goal disengagement, by contrast, refers to compensatory secondary control strategies aimed at abandoning a personal goal (e.g., the devaluation of the importance of a goal). Compensatory secondary control strategies further entail self-protective strategies, such as positive reappraisals, strategic social comparisons, or

external attributions of failure (Heckhausen & Schulz, 1995). These strategies are thought to preserve an individual's emotional and motivational resources in the context of failure and support adaptive goal disengagement.

MTD assumes that goal engagement and goal disengagement-related strategies are essential for attaining desired goals and adjusting to goal constraints that are impossible or too costly to overcome (Heckhausen, Wrosch, & Schulz, 2010). Consider, for example, a person with a goal of running a marathon in 6 months. Once this goal has been selected, training 5 hours a week (selective primary control), increasing motivational commitment (selective secondary control), and seeking out the help of a running coach (compensatory primary control) are likely to optimize this individual's chances of running the marathon. However, imagine that this person has a chronic injury, which prevents the person from engaging in necessary training. In this circumstance, all of the efforts aimed at getting ready for the marathon are futile, and are therefore likely to result in wasted resources and the experience of failure. In this situation, positively reappraising the situation, using strategic social comparisons, or avoiding self-blame (compensatory secondary control) may be adaptive as it could enable a person to accept the fact that the goal can no longer be attained and protect the person's psychological well-being from the experience of failure.

A corollary of the previous example is that, in order to be adaptive, individuals' use of control strategies must be tailored to their opportunities for attaining a goal or overcoming a problem (Heckhausen, Wrosch, & Fleeson, 2001; Wrosch & Heckhausen, 1999). When an individual has sufficient opportunities and resources to attain a goal or overcome a problem, goal engagement strategies should be particularly effective and therefore adaptive. However, if individuals' opportunities for goal attainment are scarce, goal engagement may become futile and result in the experience of failure. In such circumstances, withdrawing commitment from the

goal and abandoning goal-related effort is the most adaptive path, ideally coupled with self-protective control strategies to conserve an individual's emotional and motivational resources for future action (Heckhausen, Wrosch, & Schulz, 2010).

The occurrence of age-related declines in individuals' control capacity further implies that the adaptive value of control strategies can change as a function of age. MTD postulates that goal engagement strategies should generally be more adaptive at younger ages, when opportunities for goal attainment are plentiful, whereas goal disengagement strategies are thought to become paramount in older adulthood, when individuals typically confront increasing constraints on the attainment of their goals. From this perspective, it seems essential for older adults to limit goal engagement to those important domains for which they still have sufficient opportunities (Baltes & Baltes, 1990; Schulz & Heckhausen, 1996). In addition, older adults may have to recognize with increasing frequency that some goals have become difficult to attain, and they need to abandon those goals that are unattainable or too costly to pursue (Brandstädter & Renner, 1990; Heckhausen, 1999). This age-related shift in the use of control strategies allows older adults to conserve their limited resources for the pursuit of attainable goals, and to protect their physiological resources and psychological well-being from the experience of failure. In this way, an effective use of control strategies could explain individuals' impressive capacity to optimize development across the lifespan by regulating motivational processes in the context of waxing and waning opportunities for goal attainment (Heckhausen, Wrosch & Schulz, 2010).

A plethora of research has supported the main assumptions of MTD (for reviews, see Heckhausen, Wrosch, & Schulz, 2010; Wrosch, Dunne, Scheier, & Schulz, 2006). For example, it has been shown that perceived controllability of life circumstances decreases with advancing age (Heckhausen & Baltes, 1991), while developmental losses are typically experienced particularly frequently in later adulthood (Heckhausen, Dixon, & Baltes, 1989). Further,

numerous studies have demonstrated evidence for the adaptive value of age- and opportunity-adjusted control striving across various life domains (Heckhausen, Wrosch, & Fleeson, 2001; Wrosch & Heckhausen, 1999; Wrosch, Heckhausen, & Lachman, 2000). For example, a study examining how individuals can maintain their subjective well-being in the context of pressing demands (e.g., financial problems) showed that goal engagement prevented the adverse psychological consequences of these problems particularly in young adulthood, while goal disengagement-related strategies (i.e., positive reappraisals) became more important in older adulthood (Wrosch, Heckhausen, & Lachman, 2000). In a similar vein, emotional benefits resulting from opportunity-adjusted control striving have been demonstrated for regulating age-related challenges in other life domains, such as passing the biological deadline for childbearing or finding a new romantic partner in late midlife (Heckhausen, Wrosch, & Fleeson, 2001; Wrosch & Heckhausen, 1999). Consistent with the assumptions of MTD, these studies suggest that the controllability of life circumstances often declines during the later phases of the adult lifespan. In addition, they demonstrate that a general shift from using goal engagement to goal disengagement strategies enables older individuals to effectively manage age-related constraints on the pursuit of their personal goals.

