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# Agency and Motivation in Adulthood and Old Age

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## Keywords

agency, motivation, life-span development, developmental regulation, control, goal

## Abstract

This review addresses conceptual and empirical research about how individual agency and motivation influences development during adulthood and old age. The major life-span approaches to individual agency and developmental regulation are discussed, with a focus on the motivational theory of life-span development. Developmental agency unfolds through action cycles of pursuing long-term goals for optimal development. Individuals differ in their capacity to regulate their goal engagements effectively within the age-graded structure of opportunities and constraints in their life courses. We discuss a set of research examples about specific developmental challenges, such as transition to adulthood, biological aging, illness, and societal transformation, and show how individuals, as agents in their own development, navigate change for better or worse. We conclude with suggestions for future research.

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## 1. INTRODUCTION

Most of us have a strong desire to play an active role in shaping our own lives. We invest effort and time in striving for long-term goals and stay on developmental paths that we think will help us achieve those goals. For those goals that we consider important or essential, we will combat challenges and resist being diverted by other competing goals. This striving for long-term goals provides us with a sense of personal agency in our lives.

Life-span developmental psychology has addressed the role of individuals as active coproducers of their own development in the context of two strong shaping factors, the biological maturation of the individual and the age-graded nature of societal institutions (e.g., Brandtstädter & Lerner 1999, Crockett 2002, Freund & Baltes 2000, Heckhausen 1999, Lerner & Busch-Rossnagel 1981). In a similar vein, life-course sociologists have studied how individuals influence their life course in the context of societal institutions and social structure (Elder 1994, Evans 2007, Giddens 1991, Heinz 2009, Hitlin & Elder 2007, Settersten & Gannon 2005, Shanahan & Elder 2002). Together, psychological and sociological perspectives on individual agency in adulthood and old age reveal that individuals cannot simply invent themselves and their life courses, but rather need to adapt to their social and developmental ecology and its opportunities and constraints. Thus, individual agency in shaping one's future is always constituted and, at the same time, constrained by one's biological status and one's position in a given societal structure. Individual agency reflects both constraint and freedom, and at the same time provides the raw material for transforming social structure (Giddens 1984).

Psychological concepts of individual agency have been associated with numerous constructs, such as goals, perceived control, self-efficacy, persistence, mastery, autonomy, and self-regulation. Each of these constructs captures one or more specific aspects of motivation and action (Bandura 2006, Carver & Scheier 1990, Heckhausen & Heckhausen 2018, Pearlin & Schooler 1978, Rotter 1966, Ryan & Deci 2000). Most of these constructs concern the expectancy for action outcomes (e.g., perceptions of control), the values associated with actions (e.g., activity enjoyment) and their outcomes (e.g., goal attainment), or the characteristics of motivated behavior (e.g.,

self-regulation). In the context of life-span development, individual agency is about motivation and action for long-term goals. The relevant action field for this individual agency in development is the life course, with its age-graded and sequentially organized structure of opportunities and constraints (Heckhausen 1999). It is this kind of life course–embedded long-term agency on which we focus in this article.

## **2. INDIVIDUAL AGENCY AND MOTIVATION IN THE REGULATION OF LIFE-SPAN DEVELOPMENT**

### **2.1. Purpose of Adaptive Agency in Development**

Human action is adaptive if it produces desired effects on outcomes in the environment. People engage in motivated behaviors to affect or prevent change. Thus, behavioral evolution would have built our motivational system for regulating short- and long-term goal pursuits to maximize the effects that our behavior has on the environment in pursuit of such essentials as food, shelter, mates and reproduction, and the welfare of offspring. In our motivational theory of life-span development (MTD), we refer to this as primary control (Heckhausen 2018; Heckhausen & Schulz 1995, 1999; Heckhausen et al. 2010; Schulz & Heckhausen 1996) and propose that individuals, throughout their lives, strive to maximize primary control of their environment and developmental outcomes.

Optimizing primary control across the life span, however, poses complex and ever-changing challenges. For most people, achieving high levels of performance in multiple domains is not realistic because of the time and effort required. To achieve truly high performance, extensive investment in deliberate practice and skill acquisition lasting many years is needed, typically at the expense of other domains (Ericsson et al. 1993, Simonton 2014). Therefore, the key to an overall successful life is to manage the delicate balance of investing time and effort in major life domains, including work, family, health, and leisure. Moreover, effective developmental regulation requires that individuals are sensitive to biological or societal opportunities and constraints for pursuing important goals as they arise (e.g., to earn a college degree, raise a child, get a career promotion, or manage health problems). Accordingly, our MTD proposes that successful development and aging is based on maximizing the extent to which a person has influence (i.e., primary control) not only in one area, but also across the multiple major domains of life in a way that is synchronized with age-related changes characteristic of human development (Heckhausen et al. 2010).

Motivational self-regulation models enable researchers to identify the major regulatory challenges during different phases of goal pursuit. To the extent that individuals differ in their capacities to meet these challenges, they will differ in the effectiveness of their agency (Heckhausen & Wrosch 2016). Many components of motivational self-regulation discussed in subsequent sections can be assessed using specific measurement instruments developed in the framework of our MTD model and also of other models addressing individual agency in life-span development [e.g., the selection, optimization, and compensation (SOC) and dual-process models (Baltes & Baltes 1990, Brandtstädter & Rothermund 2002, Heckhausen et al. 2010)]. These scales assess either domain-general regulation processes or processes that are tailored to specific domains or goals (e.g., Brandtstädter & Renner 1990; Freund & Baltes 2002; Heckhausen et al. 1998, 2001; Teshale & Lachman 2016; Wrosch & Heckhausen 1999).

### **2.2. Achieving Successful Development by Optimized Goal Choice**

Given the complexity of managing multiple goal domains (e.g., family, career, health) and short- as well as long-term time horizons, the choice of which goal to invest in at a given time in life

requires top-down regulation of goal choice and motivational engagement and disengagement that is informed by and reflective of a time perspective (i.e., when to do what) and the opportunities and constraints for achieving primary control in multiple domains (e.g., which goals come first, and can they be built on, or do they impair progress towards other goals).

While society and biological maturation provide broad guidelines for development, few individuals grow up in environments where opportunities for maximizing primary control are highly structured. They cannot simply rely on being guided along an optimal path that maximizes their potential for primary control. Particularly when individuals try to achieve upward social mobility and attempt to overcome hurdles to more favorable life paths, they must effectively plan, prioritize, and orchestrate their motivational, behavioral, material, and social resources (Shane & Heckhausen 2016b). Successful agents in life-span development need to take a proactive analytical approach to their life course and development, utilizing specific heuristics for making decisions about which goals to pursue at a given point in the life course and which goals to disengage from.

There are three broad heuristics for optimization in choosing developmental goals (Heckhausen et al. 2010) and thus regulating one's own development across the life span. (a) The first is congruence with life-span changes in opportunities and constraints: To make the best use of available opportunities and resources (Freund 2008), individuals should identify and pursue goals at the peak of their attainability (for a review, see Heckhausen et al. 2010). Under certain unusual conditions, people may decide that it is best for them to pursue goals at less than optimal times in life (e.g., alternative path to college), especially if the peak opportunity time has already passed. However, pursuing goals off time often entails increased costs in terms of greater personal investments needed to compensate for more limited opportunities. Such circumstances, in turn, may curtail goal pursuits in other domains of life. (b) The second heuristic is managing interdomain and long-term consequences: The consequences of focusing on a specific goal should complement and support the pursuit of other, related goals (e.g., education and career). Pursuing conflicting goals wastes resources and undermines motivational commitment (Boudreaux & Ozer 2013, Freund et al. 2014), whereas complementary goals create synergies in terms of both promoting goal attainment and subjective well-being (Riediger & Freund 2004, 2006; Riediger et al. 2005). Finally, (c) the third heuristic is maintaining a diversity of goals, which allows individuals to switch from one goal to another when a currently pursued goal proves unattainable (Wrosch et al. 2003). Other models of developmental agency also acknowledge that adaptation of goal choice to time perspective, control expectations, or available resources is necessary, but they do not specify the heuristics in goal choice by which this task is achieved (e.g., Brandtstädter & Rothermund 2002, Freund & Baltes 2000).

