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Abstract

One of the central tenets of life-span psychology is that the process of development entails gains and losses that occur over the entire life span. Thus, Paul and Margret Baltes (1990) conceptualized successful aging as a lifelong process of maximizing gains and minimizing losses by means of three processes: selection, optimization, and compensation (SOC). This article reviews empirical studies that have investigated the use of SOC during adulthood with different methodological approaches and have found evidence for the importance of SOC for successfully managing one's resources. The article highlights the importance of prioritizing goals (selection) according to their importance for increasing gains (optimization) and avoiding losses (compensation) in consideration of currently available resources. Age-related changes in resource availability and time perspective can also result in a shift in goal orientation towards gains or losses and in goal focus on the process or the outcome of goal pursuit. Taken together, the action-theoretical approach to the SOC framework suggests that selection, optimization, and compensation can be seen as key concepts for understanding successful aging.
Successful Aging as Management of Resources: The Role of Selection, Optimization, and Compensation

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One of the central tenets of life-span psychology is that the process of development entails gains and losses that occur over the entire life span. Thus, Paul and Margret Baltes (1990) conceptualized successful aging as a lifelong process of maximizing gains and minimizing losses by means of three processes: selection, optimization, and compensation (SOC). This article reviews empirical studies that have investigated the use of SOC during adulthood with different methodological approaches and have found evidence for the importance of SOC for successfully managing one’s resources. The article highlights the importance of prioritizing goals (selection) according to their importance for increasing gains (optimization) and avoiding losses (compensation) in consideration of currently available resources. Age-related changes in resource availability and time perspective can also result in a shift in goal orientation towards gains or losses and in goal focus on the process or the outcome of goal pursuit. Taken together, the action-theoretical approach to the SOC framework suggests that selection, optimization, and compensation can be seen as key concepts for understanding successful aging.

Successful aging does not start in old age but denotes a process that encompasses the entire life span. People do not enter a phase denoted as “old age” at a certain point in their lives and start aging either successfully or unsuccessfully (Freund & Riediger, 2003). Instead, “successful aging,” as understood here, is characterized by a level of functioning that allows one to strive to fulfill personal goals and maintain personal standards and is, to a substantial degree, a result of one’s
having successfully managed internal and external resources throughout one’s life span. A life-span approach to understanding aging ought to take the entire life span into account. However, for space reasons, this short review on successful aging focuses only on old age (beginning at around age 65). In addition, it is highly selective as it focuses only on the action-theoretical specification of a model of successful aging and related research that was conducted in Paul B. Baltes’ research group.

What is meant by resources? Very broadly, resources can be defined as the means for achieving one’s goals (Freund & Riediger, 2001). Therefore, what constitutes a resource must be defined with regard to a specific goal and can be biological genetic, socio-cultural, or psychological in nature. However, the availability of goal-relevant resources does not necessarily result in goal attainment: Resources can be invested prudently or imprudently. This leads to a generally weak association of commodities such as money on the one hand and outcomes such as happiness (e.g., Diener, Suh, Lucas, & Smith, 1999). Thus, to understand successful development, one should investigate the processes of managing and investing resources. Investing one’s resources prudently often results in positive returns and increasing resource gains. Conversely, losses often result in further losses, sometimes inducing a negative spiral (e.g., Hobfoll, 1989). One of the basic tenets of life-span psychology is that the process of development entails gains and losses at every life stage (Baltes, 1987). So, the question concerning successful development becomes that concerning how people manage an ever-changing level of resources across the life span by maximizing gains and minimizing losses (e.g., Baltes & Baltes, 1990; Brandstädter, 1998; Labouvie-Vief, 1981).

Although managing resources is important throughout the entire life span, it becomes particularly important during old age due to age-related changes in the availability and efficiency of resources (Baltes, 1997): With increasing age, the ratio of gains to losses becomes less positive because resources are drawn upon more exhaustively and replenished to a lesser extent. The acquisition of new resources, then, becomes more difficult and losses become more likely. Therefore, the amount of resources accumulated at earlier times and their management in later life is crucial for successful aging. In this article, I argue that the management of resources can be understood best when three interrelated processes are taken into account, namely, selection, optimization, and compensation (SOC; Baltes & Baltes, 1990; Freund, Li, & Baltes, 1999; Freund & Riediger, 2001, 2003).

The SOC model was first introduced by Paul and Margret Baltes (Baltes, 1997; Baltes & Baltes, 1990) as a metamodel of general developmental processes operating on different levels of analysis (e.g., society, individual, cell) and applicable to different domains of functioning (e.g., cognition, emotion, motivation). According to the SOC model, successful development encompasses
selection of functional domains on which to focus one’s resources, optimizing developmental potential and compensating for losses, to ensure the maintenance of functioning. The range of applicability of the SOC model has been described elsewhere (e.g., Baltes, Freund, & Li, 2005; Baltes, Lindenberger, & Staudinger, 2006; Krampe & Baltes, 2003; Li & Freund, 2005; Riediger, Li, & Lindenberger, 2006; Staudinger & Lindenberger, 2003). This article focuses on an action-theoretical approach to SOC (Freund & Baltes, 2000; Freund et al., 1999). Psychological action-theoretical approaches are based on the assumption that people can be understood as agents able to intentionally initiate, maintain, and terminate goal-related behaviors. Life-span developmental psychology embraced this approach when proposing that development could be understood as an interplay of actively creating and reacting to one’s environment (e.g., Baltes, 1987; Brandstätter, 1998; Lawton, 1989; Lerner & Busch-Rossnagel, 1981). Thus, an action-theoretical approach to SOC views goals as the main unit of analysis for conceptualizing and understanding development.