Control Striving and Physical Disease in Older Adulthood

A growing body of research has applied the assumptions of MTD to the management of older adults' physical health problems (for early contributions, see Schulz, Heckhausen, & O'Brien, 1994; Wrosch, Schulz, & Heckhausen, 2002). This line of work is based, in part, on the premise that age-related opportunities for overcoming health-related problems generally decline in the later phases of adulthood and thus may require older individuals to engage more frequently in self-protective and goal disengagement strategies (Heckhausen, Wrosch, & Schulz, 2010). Although such a shift in control striving likely benefits older adults who confront severe and

uncontrollable physical health threats (e.g., Barlow, Liu, & Wrosch, 2014; Hall, Chipperfield, Heckhausen, & Perry, 2010), our theoretical approach also recognizes that health problems can provide a unique challenge for older adults because a loss of health has wide-reaching implications. Consider, for example, an older adult with severe arthritis. This person may not only be limited in her or his personal activities (e.g., exercise or self-care), but these limitations may put additional constraints on the person's opportunities for pursuing a number of other goals (e.g., visiting friends and family or pursuing leisure activities). Said differently, health problems can lead to particularly severe consequences for quality of life if they reduce control capacity across multiple important life domains. Thus, although physical decline is an inherent part of the aging process (Canadian Institute for Health Information, 2011), without sufficient health it may be impossible to pursue a variety of goals, and abandoning health-related goals should be postponed for as long as possible (Heckhausen, Wrosch, & Schulz, 2013).

An important implication of the latter discussion is that it may not always be adaptive for older adults who confront health-related threats to shift their control strategies from goal engagement to goal disengagement. In fact, considering that there is much variability in the controllability of older adults' physical health problems, goal engagement can be as adaptive as goal disengagement for managing health-related threats. This may be the case because some health problems could potentially be managed through investments of time, energy, and professional treatment, while other health problems may be chronic or uncontrollable. For example, in the earlier stages of age-related declines, individuals frequently confront acute or subclinical health threats that are relatively transient (e.g. stomach pain, headaches, or shortness of breath). Such acute physical symptoms may be successfully addressed by active goal engagements, such as exercise, diet change, or seeking advice from a physician (Wrosch, Schulz, & Heckhausen, 2002). Over time, however, older adults' health problems may become less

controllable and acute health threats may turn into relatively intractable chronic disease (e.g., cancer and subsequent functional disability, for disablement processes, see Verbrugge & Jette, 1994). In the latter circumstances, control strategies aimed at overcoming the health problem are often no longer effective and goal engagement may become futile. In these situations, individuals need to adjust their health-related goals and engage in self-protective strategies to avoid the adverse psychological consequences of chronic disease (Barlow, Liu, & Wrosch, 2014; Heckhausen, Wrosch, & Schulz, 2013).

A recently proposed theoretical model sheds further light on how an adaptive adjustment of health-related goals may be accomplished in the context of declining and less controllable health: the lines-of-defense model (Heckhausen, Wrosch, & Schulz, 2013). This model postulates that older adults can manage progressive health declines effectively by organizing their control strategies in cycles of goal engagement and goal disengagement, representing sequentially organized “lines of defense.” These organized cycles of control striving are thought to allow individuals to defend feasible levels of physical health for as long as possible. Only if it becomes impossible for a person to maintain a certain level of health should the person step behind the next line-of-defense to prevent further health declines. An implication of this proposition is that even if older individuals confront health problems that have become increasingly less controllable, they should not necessarily disengage from all health-related goals. For example, a person with arthritis who experiences pain during vigorous physical activity may need to disengage from those activities that are impossible to accomplish (e.g., going on a strenuous hike), while maintaining other forms of physical activity should be important and adaptive for this person (e.g., going for regular walks). In a similar vein, it may be necessary for an individual who suffers from a progressive illness (e.g., osteoarthritis, macular degeneration, or Parkinson’s disease), after all medical treatments have been exhausted, to “retreat” behind the

next line-of-defense by disengaging from the goal of overcoming the illness, and instead engage in the management of the disease by, for example, reorganizing the home environment to maintain as much quality of life as possible, despite worsening health (for a more comprehensive discussion, see Heckhausen, Wrosch, & Schulz, 2013).

A Theoretical Model of Managing Physical Disease in Older Adulthood

Figure 1 summarizes our theoretical approach by illustrating a simplified model of the role of control strategies in the management of older adults' physical health problems (adapted from Wrosch, Schulz, & Heckhausen, 2004). This model addresses that effective self-regulation of health-related threats is of utmost importance for older adults' quality of life and that individuals can confront health-related problems that differ in terms of their controllability. In addition, it postulates that an opportunity-adjusted use of control strategies may enable older individuals to effectively manage the experience of physical health declines.