Note that there may be important individual difference variables that facilitate or hinder optimized goal choice. It is essential that individuals know and analyze their control potential and the opportunities available to attain their goals in their current social ecology, including the sequence and conditional structure of subgoals (e.g., complete college degree first, then professional training). Particularly under conditions of deficient social scaffolding (e.g., in first-generation college students), individual cognitive ability to explore, access, and analyze relevant information about complex and long-term paths to important goals will play an adaptive role (Kay et al. 2016, 2017; Sy et al. 2011).

Individuals may also differ in the extent to which they are willing to adjust their developmental goals to the constraints characteristic of their social ecology. This sometimes means that the individual has to choose and invest in a subgoal that, in itself, is unattractive but that is a necessary step toward achieving a longer-term goal. Such challenges of delayed gratification of one's long-term goals require skillful self-regulation in activating explicit and volitionally effortful goal

striving when needed and allowing implicit and intrinsic motivation to take over when possible [see Rheinberg & Engeser's (2011) construct of motivational competence].

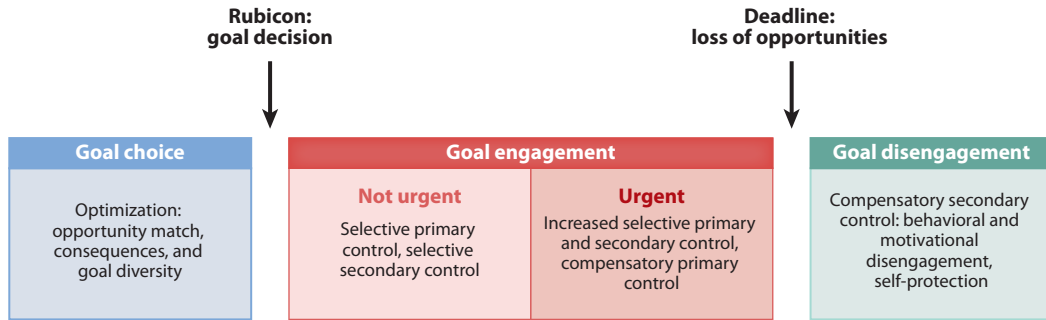
### 2.3. Developmental Agency through Action Cycles of Engagement with and Disengagement from Long-Term Goals

Individuals can influence their own development and life course by pursuing long-term goals, such as learning a new skill, getting established in a career, or finding a life partner and building a family. Each of these important goals has an optimal window of opportunity, and individuals must adapt their timing of goal pursuits to take advantage of these opportunities.

**2.3.1. Action-phase model of developmental regulation.** The adaptive regulation of developmental goals requires a person to use different motivational strategies during different phases of the goal pursuit process (Heckhausen 1999). Conceptual approaches to developmental agency have addressed the phenomenon of goal engagement and goal disengagement in different ways (for reviews, see Boerner & Jopp 2007, Haase et al. 2013, Poulin et al. 2005).

The SOC model was proposed by Baltes & Baltes (1989, 1990) as a broad metatheoretical framework to conceptualize individual experience and responses to developmental gains and losses across the life span. Selection is conceptualized as the narrowing down and preference for certain areas of functioning, optimization refers to resource investment in these selected areas of functioning, and compensation comprises attempts to adjust to developmental losses. More recent reformulations of the SOC model (Freund 2008; Freund & Baltes 2000, 2002; Knecht & Freund 2017; Lang et al. 2002; Riediger et al. 2005; Wiese et al. 2002) introduced a motivational perspective that focuses on the pursuit of long-term goals to maximize gains (elective selection, e.g., saving for retirement) and minimize losses (loss-based selection, e.g., avoiding aging-related decline in memory). This more recent, motivation-focused SOC approach proposes that elective and loss-based goal selection, i.e., striving for either growth or avoidance of loss, is activated depending on the availability of resources and the remaining lifetime. With abundant resources, elective selection of growth is activated, whereas with declining resources and a shortening lifetime perspective, loss-based selection and compensation are prioritized. Introducing this notion of resource dependency qualifies the claim implied in the original SOC approach that selection, optimization, and compensation are adaptive processes per se. Instead, it allows for boundary conditions to play a role in the differential activation of regulatory processes. However, the SOC model neither specifies how the individual can actually achieve a loss-based selection of goals nor proposes specific self-regulatory processes involved in elective selection (e.g., enhancing commitment during goal engagement).

The dual-process model of self-development (Brandtstädter 1986, 1998, 2009; Brandtstädter & Rothermund 2002) proposes that discrepancies between self-conceptions and actual capacities can be overcome by one of two processes: (a) assimilation, in which the individual engages in self-directed activities aimed at bringing personal development in line with their self and life goals (e.g., attain a promotion); or (b) accommodation (flexible goal adjustment), in which the individual adjusts self-referential goals to make them attainable in view of the actual developmental constraints. Together, the assimilative and accommodative processes of self-development allow the individual to maintain personal continuity and identity in spite of major challenges due to developmental losses associated with aging. Assimilation and accommodation processes are conceptualized as antagonistic, so that the activation of one process inhibits the other. However, the dual-process model does not specify how accommodative processes actually work, or how the individual agent can play an active role in this process.



**Figure 1**

Action-phase model of developmental regulation. This figure shows the sequence of action phases from goal choice to goal engagement (first not urgent, then urgent) to goal disengagement. Transitions between phases are specified as crossing the Rubicon of goal decision and as crossing the deadline of opportunity loss. Each phase is characterized by specific processes of either goal selection heuristics or primary and secondary control strategies. Figure adapted from Heckhausen (1999, figure 5.1, p. 115).

The MTD conceptualizes and operationalizes a set of distinct control strategies for goal engagement and disengagement (Heckhausen et al. 2010). These control strategies partly converge with several constructs from other motivational life-span theories (Haase et al. 2013, Poulin et al. 2005) and likely reflect fundamental motivational means for goal pursuit and successful development. Note that (unlike the original SOC model) the MTD does not view control strategies as adaptive per se, but rather as adaptive only insofar as they serve the pursuit of appropriate goals, for example, goals that match available opportunities or that have positive consequences for future control striving.

**Figure 1** shows the action-phase model of developmental regulation, which is an expansion of the Rubicon model of action phases (Heckhausen 1991) for a life-span developmental context. It describes a series of consecutive phases in the action cycle, starting with the phase of goal choice, when a person considers the pros and cons for pursuing a certain goal and then crosses the decisional Rubicon by making a choice of one particular goal. Once individuals decide to pursue a developmental goal (e.g., obtaining a degree in engineering), they should become engaged with this goal and start focusing their investment of resources, such as time, effort, and skills, into the attainment of this goal (see the decisional Rubicon transition from optimization to goal engagement in **Figure 1**). This selective investment is referred to as selective primary control. Indeed, motivational researchers studying pre- and postdecisional behavior (for a review, see Achtziger & Gollwitzer 2018) found that crossing the decisional Rubicon brings about a switch from a deliberative mind-set (i.e., broad information search, weighing different action alternatives equally) to an implemental mind-set (i.e., being biased and committed to one particular goal and planning how to attain it). The MTD proposes that similar processes of biased goal engagement are set in motion when individuals decide to pursue long-term, developmental goals.

At times, however, there may be distractions or obstacles that pull an individual's attention away from a chosen goal. To overcome such challenges by focusing on the chosen goal, individuals can utilize metavolitional strategies. The MTD refers to these strategies as selective secondary control. For example, individuals may imagine the joy and pride associated with eventually achieving a difficult goal (e.g., graduating from college) and thus re-energize their efforts to pursue the goal.

A circumstance that is common in life-span developmental contexts is that goal-related opportunities decline with age (e.g., biological clock for child bearing), and thus, goal pursuit becomes urgent as the individual approaches a point where further goal pursuit is no longer productive due

to a critical loss of opportunities for the goal in question (e.g., having a child before menopause) (Heckhausen et al. 2001). The MTD refers to such situations as developmental deadlines. When developmental deadlines are approaching, enhanced goal engagement, including metavolitional strategies of self-mobilization, are required (see the urgent goal engagement phase in **Figure 1**). These selective secondary control strategies become ever more important as individuals approach the deadline, and opportunities for attaining the goal are about to disappear (Poulin & Heckhausen 2007). Another type of control strategy involved in goal engagement, particularly when goal pursuit becomes more difficult or urgent, consists of compensatory primary control strategies. These strategies involve compensatory means that support goal attainment, such as getting help or advice from other people (e.g., hiring a tutor to help with difficult engineering courses) or using special technical aids or work-arounds (e.g., acquiring specialized training or problem-solving software).

Finally, once the developmental deadline has been passed and opportunities have deteriorated below a point of productive goal pursuit, individuals need to disengage from further pursuit of a now obsolete goal by using a variety of compensatory secondary control strategies. This adaptation to the decline of opportunities for goal pursuit is needed to free up resources for other goal pursuits and, generally, to avoid squandering resources on a futile effort. Of course, a switch from urgent goal engagement to radical goal disengagement is extremely challenging for the motivational and self-regulatory system. Disengaging from an important goal can undermine an individual's self-esteem and general confidence about their own effectiveness as an agent. In addition to withdrawing behavioral engagement and breaking motivational commitment to disengage from the goal (Wrosch et al. 2003), it is often necessary to use strategies of self-protection to maintain self-esteem and optimistic views about one's chances of pursuing and attaining other, alternative goals. Such self-protective strategies of compensatory secondary control include strategic attributions of failure (e.g., to external circumstances) to avoid the draining effect of self-blame and self-serving social comparisons with inferior others or comparisons with oneself at better times (i.e., temporal comparison; Ferring & Hoffmann 2007) or in more favorable domains of functioning (i.e., dimensional comparison).

**2.3.2. Different phases in the action cycle require different motivational mind-sets.** Research in motivation shows that basic motivational processes are adapted to the function of a person's current position in a given action cycle. Action cycles are composed of different action phases: a goal decision phase followed by planning and action phases, culminating in intention deactivation (disengagement) and postactional evaluation (for reviews, see Achtziger & Gollwitzer 2018, Heckhausen 1991). People in the decisional phase who are unsure which goal to pursue and weighing different possibilities will benefit from a motivational mind-set that allows them to process large amounts of information in objective, unbiased ways. This kind of motivational mind-set is referred to as deliberative (Achtziger & Gollwitzer 2018). In contrast, during the phases of planning and action, it is most effective to be in an implemental mind-set of narrowed-down, goal-oriented, and biased information processing so as to maximize volitional investment in the chosen goal without any second thoughts, doubts, or distractions. Numerous studies have supported the contrasting functions of deliberative and implemental mind-sets in different action phases.

We propose that these contrasting mind-sets are also operating in long-term developmental goal cycles. However, the engagement with long-term goals has unique challenges not present when merely striving for a short-term goal. Long-term goals cannot be attained in one vigorous session of active goal pursuit, but rather need to be embedded in and interspersed with everyday activities and other important goal strivings. Individuals have to be able to live their everyday

lives and pursue multiple important goals (including responsibilities and commitments) and can therefore only rarely give a certain long-term goal their full attention. The major challenge in the pursuit of long-term goals is not to employ hard-knuckled persistence, but rather to keep returning to the goal pursuit for more or less short bouts of enhanced goal engagement, in spite of all the other ongoing activities and motivational commitments.

During long-term goal pursuit, obstacles and distractions can stall or prevent effective primary control striving. Under such challenging conditions, individual strengths or weaknesses are put to the test, and robust persistence and enhanced effort are essential motivational resources for successful agency in development. These control responses may be facilitated by having an overall optimistic outlook, which promotes stronger and more persistent goal striving (Rasmussen et al. 2006).

Another important interindividual resource during goal engagement phases are the metacognitive strategies that the MTD refers to as selective secondary control strategies. They include perceptions of enhanced control over goal attainment, elevated valuation of the aimed-for goal, anticipated positive emotions with goal attainment, and avoidance of distraction. Empirical studies show that these strategies allow the individual to stay committed to the goal and to invest effort into goal pursuit even when setbacks, distractions (e.g., negative life events; Poulin & Heckhausen 2007), and high levels of difficulty (Hamm et al. 2013, 2016) undermine goal commitment.

Finally, the ability to switch the associated mind-set from one phase to another may well be associated with interindividual differences captured by the dimension of action versus state orientation (Kuhl & Beckmann 1994). Individuals with a stronger action orientation show a superior ability to detect and seize opportunities, to maintain a focus on goal-directed activities, and to ignore negative thoughts and affective states. In contrast, individuals with a stronger state orientation ruminate more about negative events, miss opportunities to act, and are more easily distracted and discouraged from pursuing a goal.

**2.3.3. Challenge of moving from goal engagement to disengagement.** The experience of an unattainable goal requires individuals to adjust their motivational responses. Such circumstances can be related to poor goal choices that do not map onto a person's opportunity structure, lack of skills necessary for attaining a particular goal, age-normative declines in personal resources, increases in external constraints on goal pursuits, or other kinds of developmental deadlines (Heckhausen & Schulz 1995, Heckhausen et al. 2010, Wrosch et al. 2003). Regardless of the reasons, confronting an unattainable goal implies that individuals will experience repeated failure if they continue to strive for the respective goal. In addition, they may deplete their limited resources, which may be needed for the pursuit of other important goals. Thus, in circumstances that involve unattainable goals, individuals need to disengage from the respective goal and pursue other meaningful and attainable goals. A large body of research supports this assumption by showing that the capacity to disengage from unattainable goals and reengage in alternative goals facilitates improved levels of psychological well-being and physical health (Wrosch et al. 2003). By contrast, individuals with compromised capacities to disengage from and adjust unattainable goals experience greater distress, secretion of stress hormones, inflammatory processes, and physical health problems (Castonguay et al. 2014, Wrosch et al. 2013), likely because they cannot effectively avoid repeated failure experiences when pursuing unattainable goals (for a review, see Wrosch et al. 2013).