Figure 1 suggests that older adults may experience physical health problems that can be located on a continuous dimension from being controllable (e.g., acute symptoms such as pain) to becoming uncontrollable (e.g., functional disability such as not being able to move around independently). It further illustrates that the occurrence of such health problems can trigger emotional distress (Fig. 1, paths a–b), subsequently influencing health-compromising cognitive/behavioral, motivational, and physiological processes (Fig. 1, paths b–c). For example, the experience of a variety of health conditions has been linked to increases in older adults' depression (Lenze, Schulz, Martire, et al., 2005). Furthermore, depressed individuals may lose their motivation to overcome health-related problems, engage in health-compromising behaviors, or experience cognitive deficits and disturbances (Bruce, Seeman, Merrill, & Blazer, 2002; Yaffe, Blackwell, Gore, et al., 1999; Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008). Finally, the experience of emotional distress can cause a dysregulation of health-relevant physiological

systems (e.g., hormonal and immune system, see Cohen, Janicki-Deverts, & Miller, 2007; Dantzer, O'Connor, Freund, Johnson, & Kelley, 2008; Folkman & Lazarus, 1986; Kiecolt-Glaser & Glaser, 1991).

Figure 1 further shows that distress-related alterations in motivational, cognitive/behavioral, and physiological processes can loop back, resulting in the development of new or more severe health problems (Fig. 1, paths c-a). For example, motivational problems may undermine adherence to medical regimens (Rubak, Sandbaek, Lauritzen, & Christensen, 2005), and behavioral and cognitive disturbances can influence a variety of health conditions, including coronary heart disease (e.g., Ayas, White, Manson, et al., 2003; Brosschot, Gerin, & Thayer, 2006). Moreover, research has demonstrated that disturbances in individuals' hormonal or immune systems can cause a variety of aging-related diseases (Fig. 1, paths c-a; Cohen, Janicki-Deverts, & Miller, 2007; Ridker, Rifai, Rose, Buring, & Cook, 2002). The presence of these feedback loops highlights the possibility for older adults to enter a downward spiral such that a disruption at any point in this process can lead to perpetuating declines in physical and psychological health (Wrosch, Dunne, Scheier, & Schulz, 2006; Wrosch, Schulz, & Heckhausen, 2004).

Finally, the dotted paths in Figure 1 illustrate that an opportunity-adjusted use of control strategies may prevent the adverse psychological and physical consequences of confronting physical health threats. More specifically, if older adults confront potentially manageable physical health threats (e.g. acute symptoms), goal engagement strategies should be conducive to overcoming the respective problem and thus buffer the associated emotional distress. (Fig. 1, path a1-d1-b). By contrast, to the extent that individuals' health problems become less controllable (e.g. development of chronic illness and functional disability), the use of goal disengagement-related control strategies should become increasingly adaptive, as these strategies

are likely to ameliorate emotional distress in the context of insurmountable health problems (Fig. 1, path a2-d2-b). In this way, the emotional benefits deriving from the use of opportunity-adjusted control strategies may protect older adults' physical health by preventing a disturbance of health-relevant cognitive/behavioral, motivational, and physiological processes (Wrosch, Schulz, & Heckhausen, 2004).

Empirical Evidence

Measurement of Health-Related Control Striving

Approximately 15 years ago, we started examining our theoretical model by creating a measurement instrument to assess individual differences in health-related control striving. This instrument consists of a self-report scale designed to measure different types of control strategies that individuals can use to manage their health problems. The items of this scale were based on a generic version of the optimization with primary and secondary control scales (Heckhausen, Schulz, & Wrosch, 1998) and a primary and secondary control scale used in an American national probability sample (MIDUS, Wrosch, Heckhausen, & Lachman, 2000).

Our early work on the management of older adults' health threats focused on goal engagement strategies, labeled as "health engagement control strategies" (hereafter referred to as HECS, Wrosch, Schulz, & Heckhausen, 2002). The items of the HECS reflect the use of selective primary control (e.g., I invest as much time and energy as possible to improve my health), compensatory primary control (e.g., When a treatment doesn't work for a health problem I have, I try hard to find out about other treatments), and selective secondary control strategies (e.g., I often think about how important good health is to me). The HECS has shown appropriate reliability across studies and predicted important outcomes (e.g., depressive mood, cortisol dysregulation, or physical health declines; Wrosch & Schulz, 2008; Wrosch, Schulz, & Heckhausen, 2002, Wrosch, Schulz, Miller, Lupien, & Dunne, 2007).

We subsequently completed this measurement instrument by devising additional items that reflect health-specific compensatory secondary control strategies, which are thought to protect individuals' motivational and emotional resources in the context of health problems and facilitate disengagement from unfeasible health goals. The latter subscale of health-related self-protection has also shown appropriate psychometric characteristics and predicted adaptive emotional and physiological outcomes (e.g., Barlow, Liu, & Wrosch, 2014; Castonguay, Wrosch, & Sabiston, 2014). It includes items associated with positive reappraisals (e.g., When I am faced with a bad health problem, I try to look at the bright side of things) or the avoidance of self-blame (e.g., When I find it impossible to overcome a health problem, I try not to blame myself).

Note that not all studies reviewed here used this measure of health-related control striving. Some research has developed its own constructs of goal engagement and goal disengagement-related control strategies. For example, Hall and colleagues (2010) asked older adults with serious health problems, in which domain they suffered the most activity restrictions due to their health problem. Control strategies of goal engagement and disengagement were then rated with reference to those activity restrictions. In addition, other research on the management of older adults' health problems stems from personality psychology and operationalized goal disengagement as a relatively stable individual tendency that people apply across life domains (Dunne, Wrosch, & Miller, 2011).

Psychological and Physical Consequences of Health-Related Control Striving

Research examining the influence of health-related control striving has provided substantial empirical support for the proposed theoretical model. A first study of 127 older adults tested whether HECS would buffer the association between different types of health problems (more controllable acute physical symptoms and less controllable functional disability) and depressive symptoms (Wrosch, Schulz, & Heckhausen, 2002). The results of this study showed

that levels of acute physical symptoms were associated with depressive symptoms, but only among older adults who did not engage in HECS. By contrast, older adults who reported high levels of HECS were entirely protected from experiencing the adverse effect of acute physical symptoms on depressive symptomatology. Of importance, this buffering effect of HECS was not observed in the context of relatively intractable functional disability. These findings support our theoretical model by documenting that control strategies aimed at overcoming health problems (i.e., HECS) are particularly adaptive if older adults confront potentially manageable health problems, such as acute physical symptoms (see Fig. 1, path a1-d1-b), but may reduce their adaptive value in the context of chronic health problems, such as functional disability (Wrosch, Schulz, & Heckhausen, 2002).

Another study, reporting cross-sectional data from 215 older adults, examined the role of HECS in the associations between participants' physical health problems, depressive symptoms, and diurnal cortisol secretion (Wrosch, Schulz, Miller, Lupien, & Dunne, 2007). The study's hypotheses predicted that physical health problems (e.g., high blood pressure or diabetes) could be associated with levels of depressive symptoms and cortisol secretion, but only if older adults did not engage in counteracting their health problems (i.e., low HECS). To exclude those portions of variance in the outcome measures that were associated with relatively intractable health problems, the analyses controlled for participants' levels of functional disability. The results of the study showed that physical health problems predicted higher levels of both, depressive symptoms and diurnal cortisol secretion. However, these associations were obtained only among participants with low levels of HECS, but not among their counterparts who reported comparatively higher levels of HECS. In addition, the analyses showed that the buffering effect of HECS on cortisol output was completely mediated by individual differences in participants' depressive symptomatology. Of note, this pattern of effects was considerably

weaker if the analyses did not control for participants' functional limitations, indicating that the beneficial effects of HECS were due to potentially manageable health problems, and not associated with more intractable functional disability (Wrosch, Schulz, Miller, Lupien, & Dunne, 2007). These findings show further evidence for the assumption that goal engagement strategies can ameliorate the adverse effects of relatively controllable health problems on older adults' emotional and physiological health (see Fig. 1, path a1-d1-b-c). Moreover, they point to the presence of a potential mediation process, in which the emotional benefits deriving from opportunity-adjusted control striving contribute to adaptive patterns of physiological processes (i.e., cortisol function; see Fig. 1, path a-b-c; Cohen, Janicki-Deverts, & Miller, 2007).

A two-year longitudinal follow-up of the previous study documented further evidence for the importance of HECS in the management of controllable health problems (Wrosch & Schulz, 2008). This study examined whether HECS can determine the extent to which manageable acute physical symptoms develop into more intractable chronic disease and functional disability over time. In addition, it addressed potential mediators of this association. The results of the study demonstrated that baseline levels of acute physical symptoms predicted increases in chronic disease and functional disability over time, but only among participants who reported low baseline levels of HECS. By contrast, older adults who reported high levels of HECS were protected from the consequences of acute physical symptoms on increases in chronic disease and functional disability. In addition, the study showed that reduced cortisol levels partially mediated the buffering effect of HECS on the association between acute physical symptoms and subsequent chronic health problems (Wrosch & Schulz, 2008). Consistent with our theoretical model, these findings extend the previous studies by demonstrating in longitudinal analyses that early manifestations of illness can result in more severe and chronic health conditions if older adults do not counteract developing illness through active goal engagements (see Fig. 1, path a1-

d1-a2). In addition, it documents that the buffering effect of active control strivings may be due, in part, to a prevention of physiological disturbances in health-relevant bodily systems (see Fig. 1, path a1-d1-c-a2).