From an action-oriented perspective, goal disengagement presents a regulatory challenge that requires an individual to exert a radical shift from intense goal engagement (when the goal is still attainable) to goal disengagement (after passing the deadline) (see **Figure 1**). Research examining the specific processes involved in accomplishing such a shift is still sparse. Brandstätter and



colleagues (2013) have proposed a potential mechanism in which repeated failure in the pursuit of a goal gives rise to an action crisis. The experience of such an action crisis may break a person's positively biased implemental mind-set and trigger a new evaluation process about whether the pursuit of a certain goal should be continued (Brandstätter & Schüler 2013). Pending the evaluation, the outcome of this less biased process may be that a person withdraws commitment and effort from pursuing a goal that has become futile. Another potential facilitating factor is the availability of alternative feasible goals to which to switch (Wrosch et al. 2003). Late in life, goal disengagement may become more difficult because it is harder to find new meaningful goals to replace an obsolete goal pursuit, which could lead to extremely negative psychological states, such as aimlessness or hopelessness (Wrosch et al. 2007b).

Finally, self-protective appraisals, such as external attributions of failure and downward social comparison, make up an important set of strategies that helps to protect the overall motivational and emotional resources (e.g., confidence in future primary control striving) that are needed for primary control striving. These strategies are important during disengagement phases from futile goal pursuits, but also during extended long-term goal pursuits that involve setbacks (Wrosch & Heckhausen 1999).

Note that other theories of life-span development rarely discuss how individuals shift from goal engagement to goal disengagement. The SOC model has, to our knowledge, not addressed this issue. The dual-process model assumes that the adjustment of unattainable goals is not a process that an individual is consciously aware of, but instead that it happens automatically, without conscious intent (Brandstätter 2009).

**2.3.4. Role of emotion in motivational self-regulation.** From a motivational perspective, emotions play an essential role in the regulation of action as (*a*) incentives that serve as a motivational pull toward an anticipated desirable change in emotion (i.e., less negative or more positive emotions) (Frijda 1988, Plutchic 1980, Scherer 1984); (*b*) instigators that function as a motivational push when an unsatisfactory life situation calls for active change of the current situation (Frijda 1988, Plutchic 1980, Scherer 1984); and (*c*) motivational resources, because an emotional balance within a certain functional range is needed to effectively pursue long-term developmental goals (Charness et al. 2004).

When individuals strive for a particular goal that proves to be more difficult to attain than expected, they tend to intensify their efforts (for a review of motivational intensity theory, see Wright 1996). Such enhanced goal striving can also be promoted by anticipating the change in emotional experience from strain to enjoyment of and pride about having mastered a difficult challenge (Atkinson 1957). Intentionally imagining such positive emotional change will assist in goal pursuit even under adverse conditions. Under circumstances of loss and threat, primary control striving is often best served by contrahedonic regulation, that is, maintaining or enhancing negative affect or dampening positive affect (Riediger et al. 2009) and thus instigating vigorous and robust primary control striving (see also Frijda 1988).

Repeated failure can lead to negative affect, which can, at first, work as an emotional instigator for trying harder (Wright 1996) but, when prolonged and repeated many times, can deplete an individual's motivational resources to pursue goals. In the long run, this would limit the primary control potential of the individual. To attenuate or buffer the impact of failure and loss experiences and their attendant negative affect, the individual has available a large repertoire of control strategies. These strategies are invoked when opportunities for direct action are constrained, and they vary in direct proportion to the intensity of negative affect instigated by the loss experience. Together, these responses to failure help to protect existing levels of primary control and assure goal striving.

When considering the role of emotions in the context of the action-phase model, one needs to consider the function of each action phase. The evaluative phase of goal selection requires an emotionally unbiased deliberation of pros and cons, although it could involve anticipated emotions such as pride in potential accomplishment and embarrassment or regret about potential failure (Zeelenberg 1999). The phase of goal engagement likely benefits most from high-energy and approach-oriented emotions that are positive when things go smoothly and negative when one has to overcome difficulties. Irrevocable failure in achieving a major life goal would result in negative affect such as sadness, which, in turn, can serve as a signal that it is time to disengage from the goal and move on to something else (Klinger 1977, Koppe & Rothermund 2017, Nesse 2000, Wrosch & Miller 2009). Whether a major failure experience facilitates or impedes subsequent reengagement with other goals would depend, in part, on the intensity of the affective response. Sadness or mild depressive symptoms would motivate efforts to avoid this negative affect, and reengagement with other goals can serve to facilitate this process (Wrosch et al. 2003). However, more extreme affective responses, such as clinical depression, would deplete the motivational resources of the individual (Seligman 1975), making it difficult to pursue alternative goals.

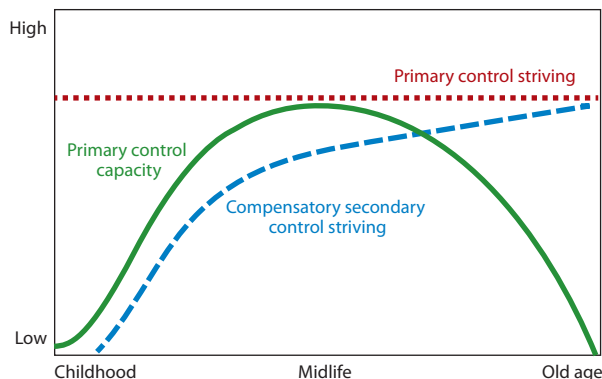
Our view of emotions emphasizes their role in life-course development and important life-course transitions. Thus, we focus on how emotional processes serve regulatory challenges of goal engagement and disengagement. For example, anger is likely to support the attainment of threatened but attainable goals, while sadness may facilitate psychological adjustment to irreversible losses and unattainable goals. Given age-normative losses and declines in the controllability of life circumstances, research has shown that anger can be particularly salient in young adulthood, while the salience of sadness tends to increase in old age (Kunzmann et al. 2014, Wrosch et al. 2018). Early adulthood is a life phase characterized by the exploration and pursuit of diverse life goals. The experience of anger in response to failed goal achievement can motivate assertiveness and persistence to overcome challenges to successful goal achievement. Later adulthood, by contrast, is characterized by increasing developmental constraints and irreversible age-related losses (Achtziger & Gollwitzer 2018, Baltes 1987, Heckhausen et al. 2010). As a consequence, the motivational and behavioral concomitants of anger may become less effective in old age, and the usefulness of other discrete emotions, such as sadness, is likely to increase (Haase et al. 2012, Kunzmann & Wrosch 2018). As an aversive affective consequence of failure and loss, sadness could serve as a signal that it is time to let go of a goal and move on to something else. To the extent that the experience of sadness is communicated to one's social network, it may also elicit support from others (Andrews & Thomson 2009), who may help facilitate disengagement from futile goal pursuits and engagement with alternative goals (Klinger 1975, Nesse 2000, Wrosch & Miller 2009).

### **3. DEVELOPMENTAL CHALLENGES AND INDIVIDUAL AGENCY: A SET OF RESEARCH EXAMPLES**

The following sections discuss a set of exemplar issues and recent empirical studies that illustrate the potential for applying the motivational theory of life-span development to a wide range of challenges in developmental regulation across the adult life span.