The studies reported so far focused on the adaptive value of older adults' goal engagement strategies for managing potentially manageable health threats, and did not address whether self-protective and goal disengagement processes can be adaptive in the context of less controllable, chronic disease. The latter possibility, however, has been addressed in a growing literature on the influence of older adults' control strategies for managing chronic disease. For example, a longitudinal study of older adults with serious health problems addressed both, the congruence of goal engagement strategies when the health problem was acute and controllable (e.g., heart attack and stroke patients during rehabilitation) and of goal disengagement strategies when the health problem was chronic and uncontrollable (e.g., arthritis, heart disease) (Hall, Chipperfield, Heckhausen, & Perry, 2010). The assessment of control striving in this study focused on trying to control (i.e., goal engagement) and giving up on controlling (i.e., goal disengagement) the restrictive influence of physical disease on older adults' everyday activities.

The results of the study demonstrated that older adults, who were diagnosed with acute and controllable health problems (e.g., heart attack, stroke, controllable via rehabilitation), but not those who only suffered from common chronic uncontrollable disease (e.g., hypertension or arthritis), benefitted from goal engagement strategies in terms of a 39% greater likelihood of survival nine years later. By contrast, older adults who utilized goal engagement strategies even though they had not experienced any acute controllable health event and only dealt with common chronic uncontrollable health problems reported a deterioration of their health status after five years of study. In addition, the results showed that older adults who were suffering only from uncontrollable chronic disease, but not those diagnosed with acute and controllable health

problems, benefitted in terms of their health status five years later if they disengaged from the goal of overcoming the activity restrictions imposed by their health problem (Hall, Chipperfield, Heckhausen, & Perry, 2010). These findings support the proposed model by demonstrating that goal disengagement strategies may prevent a deterioration of physical health among older adults who are confronted with an intractable chronic health problem (see Fig. 1, path a2-d2-a2). Moreover, they suggest that the use of goal engagement strategies is beneficial when they are used in response to relatively controllable health problems, but turn maladaptive in the context of an intractable chronic disease. The latter process could occur if older adults continue to strive towards overcoming activity restrictions due to intractable health problems, and as a consequence experience the adverse consequences of repeated failure on their psychological and physical health (cf. Wrosch, Miller, Scheier, & Brun de Pontet, 2007).

In addition to goal disengagement as an adaptive response to uncontrollable health threats, our theoretical model conceptualized self-protective thoughts as important control strategies that enable individuals to maintain their emotional and motivational resources for future action. This proposition has been tested in a long-term longitudinal study of 121 older adults examining the associations between self-protective control strategies, chronic health threats, and feelings of loneliness (Barlow, Liu, & Wrosch, 2014). The theoretical model of this study predicted that chronic health problems could trigger feelings of loneliness, given that the illness may prevent older individuals from engaging in emotionally relevant social interactions. In such circumstances, however, the use of self-protective control strategies (e.g., positive reappraisals or self-protective attributions) was expected to ameliorate feelings of loneliness (e.g., by facilitating social activities through a more positive appraisal of an individual's health status or through the prevention of depression, Bombardier, D'Amico, & Jordan, 1990).

The results of this study showed that levels of chronic illness predicted a linear increase

in loneliness over eight years of study. More specifically, older adults with high baseline levels of chronic illness reported a sharp increase in loneliness over time, while their counterparts with lower levels of chronic illness exhibited a low and stable trajectory of loneliness. Further analyses demonstrated, among those older adults with high levels of chronic illness, that an increase in loneliness was observed only among participants who did not use self-protective control strategies. By contrast, older adults who were able to positively reappraise their health-related circumstances and to avoid blaming themselves for the health problems (i.e., high self-protection) did not experience an illness-related increase in loneliness over time. Of note, the reported study also included goal engagement strategies (i.e., HECS). Different from self-protective control strategies, HECS did not buffer the adverse effect of chronic illness on increases in loneliness (Barlow, Liu, & Wrosch, 2014). Given that it is often difficult or impossible to overcome chronic illness in older adulthood, these findings support our theoretical model by identifying self-protective control strategies (and not goal engagement strategies) as an adaptive motivational response that enables older adults to manage the adverse emotional consequences of relatively intractable physical health problems (see Fig. 1, path a2-d2-b).