#### **3.1. Adaptation of Agency to Overall Changes in Controllability Across the Adult Life Span**

As individuals move through childhood and adolescence and into and through adulthood and old age, their capacities and opportunities to pursue certain goals emerge and increase, peak, and



**Figure 2**

Hypothetical life-span trajectories for primary control capacity, primary control striving, and compensatory secondary control striving. This figure shows the expected trajectories of primary control striving (*dashed red line*), capacity for primary control (*solid green line*), and compensatory secondary control striving (*dashed blue line*). Primary control striving remains high and stable throughout the life span. The capacity for primary control undergoes substantial changes, increasing in childhood, adolescence, and young adulthood; plateauing in midlife; and decreasing in old age. Striving for compensatory secondary control increases throughout the life span due to increasing cognitive and self-regulatory competence and increasing need to use compensatory strategies of goal disengagement and self-protection. Figure adapted from Heckhausen (1999, figure 3.1, p. 72).

decrease due to three major systems of influence: biological changes associated with maturation and aging, age-graded societal institutions and social structure, and normative conceptions about the life course (Heckhausen 1999, Heckhausen & Schulz 1995, Schulz & Heckhausen 1996). Taken together, these major systems of influence bring about a life-span trajectory of capacity for primary control that reflects an inverted U shape (see **Figure 2**, solid green line). During infancy and childhood, primary control increases at an enormous rate and breadth. This predominantly maturation- and socialization-based surge slows down during adolescence and early adulthood but still continues to rise. Thus, in early adulthood, primary control capacity still increases while the individual enters a career, builds a family, and settles in a neighborhood. Primary control capacity peaks in early or late (likely as a function of social class) midlife. In late midlife and old age, primary control capacity gradually declines, with accelerations in decline associated with major health problems.

**3.1.1. From gain-oriented to loss-avoiding goals.** Given that control striving remains a fundamental need throughout life, individuals keep striving for primary control (see **Figure 2**, dashed red line) but adjust their goal aspirations according to the opportunities available. Studies comparing the goals reported by adults at different ages have found that, with increasing age and in keeping with age-normative expectations (Heckhausen et al. 1989), adults pursue fewer goals oriented toward growth or the acquisition of developmental gains and shift toward goals focused on maintaining a given state of functioning and avoiding decline (Ebner et al. 2006, Heckhausen 1997, Ogilvie et al. 2001). Moreover, older adults are at least as persistent and intense in their striving for chosen goal pursuits as younger adults (Riediger et al. 2005). However, there seems to be an age-related shift in goal focus not only in number of goals, but also in intensity of goal engagement, with younger adults showing more persistence when pursuing gain-oriented goals, and older adults reporting more intense goal engagement with loss-avoiding goals (Freund 2006).

**3.1.2. Increase in compensatory secondary control across adulthood.** When the individual experiences decreasing controllability of outcomes, it is essential that they disengage from a futile goal, so that behavioral and motivational resources are freed up for goals that are attainable. Different conceptual approaches to developmental regulation (e.g., the SOC model, the dual-process model) have used a variety of indicators (e.g., loss-based selection, accommodation) that reflect a withdrawal of mental and behavioral effort from goals that have become (close to) unattainable (for a review and comparison between different models, see Haase et al. 2013). Numerous studies have found that goal disengagement is more prevalent among older adults (Brandtstädter & Renner 1990, Heckhausen 1997); that adults at different ages focus on different goals, which implies that they disengage from previously pursued goals (Nurmi 1992); and that adults disengage even from highly valued personal goals when encountering depleted control opportunities (Heckhausen et al. 2001, Wrosch & Heckhausen 1999).

Disengaging from a goal can have negative consequences for self-esteem and confidence in future success and can thus undermine an individual's capacity for primary control striving. For this reason, adults become more likely to use strategies of protecting the self against blame, negative affect, and discouragement as they advance in age. Self-protective strategies can take many forms and are quite effective in guarding against negative affect and discouragement, with the most common focusing on positive reappraisal (Park 2010, Wrosch et al. 2000), downward social comparison (e.g., Bailis et al. 2005, Bauer et al. 2008, Ferring & Hoffmann 2007, Frieswijk et al. 2004), avoiding self-blame by attributing failure to external factors (e.g., Mendola et al. 1990, Wrosch et al. 2007c), and downgrading the value or importance of the goal (e.g., Rothermund & Brandtstädter 2003).

**3.1.3. Function and age differences in regret.** Regret is a negative psychological state that involves blaming ourselves for a bad outcome, feeling a sense of loss or sorrow at what might have been, or wishing we could undo a previous choice that we made. The age-related experience and consequences of life regrets represent an example of the role of emotions in producing developmental outcomes and their associations with motivational strategies. Note, however, that regret is not a purely emotional state. In addition to specific emotions, such as despair, or wistful emotions (Gilovich et al. 1998), regret also involves specific cognitions associated with upward counterfactual thoughts (e.g., what would have happened if . . .?) (Roese 1997). Such experiences of regret are frequently encountered in central life domains (Roese & Summerville 2005) by most adults and at different ages (Landman 1987).

Life regrets can serve important motivational functions. For example, it has been argued that regret can foster goal engagement. This perspective assumes that individuals experience intense regret if they confront modifiable negative outcomes that can be addressed through the implementation of active behaviors (Roese & Summerville 2005). Other research, by contrast, suggests that regret is intensified when individuals had sufficient opportunities in the past to attain a goal, but these opportunities have since vanished and may not come back (Beike et al. 2009). In the latter case, individuals may not be able to undo a regretted behavior and are likely to experience negative affect.

The evidence for both kinds of regrets (Beike et al. 2009, Roese 1997) can be reconciled if one takes into account the potentially contrasting perspectives on regrettable events at different times in the life span. A motivational and life-span perspective would propose an age-related shift in the reasons for and consequences of regret experiences (Wrosch & Heckhausen 2002). Young adults typically have ample opportunity to overcome goal-related problems, and their regret experiences are frequently related to circumstances that can be addressed through action. In fact, research that experimentally engaged young adults in regret-related counterfactual thoughts documented

subsequent increases in their motivation to resolve a problem and take action (Roose 1994). In later adulthood, by contrast, personal behaviors that have caused a regretted event typically date back 30 years or more, and most individuals have lost their opportunities to overcome such regretted consequences of long-past behavior (Bauer et al. 2008). In this case, older adults who experience intense life regrets may be at risk of ruminating about problems that cannot be resolved, which may jeopardize their mental and physical health. In support of this argument, research shows that intense regret predicts increased depressive symptoms and reduced life satisfaction among older but not younger adults (Wrosch et al. 2005). In addition, a study on older adults showed that the experience of regret was associated with health-compromising physiological processes (e.g., high cortisol) and physical health problems (e.g., chest pain) (Wrosch et al. 2007a).

Research based on the motivational theory of life-span development has examined how individuals of different ages can manage regret experiences and protect their well-being and health. For example, a study on perceived control (Wrosch & Heckhausen 2002), which is widely thought to foster goal engagement and persistence (Lachman 2006), showed that high internal control beliefs regarding a regretted event were associated with reduced levels of intrusive thoughts and regret intensity in young adulthood but showed the reverse associations in old age. This pattern of findings may imply that internal control beliefs can enable younger but not older adults to successfully overcome regret experiences. These findings on regret converge with earlier work on the age-differential benefits of perceived control of development across adulthood (Lang & Heckhausen 2001).

Researchers have also explored associations between social comparison processes and regret experiences. This work showed that older, as compared to younger, adults relied more frequently on downward social comparisons over time to manage their regrets. In addition, it suggested that the use of such downward social comparisons consistently predicted a reduction of regret intensity among older adults but not among their younger counterparts (Bauer et al. 2008). Thus, the use of self-protective downward social comparisons in response to regret seems to be particularly adaptive in old age.