We note that there is also research examining the role of broader individual differences in goal disengagement capacities for managing chronic health problems in older adulthood. Different from the previously reported studies on the use of specific control strategies, research on goal disengagement capacities assesses generalized individual tendencies to disengage from unattainable goals across different areas of life (Wrosch, Scheier, & Miller, 2013; Wrosch, Scheier, Miller, Schulz, & Carver, 2003). In this regard, a 6-year longitudinal study of 135 community-dwelling older adults investigated the associations between goal disengagement capacities, functional disability, and depressive symptoms (Dunne, Wrosch, & Miller, 2011). The study's results showed that the onset of functional disability predicted a steep increase in

older adults' depressive symptomatology over six years of study. Moreover, and consistent with the reported findings by Hall and colleagues (2010), this association was observed only among older adults who reported difficulty disengaging from unattainable goals. By contrast, functional disability did not predict an increase in depressive symptoms among older adults who were better able to disengage from unattainable goals (Dunne, Wrosch, & Miller, 2011). This research documents that the adverse emotional consequences of experiencing chronic and relatively intractable disease may be prevented if older adults have developed a general capacity for disengaging from unattainable goals (cf. Fig. 1, path a2-d2-b). Moreover, considering that this conclusion maps closely onto the discussed literature examining the effects of stressor-specific control strategies (Barlow, Liu, & Wrosch, 2014; Hall, Chipperfield, Heckhausen, & Perry, 2010), these findings could imply that there are important functional associations between broader individual tendencies in certain control dimensions and the specific control strategies that individuals use to manage health-related challenges (Heckhausen & Wrosch, 2015).

Conclusions and Future Research

This chapter addressed how older adults can manage the occurrence of physical health problems and protect their psychological and physical health. Based on the motivational theory of life-span development (Heckhausen, Wrosch, & Schulz, 2010), we discussed a theoretical model of opportunity-adjusted control striving for the management of physical health problems in old age. This model suggests that health-related problems can compromise older adults' emotional well-being, and put individuals at risk for developing subsequent psychological and physical health declines. In addition, it postulates that older adults can prevent the adverse consequences of physical health threats if they adjust their control strategies to the opportunities available for overcoming a health problem. When faced with a health threat that can potentially be addressed (e.g., acute physical symptoms), older adults should invest resources in actively

overcoming the health problem by using goal engagement strategies. However, when health problems become less controllable and individuals are faced with more intractable health threats that may not be overcome (e.g., chronic health problems or functional disability), active goal engagements can become futile, and older adults should protect their emotional well-being and adjust their health-related goals by using goal disengagement-related strategies.

The reviewed empirical evidence lends strong support to the proposed model. First, the discussed cross-sectional and longitudinal studies showed that the experience of physical health threats can forecast emotional and health-related problems. More specifically, while relatively controllable physical health problems exerted adverse effects on older adults' depressive symptomatology, cortisol secretion, and subsequent physical health (e.g., Wrosch & Schulz, 2008; Wrosch, Schulz, Miller, Lupien, & Dunne, 2007), more intractable health problems were associated with increased levels of loneliness, depressive symptomatology, and further health problems (e.g., Barlow, Liu, & Wrosch, 2014; Dunne, Wrosch, & Miller, 2011; Hall, Chipperfield, Heckhausen, & Perry, 2010). Second, the empirical evidence indicated that the adverse downstream implications of physical health problems on health-relevant physiological systems (i.e., cortisol regulation) can be mediated by older adults' emotional distress (i.e., depressive symptoms, Wrosch, Schulz, Miller, Lupien, & Dunne, 2007), and that such disturbances of physiological systems may contribute to the development of further health problems (Wrosch & Schulz, 2008; for control strategies, cortisol disturbances, and functional disability, see also Wrosch, Miller, & Schulz, 2009). Third, the reported studies support our main theoretical premise by demonstrating that older adults can manage the occurrence of physical health problems if they use control strategies in close correspondence to the opportunities available for overcoming a health problem. In the context of manageable physical health threats, older adults could avoid the negative consequences on their psychological and physical health if

they used high levels of goal engagement strategies (e.g., Hall, Chipperfield, Heckhausen, & Perry, 2010; Wrosch & Schulz, 2008; Wrosch, Schulz, & Heckhausen, 2002; Wrosch, Schulz, Miller, Lupien, & Dunne, 2007). By contrast, high levels of self-protective and goal disengagement strategies prevented older adults from encountering the negative psychological and physical consequences of more intractable health problems (e.g., Barlow, Liu, & Wrosch, 2014; Dunne, Wrosch, & Miller, 2011; Hall, Chipperfield, Heckhausen, & Perry, 2010).

Overall, these findings point to individuals' impressive capacity to regulate their development in the context of severe and pressing demands. In particular in older adulthood, when a person's capacity to achieve important outcomes undergoes sharp declines, it becomes essential that individuals focus their control resources on managing those challenges that can still be addressed, and protect their psychological and motivational resources in the context of more intractable problems. This process of effective developmental regulation requires individuals to activate specific control strategies that facilitate the attainment of feasible goals and contribute to overcoming manageable problems. In addition, it demands from individuals to use goal disengagement-related control strategies to adjust unfeasible goals and buffer the adverse psychological and physical consequences of those goal-related problems that have become too difficult to overcome (Heckhausen, Wrosch, & Schulz, 2010).

Although these conclusions clearly support the theoretical claim that using adaptive control strategies plays an important role in successful aging, questions remain that could provide promising avenues for future research. First, we note that the discussed literature focused largely on how older adults can manage specific health threats at discrete points in their lives, and it did not examine the complete process of illness progression from being disease-free to experiencing subclinical and chronic illness, and eventually terminal illness (cf. Verbrugge & Jette, 1994). As discussed earlier in this chapter, the recently proposed lines-of-defense model

provides a promising theoretical framework for examining the role of control striving in the process of illness progression (Heckhausen, Wrosch, & Schulz, 2013). This model postulates that an organized use of goal engagement and disengagement-related control strategies may allow older adults to hold sequentially organized lines-of-defense for as long as possible and adjust health-related goals if it becomes impossible to prevent further health declines. In addition, the lines-of-defense model can be applied to the reversed processes, associated with recovery from certain age-related diseases (Heckhausen, Wrosch, & Schulz, 2013). Given that aging is not always a unidirectional, loss-related, process (Baltes, 1987), organized cycles of goal engagement and disengagement could thus also play an important role in the improvement of older adults' physical health. We think that future research should apply the lines-of-defense model in long-term longitudinal research to track individuals' control strategies and health conditions over extended periods of time. Such research may examine how older adults can maintain quality of life in the process from being disease-free to experiencing terminal illness. It may reveal how adaptive control strategies can slow down, stop, or even reverse progressive health conditions, and thus has a great potential to discover new pathways to successful aging.

Second, this chapter focused on the age-normative development of physical disease in old age. However, it seems important to address that individuals of any age can confront physical health threats that are more or less controllable. From our perspective, it seems reasonable to assume that patterns of opportunity-adjusted control striving could also represent an adaptive motivational response in the context of non-normative health threats. In addition, considering that the management of non-normative threats may represent a particularly severe challenge, given that established role models and support systems are often lacking outside of normative tracks, individual differences in adaptive control striving may become paramount in such circumstances (Wrosch & Freund, 2001). Preliminary evidence for the importance of control

strategies in the context of non-normative health threats has been reported in a heterogeneous study of breast cancer patients (Castonguay, Wrosch, & Sabiston, 2014). This study concluded that, regardless of age, a disturbance of health-relevant physiological processes in patients' immune system (i.e., patterns of systemic inflammation as indicated by C-reactive protein) may be prevented by the use of self-protective control strategies, particularly if individuals are able to disengage from peripheral goals and redirect resources to managing the pressing demands of the cancer. Future research may build on these findings and recognize that life-span developmental principles of adaptive control striving can be applied to the non-normative occurrence of health threats. Such research should examine the influence of control striving in a variety of populations across the lifespan that confront severe physical health problems.

Third, while our conclusions suggest that opportunity-adjusted control striving is an important aspect of successful aging, the discussed evidence did not reveal the factors that may facilitate an adaptive use of control strategies. This seems to be an important task since the observed reliable associations between the use of control strategies and psychological and health-related outcomes suggest that some older adults are more successful than others in adjusting their control strategies to changing opportunities for goal attainment. However, empirical research identifying the precursors of adaptive control striving is scarce, and theoretical work has only begun to conceptualize some factors that could determine individual differences in adaptive control striving (Heckhausen & Wrosch, 2015; Wrosch, Heckhausen, & Lachman, 2006). One of the few empirical studies addressing predictors of control responses showed that depressive symptoms can make it easier for individuals to disengage from unattainable goals (Wrosch & Miller, 2009). In addition, experimental research documented that dispositional optimism may predict faster disengagement from unsolvable tasks in the presence of alternatives (Aspinwall & Richter, 1999). Finally, theoretical work suggested that broader individual difference variables,

related to goal-relevant behavioral tendencies applied across life domains (e.g., dispositional optimism, action versus state orientation, generalized perceived control, or goal disengagement capacities, Kuhl, 1981; Pearlin & Schooler, 1978; Scheier & Carver, 1985; Wrosch, Scheier, Miller, Schulz, & Carver, 2003), could determine the extent to which individuals are able to use specific control strategies effectively (Heckhausen & Wrosch, 2015; Wrosch, Heckhausen, & Lachman, 2006). In fact, some of the evidence that we discussed in this chapter would be consistent with the latter possibility by suggesting that general goal disengagement capacities and stressor-specific control strategies can produce similar emotional benefits in the context of older adults' chronic disease (e.g., Barlow, Liu, & Wrosch, 2014; Dunne, Wrosch, & Miller, 2011). Such a pattern of matching effects may occur if the general capacity to disengage from unattainable goals would facilitate the engagement in specific self-protective and goal disengagement strategies (for a more comprehensive discussion, see Heckhausen & Wrosch, 2015). We think that research examining the underlying dimensions of adaptive control striving is important and may reveal a more complete picture of the factors involved in successful developmental regulation across the lifespan.