Finally, different studies have examined the role of goal disengagement processes for managing regrets. This research showed that disengagement from undoing regret experiences predicted reduced levels of depressive symptoms among older but not younger adults. In addition, it suggested that available future goals can reduce the experience of regret, particularly in later adulthood (Wrosch et al. 2005). The latter effect may occur if new meaningful goals make it easier for an older adult to accept that the consequences of regretted behaviors can no longer be undone. Further evidence for an adaptive function of goal disengagement processes in the management of older adults' regret experiences stems from a study that fostered goal disengagement by experimentally involving older adults in self-protective writing about their greatest life regret. Those older adults who participated in the self-protection intervention (but not the control group) improved their sleep quality over time, and this intervention effect was statistically mediated by a reduction of the intensity of their regret experiences (Wrosch et al. 2007a).

### **3.2. Navigating Change: Life-Course Transitions, Social Mobility, and Societal Transformation**

Individual agency in life-span development is most salient when it is put to the test. This happens when individuals have to adapt to change. We discuss above how individuals adapt to the change in overall controllability across the life span (see Section 3.1). In this section, we focus on specific settings that challenge the individuals' adaptive capacity with regard to adjusting goal selection and strategies of goal pursuit.

**3.2.1. Developmental deadlines.** Our concept of developmental deadlines (Heckhausen 1999, Wrosch & Heckhausen 2005) is based on the idea that the pursuit of specific developmental tasks is particularly fruitful during optimal lifetime windows (Hagestad & Neugarten 1985). For example, most individuals strive to obtain an education or profession during the transition to adulthood, find a partner in young adulthood, or have their children before midlife. During such lifetime windows, success in achieving a respective developmental task is optimized based on a constellation of biological, sociostructural, and age-normative factors (Heckhausen 1999). However, as people advance in age, opportunities for attaining a specific developmental goal often decline and may eventually vanish altogether, creating a developmental deadline. As outlined in Section 2.3.1, the MTD proposes that, in the context of approaching and passing a developmental deadline, an individual's developmental success depends on an opportunity-adjusted use of goal engagement and goal disengagement strategies (Heckhausen et al. 2010).

The deadline model as research paradigm was applied to the developmental deadline associated with a so-called biological clock for childbearing. Heckhausen et al. (2001) compared different indicators of goal engagement and goal disengagement among groups of women who were, based on their age, before (e.g., urgency phase) or after (e.g., recently or long passed) the deadline for childbearing. They found that childless women who were approaching the childbearing deadline were more likely to nominate childbearing or child-rearing-related goals and reported more use of goal engagement control strategies, whereas women who had passed the deadline without having a child were less likely to report child-relevant goals and used more goal disengagement strategies. In addition, incidental recall of childbearing-related and neutral sentences indicated that predeadline, compared to postdeadline, women focused more of their recall on child-related sentences. In addition to showing an age-graded pattern of goal engagement and disengagement, Heckhausen et al. (2001) also found evidence that an individual's congruence between control opportunity and goal selection was associated with psychological well-being. This association held both for the explicit self-report (goal nomination, rating of control strategies) and implicit information processing (via incidental recall) indicators of goal engagement. In particular, using goal engagement strategies was associated with reduced depressive symptoms among women who were approaching the childbearing deadline, while the same strategies predicted enhanced levels of depressive symptoms among women who had passed the deadline without having children.

Another developmental goal that has been addressed using the deadline paradigm is romantic partnership formation. Demographic surveys indicate that the likelihood of forming a new intimate partnership after a separation drastically decreases in midlife (see Wrosch & Heckhausen 1999). Thus, the experience of a partnership separation in late midlife may create a developmental deadline, which requires individuals to disengage from new intimate relationship goals and engage in other meaningful goals. The results of Wrosch & Heckhausen's (1999) study showed that, while separated young adults engaged more frequently in goal engagement strategies related to forming a new intimate relationship, separated adults in late midlife more frequently used goal disengagement strategies. In addition, an incidental memory paradigm indicated differences in participants' motivational mind-sets, in that separated adults in late midlife focused to a greater extent than their younger counterparts on negative, relative to positive, partnership-related information. Finally, this study also demonstrated that opportunity-adjusted control striving predicted beneficial emotional outcomes. In particular, disengagement from partnership goals improved the mood of separated adults in late midlife, while it contributed to deteriorated affective states among younger separated individuals (Wrosch & Heckhausen 1999).

The developmental deadline model can be applied to a wide variety of life domains with trajectories of opportunity reflecting precipitous decline, including age-sensitive career paths (Heckhausen et al. 2017).

**3.2.2. Transition to adulthood and social mobility.** The transition to adulthood is an example of a situation with rapidly expanding opportunities for primary control and associated increases in prospects for social mobility with substantial downstream consequences for the life course (Freund et al. 2013, Heckhausen & Shane 2015, Heinz 2009, Ng-Knight & Schoon 2017, Salmela-Aro et al. 2014, Schoon & Lyons-Amos 2017, Tomasik & Salmela-Aro 2012, Vuolo et al. 2016). The educational and career systems in different countries set up different challenges for goal setting and motivational self-regulation, thus providing natural paradigms to study the potential and limits of individual agency (Heckhausen 2016, Heckhausen & Buchmann 2018, Heckhausen & Shane 2015, Heinz 2009).

German youth on the verge of applying for apprenticeships after graduating from a middle-tier high school need to closely calibrate their aspirations for entering a prestigious apprenticeship and career to the grades that they attained in school, whereas US high school graduates are more likely to focus on long-term educational attainment. Confirming the congruence principle proposed by the MTD, the middle-tier school youth in Heckhausen & Tomasik's (2002) Berlin (Germany) longitudinal study showed impressive calibration of aspirations regarding the association between vocational prestige of the apprenticeship that they applied for and their graduation grade average. In contrast, and congruent with their transition opportunities, California high school graduates in United States-based longitudinal studies expressed extremely high educational aspirations, even when their current grade average was low (Heckhausen & Chang 2009, Villarreal et al. 2015). Moreover, extremely ambitious youth benefitted from their over-ambition by becoming the most likely to enter college and earn a 4-year university degree. It thus appears that even relatively young youth can accurately adapt their educational goals and their ambitions to the prevailing institutional conditions of the educational system of their country of residence.

Haase et al.'s (2008) investigation of goal engagement during the transition to adulthood shows that stronger endorsements of goal engagement control strategies (i.e., selective primary control, selective secondary control) predicted better outcomes in terms of securing an apprenticeship for German girls and better psychological well-being for German girls and boys in a Berlin-based study. In Heckhausen et al.'s (2013a) longitudinal study of the post-high school transition in the United States, selective engagement for educational goals predicted better educational, socioemotional, and even career outcomes. Longitudinal trajectories in the Youth Development Study of Minnesota showed that youth who maintained high and unwavering career aspirations attained better income and were also better insulated against unemployment during the Great Recession (2007–2009) (Vuolo et al. 2012). Recent short-term longitudinal studies covering the transition into careers suggest that robust engagement with career goals is associated with belief systems that view personal effort and ability as decisive for upward mobility in society (Shane & Heckhausen 2013, 2016a). In contrast, youth who believe that career attainment is due to privilege and luck are more likely to disengage from their career goals.

The MTD predicts that, when individuals are facing extreme challenges, the metavolitional strategies of selective secondary control should be particularly beneficial. This prediction was supported in Poulin & Heckhausen's (2007) German longitudinal study of youth applying for apprenticeships. The sample included a subset of participants that had experienced severe stressful life events (i.e., someone died in their immediate family, parents got divorced). These youths only managed to keep up their primary control striving for an apprenticeship if they used metavolitional strategies (i.e., selective secondary control), particularly those strategies that enhanced their perceived control over attaining an apprenticeship. Converging evidence for the important role of selective secondary control strategies stems from research involving freshmen in a Canadian public university. Selective secondary control strategies to protect goal engagement

proved beneficial for enhancing primary control striving and end-of-semester course grade attainment as well, specifically for those students who had started out with low grades (Hamm et al. 2013, 2016). It is under challenging control conditions that selective secondary control strategies are most needed and effective for staying committed to a chosen goal and enhancing primary control.