Finally, we note that motivational processes, such as control striving, represent malleable psychological dimensions that can be targeted in interventions aimed at improving older adults' quality of life. In fact, previous research examining the implementation of interventions focused at modifying control processes over disease has shown promising results (e.g., Gitlin, Hauck, Winter, Dennis, Schulz, 2006). If older individuals learn to adjust their control strategies to the controllability of specific health problems, they may experience considerable improvements in their emotional well-being and could prevent subsequent psychological and physical health declines. More research along these lines is warranted as it will contribute to psychological theories of control and successful development, and may ultimately help improve quality of life.

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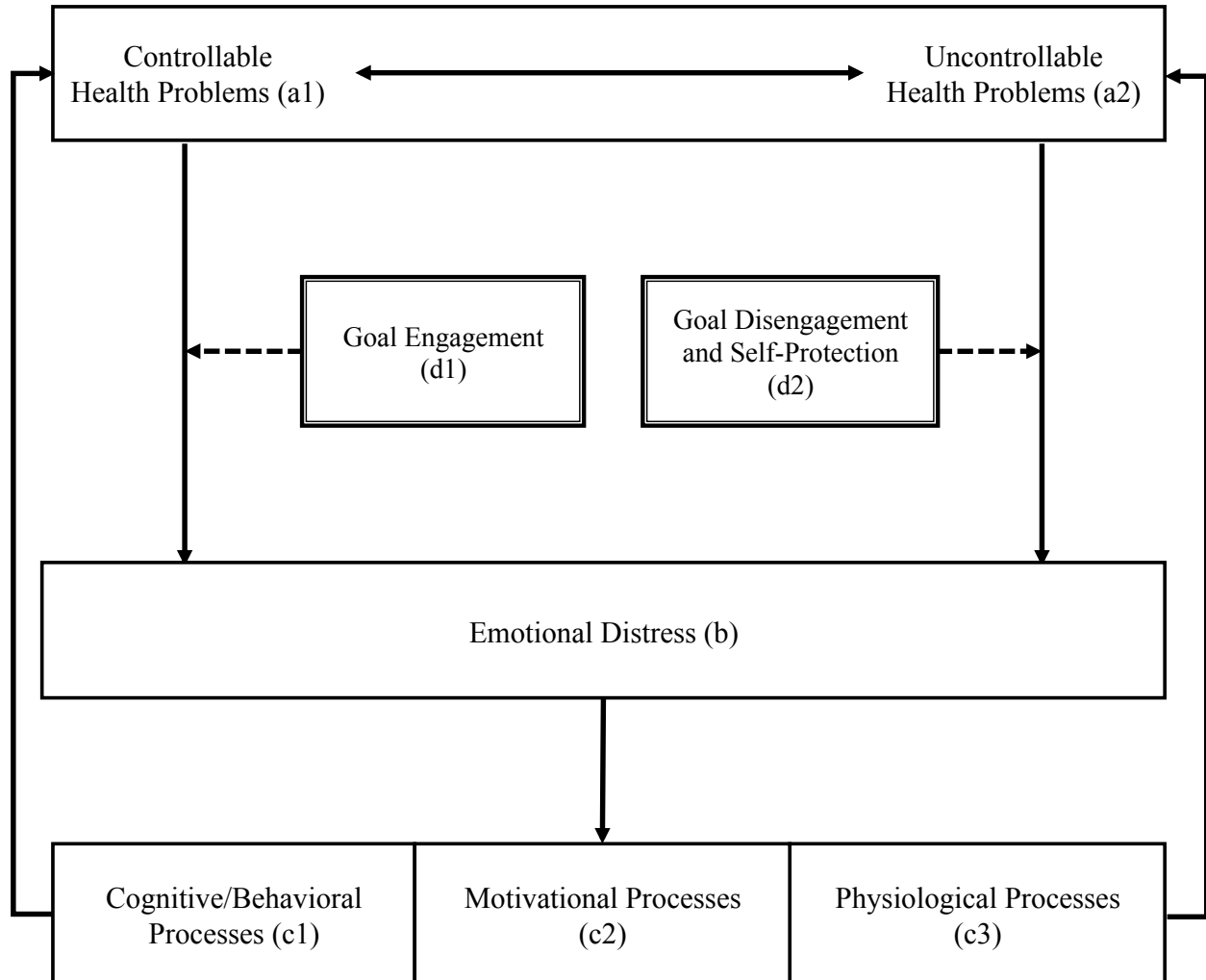


Figure 1. Theoretical model of opportunity-adjusted management of physical health problems in older adulthood (adapted from Wrosch, Schulz, & Heckhausen, 2004). Dotted lines represent adaptive motivational mechanisms that buffer the adverse emotional consequences of physical health problems.