**3.2.3. Societal transformation.** Societies, with their institutions and socioeconomic structures, set up the action field for many pursuits of individual agency (Heckhausen 1999, Heckhausen & Shane 2015). When societies undergo radical social change, such as occurred in the post-Soviet states, individuals have to adapt to uncertainties and a new set of circumstances (Elder 1974, 1994; Heckhausen 2010; Heckhausen et al. 2010; Silbereisen 2005; Silbereisen & Chen 2010). Radical societal change, if overall negative, as during the Great Depression, is most disruptive to the life paths of individuals who transition into adulthood at the time (Elder 1974). However, if the societal transformation opens up new opportunities for individual agency, young people, who are typically still able to (re)direct their education path and career goals, can be the winners of social change. By contrast, middle-aged and older adults, who often cannot sufficiently change their life path, end up being the losers of such societal transformations (Titma & Tuma 2005). A 15-year longitudinal study in six former Soviet states (Titma & Tuma 2005) tracked 12,000 young adults from their school graduation during the final years of the Soviet Union, which provided a unique opportunity to study individual agency during societal transformation. Intragenerational upward and downward mobility of these young adults in the transitional societies of former Soviet states was hugely increased, dominating most occupational groups. In Estonia, for example, almost 10% moved from the top to the bottom quintile of income, and 10% moved from the bottom to the top. Motivational characteristics played a major role in predicting climbs and falls on the social ladder. Youth who had goals for higher education and becoming a future leader when they graduated from high school were more likely to become a business owner or sales or service worker. Moreover, those young adults who searched out work opportunities outside their principal job, and thus showed strong agency even before the demise of the Soviet Union, were more likely to become entrepreneurs, earning a higher income in the transitional societies of the post-Soviet era (Titma & Tuma 2005).

The reunification of Germany was another giant natural experiment on human agency. A 1991–1992 survey of adults in four birth cohorts (early 1930s, 1940s, 1950s, and 1960s) showed that the younger two cohorts reported strong primary control striving, whereas the oldest cohort reported enhanced goal adjustment capacity (Diewald et al. 1996, Heckhausen 1999). East Germans in their early 50s were the worst off in terms of weak control strategies, both for primary and secondary control; weak beliefs in their control capacities in the work domain; and low self-esteem.

More recent studies have focused on adaptive effects of opportunity-congruent control strategies, as proposed by the MTD. A 2005 survey of young and middle-aged East and West Germans from two prosperous and two economically strained states examined control perceptions and striving regarding demands in the work and family domains that had resulted from social change (Grüner et al. 2013). Control strategies of goal engagement and disengagement were beneficial to life satisfaction and mental health to the extent that they matched the perceived control of demands associated with social change. Another analysis based on the same survey showed contrasting effects of individuals' goal disengagement in prosperous versus impoverished regions of Germany (Tomasik et al. 2010). Goal disengagement was associated with improved life satisfaction under conditions of severely constrained opportunities in impoverished geographical regions, whereas it was detrimental in prosperous regions.



### 3.3. Managing Biological Aging and Physical Health Problems

Physical health problems and biological aging are important areas of agency because they substantially affect an individual's capacity for primary control striving. As physical capacities and health conditions change, individuals need to navigate dynamic and complex challenges for motivational self-regulation.

**3.3.1. Increasing health challenges in old age.** Theories of life-span development recognize that age-related biological changes are an integral feature of development throughout life (Baltes 1987, Freund & Baltes 2000, Heckhausen et al. 2010). Early development is characterized by growth and increased physical functioning, while midlife and old age are characterized by general decline and decreased physical functioning. Toward the end of life, individuals experience a sharp increase in physical health problems that can compromise functioning in many areas of life (Baltes & Smith 2003, Gerstorf et al. 2013, Smith et al. 2002).

Individuals can experience a variety of physical health threats, ranging from relatively controllable challenges (e.g., subclinical or acute physical symptoms) to more intractable physical health problems (e.g., chronic disease or functional disability). In general, health problems become less controllable with increasing age (Verbrugge & Jette 1994) and contribute to psychological distress, including depressive symptomatology (Lenze et al. 2005). The experience of distress, in turn, may reduce a person's motivation to address a pressing health problem and further disrupt health-relevant physiological systems, such as the neuroendocrine systems (e.g., by increasing cortisol) or immune systems (e.g., by causing low-grade inflammation; Cohen et al. 2007). These adverse motivational and physiological changes may aggravate existing health problems (Wrosch et al. 2004). As a consequence, the onset and development of physical disease in older adulthood may jeopardize an individual's primary control capacity by making it difficult or impossible to engage in many desired activities across multiple important life domains.

**3.3.2. Congruence of controllability and control striving.** To examine how older adults can effectively manage physical health problems and avoid the adverse downstream effects on well-being, motivation, and physiology, Schulz et al. (1994) and Wrosch et al. (2002, 2004) applied the theoretical propositions of the MTD to the regulation of health-related problems. This approach made it possible to predict which type of control strategy should lead to adaptive outcomes, depending on the controllability of a specific health condition. If older adults confront potentially manageable physical health problems, then the use of goal engagement strategies should contribute to overcoming the health threat and should thus reduce emotional distress and prevent downstream effects on health. For example, in the context of experiencing acute physical symptoms, an individual may successfully overcome the health threat by engaging in a more active lifestyle, focusing on the importance of physical health, or consulting a health professional. As an individual confronts health challenges that are less controllable (e.g., chronic disease, functional disability), goal engagement strategies (e.g., reversing disease or recovering function) may no longer be effective. Under these circumstances, it may be more adaptive for older adults to disengage from overcoming an intractable health problem, focus on disease management, and use self-protective control strategies to avoid inevitable failure experiences and associated emotional distress (Barlow et al. 2015, 2016; Wrosch et al. 2004).

Evidence supporting these predictions about congruent control strategies comes from a study of older adults facing serious health problems that were either acute and potentially manageable (e.g., by rehabilitation) or chronic and uncontrollable (Hall et al. 2010). Older adults with controllable acute illnesses, but not those with uncontrollable chronic illnesses, benefitted

substantially from goal engagement strategies to overcome the effects of the illness, as indicated by a 39% higher survival rate 9 years later. Goal disengagement strategies were detrimental to the long-term health of the group with controllable health problems. For those older adults who suffered from chronic and uncontrollable health problems, however, goal disengagement strategies were adaptive, in that they predicted a better health status over the course of 5 years (Hall et al. 2010).

A substantial body of other research has shown beneficial effects of health-related goal engagement strategies when health problems are relatively controllable. For example, a cross-sectional study showed that goal engagement strategies buffered the adverse effect of physical health threats on older adults' depressive mood, but only in the context of relatively controllable acute physical symptoms and not in the context of more intractable functional disability (Wrosch et al. 2002). Another study demonstrated that the adverse emotional consequences of physical health threats mediated the association between potentially manageable physical health problems (e.g., diabetes or high blood pressure) and enhanced levels of cortisol secretion (Wrosch et al. 2007c). However, this association was observed only among participants who did not invest in health-specific goal engagement strategies and not among those who used these strategies more frequently. There is also longitudinal research examining the progression of older adults' physical illnesses over time. This work demonstrates that health-specific goal engagement could prevent subsequent health declines, from acute physical symptoms to chronic disease and functional disability, and that this buffering effect was partially mediated by reduced levels of cortisol among participants who reported higher levels of goal engagement strategies (Wrosch & Schulz 2008). Together, these studies point to the importance of health-specific goal engagement strategies when older adults experience potentially controllable health threats. Under such circumstances, goal engagement strategies may prevent a negative cascade associated with emotional distress, dysregulation of health-relevant physiological systems, and subsequent chronic disease.

In contrast to these more controllable health challenges, intractable health problems are better met with control strategies of goal disengagement and self-protection. For example, longitudinal data of older adults with vision problems showed that self-protective control strategies were associated with better affective well-being and that these strategies became increasingly predictive of their well-being as individuals experienced increased levels of functional disability (Schilling et al. 2016, Wahl et al. 2004). In a similar vein, another longitudinal study of older adults showed that chronic disease was associated with a subsequent increase in loneliness unless the older adults engaged in self-protective control strategies (Barlow et al. 2015). Note that self-protective control strategies have also been discussed in the personality literature with regard to meaning-focused coping (Folkman 1997), and associated research similarly suggests that such coping responses can be beneficial for older adults dealing with chronic health problems (e.g., Park 2010).

Other relevant research in this area examined the influence of dispositional tendencies involved in goal disengagement (e.g., Brandstädter & Renner 1990, Wrosch et al. 2013). Research from this line of work has shown that the general ability to adjust goals can buffer the cross-sectional association between functional disability (e.g., vision loss) and mental health problems in late midlife (Boerner 2004). Longitudinal research tracking the onset of functional disability in older adults arrived at a similar conclusion (Dunne et al. 2011). Onset of disability predicted a subsequent increase in depressive symptoms only among participants who were not able to disengage from unattainable goals, but not among those older adults who reported high levels of goal disengagement capacities. Finally, research comparing effects of goal disengagement capacities across different age segments of older adulthood suggests that the emotional benefits of these capacities may ameliorate depressive effects on physical health, particularly in advanced old age, when many individuals experience a normative increase in uncontrollable health problems. Goal

disengagement capacities buffered longitudinal increases in participants' cold symptoms among individuals in advanced (but not early) old age, and this effect was mediated by a reduction of their levels of depressive symptoms (Jobin & Wrosch 2016).

**3.3.3. Goal adjustment along lines of defense.** The experience of chronic disease and uncontrollable health problems should not require older adults to disengage from health-related goals altogether (Barlow et al. 2015). Given the widespread consequences of health declines for goal pursuits across life domains, some health goals may need to be adjusted downward in the context of chronic disease (e.g., going for regular walks instead of strenuous hikes), and feasible levels of physical health should be defended for as long as possible. The action-phase model at the core of the MTD provides a conceptual framework for sequential goal adjustment and organized mobilization of agency for feasible goals of health and functioning, in particular when facing uncontrollable decline associated with disease and old age. This idea has been expressed in the lines-of-defense model, which postulates that older adults can manage progressive health declines by organizing their control strategies in cycles of goal engagement and goal disengagement with successively less ambitious functioning goals (Heckhausen et al. 2013b). From this perspective, a person should disengage from a health goal and retreat behind the next line of defense only if it has become impossible to maintain a certain level of functioning. This way, individuals with chronic and progressive diseases can remain actively involved with their health and positive functioning without having to rigidly cling to unrealistic goals of functioning or having to give up altogether. Much of the research addressing goal engagement with specific health goals reported in the previous section is consistent with the lines-of-defense model (e.g., Boerner 2004, Dunne et al. 2011, Wrosch & Schulz 2008).

The lines-of-defense model can also be applied to the inverse process of improvement during rehabilitation. A longitudinal study applied the model to the process of rehabilitation after prostate surgery and demonstrated that goal adjustment to attainable levels of postsurgery functional improvement and spousal congruence in such goal adjustments significantly improved well-being and functioning (Knoll et al. 2014, 2015).

## 4. FUTURE RESEARCH

Agency and motivation in adulthood and old age provide a fascinating and expansive field of research. Life-span theories on human agency allow researchers to generate specific questions and hypotheses about motivational self-regulation during phases of goal setting, adjustment, engagement, and disengagement in many domains of human functioning. Individual capacities for motivational self-regulation are particularly put to the test during times of ontogenetic and historical challenge. Many questions still await scientific inquiry and empirical study, and we outline in this section only a few fruitful avenues for research.

The first avenue is optimization in choosing goals for one's life and development: How much does society, with its educational institutions, labor markets, etc., support individuals in making adaptive goal choices, and how much do individuals rely on idiosyncratic plans about their future? Who chooses to talk and benefits from talking about future plans with trusted others, such as parents and friends?

Second, once important goals are selected, what factors shape the choice of subgoals that define the trajectory toward a goal? For example, we would expect that economically advantaged individuals have multiple goal-path options, whereas economically disadvantaged individuals have few. For the latter, finding a single path blocked may mean that an important life goal is out of reach.

Third, the role of emotions as incentives, instigators, and resources in motivational self-regulation has so far rarely been empirically investigated. Certain emotions may be more suitable than others during certain action phases (e.g., anger during goal engagement, sadness during goal disengagement) and may vary accordingly in their usefulness with age. There may be important connections between effective agency in adulthood and old age and the early developmental origin of individual differences in emotional experience and regulation (Kuhl 2018).

Fourth, which processes exactly enable the transition from intense goal engagement to disengagement? The theory of action crisis (Brandstätter et al. 2013) and ideas about certain dispositions in effective control striving (Wrosch et al. 2017) have moved us closer to an answer to this question. Perhaps individuals engage in preconscious background monitoring of failures via the tracking of negative affect or the decline of positive affect, which then trigger the transition from motivationally biased goal engagement to critical review and disengagement. Both experimental and short-term intensive longitudinal studies are needed to make progress in this area.

Fifth, how do people manage to integrate their long-term goal pursuits into their everyday lives? How do they return to goal-directed activities in the stream of daily living and when also pursuing other long-term goals? This issue is addressed as intention initiation in the Rubicon model (Heckhausen 1991), and there is empirical evidence that individuals that are high in state orientation do worse than action-oriented individuals, especially when action cues are missing and cognitive load with other uncompleted tasks is high (Kazén et al. 2008). In the multirole and overcommitted context of everyday developmental goal pursuits, such individual differences would likely be amplified and contribute to greater differences in developmental outcomes.

Sixth, the lines-of-defense model (Heckhausen et al. 2013b) has great potential to guide researchers in studying processes of progressive illness and gradually worsening disability, as well as processes of rehabilitation after injury or health crisis. The reluctance of Western societies to embrace palliative care is strong testament to how heavily we are invested in preserving the potential for primary control striving, often at the cost of high levels of pain and discomfort. Determining the best way to help individuals and health professionals navigate the transition from cure to optimized functioning and eventually to comfort will become increasingly important as the population ages.

Seventh, international multidisciplinary studies should compare different countries in terms of providing opportunities for agency and then determine which individual agency profiles of motivational self-regulation (e.g., ambitiousness of goal setting, persistence, goal adjustment capacity) fit with which societal contexts (Heckhausen 2016, Heckhausen & Buchmann 2018). A related question is which self-regulatory capacity is critical for compensating disadvantage of low socioeconomic status in which society. These issues are critical in times of large-scale international migration at all levels of society.

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## Errata

An online log of corrections to *Annual Review of Psychology* articles may be found at <http://www.annualreviews.org/errata/psych>