SUCCESSFUL AGING AS MANAGEMENT OF RESOURCES

How do people manage their resources in the service of continued growth (achievement of new outcomes) and the maintenance of functioning in the face of losses when approaching old age? From an action-theoretical perspective, one important way in which individuals shape their development is by choosing, committing to, and pursuing a set of life goals (Freund, 2006). Embedding SOC in an action-theoretical perspective focusing on goals, selection, optimization, and compensation refer to the processes of setting, pursuing, and maintaining personal goals in the face of loss or decline.

Regarding the phase of old age, the SOC model conceptualizes successful development as an interplay of three processes:

1. Selection: During old age, when confronted with an overall decline in resources and changes in personal needs or preferences, selection of goals that promote a fit between resources and needs should be of particular importance for positive functioning.
2. Optimization: During old age, a phase in which resource losses outweigh resource gains, it is important to acquire new or activate previously unused goal-relevant, external or internal resources to promote continued growth (achievement of new outcomes).
3. Compensation: Given the inevitable losses of old age, the management of losses and maintenance of functioning constitutes an important aspect of successful aging.
However, as compensatory efforts also draw upon resources, careful selection of goals on which to focus in the face of loss (i.e., loss-based selection) is essential for successful aging (for a more detailed definition of SOC processes, see, e.g., Freund & Baltes, 2007; Freund et al., 1999; Lerner, Freund, De Stefanis, & Habermas, 2001).

**EMPIRICAL EVIDENCE FOR SOC**

A number of self-report studies spanning the entire phase of adulthood from young to very old adults provide evidence that the selection of goals, investment in the pursuit of selected goals (optimization), and compensatory efforts to maintain a goal state in the face of losses are related to various subjective indicators of successful development throughout adolescence and adulthood (e.g., Freund & Baltes, 2002; Gestsdottir & Lerner, 2007; Wiese, Freund, & Baltes, 2000). As expected, self-reported use of SOC strategies declines with age as the execution of strategies also requires resources. Nevertheless, the use of SOC strategies is related to positive outcomes well into very old age as was shown in a sample spanning the age range of 72 to 102 years (Freund & Baltes, 1998). Interestingly, SOC seems to be particularly helpful for those older individuals with fewer available resources (Jopp & Smith, 2006; Lang, Rieckmann, & Baltes, 2002; for younger adults, see Young, Baltes, & Pratt, 2007).

**SELECTION: PRIORITIZATION AND INTERGOAL RELATIONS**

Focusing on the role of selection for actually engaging and succeeding in optimization, a series of studies by Riediger and colleagues (Riediger & Freund, 2004, 2006; Riediger, Freund, & Baltes, 2005) demonstrated the importance of considering how goals influence each other vertically and horizontally. Assuming a hierarchical goal structure of sub- and superordinate goals of increasing abstractness (Carver & Scheier, 1995), vertical goal relations denote how sub- and superordinate goals are interrelated (e.g., does one goal serve as a subgoal for the other?), whereas horizontal goal relations address how goals on the same level of abstractness can facilitate or hinder each other.

On the horizontal level, goals can facilitate each other by sharing the same strategies (e.g., jogging regularly with a friend serves two goals: losing weight and spending time with a friend). Conflict occurs when strategies are incompatible (e.g., leading a very active social life and a highly secluded life) or when limited resources do not allow different goals to be pursued simultaneously (e.g., limited financial means precludes the possibility of simultaneously paying for a child’s college education and taking a luxurious trip). Interestingly,
goal facilitation and conflict seem to affect different aspects of experience and behavior: Although goal conflict impairs subjective well-being as measured on a day-to-day basis as well as on a more aggregate level with respect to several months, goal facilitation primarily affects the actual engagement in goal pursuit and, as a consequence, goal attainment (Riediger et al., 2005).

One way of dealing with conflicts between goals that compete for limited resources is using temporal sequencing. In fact, Wiese and Freund (2001) showed that young adults who pursue conflicting work- and family-related goals are better off when they prioritize one goal and postpone pursuing the other. This finding supports the notion of selection (here: prioritization) as a key process for successfully managing resources. However, using this strategy may be unwise when future time perspective is limited as, for example, in old age (e.g., Lang & Carstensen, 2002). Older people may thus rely more on the strategy of focusing on goals with a common higher-order goal. This strategy is addressed next.

A selection-related strategy that facilitates the management of one’s limited resources is to achieve vertical congruence of goals. Riediger and Freund (2006) showed that it is not simply restricting one’s goals in number but focusing on personally important, superordinate goals that seem to be particularly adaptive in managing limited resources.

Focusing goals on central and similar life domains contributes to higher facilitation among goals, which leads to stronger goal engagement and achievement. This adaptive facet of selection was found to increase with age (Riediger & Freund, 2006). Note that this was not simply due to a reduction in the number of goals (which, in this study, was held constant across age groups). As is true for social relations (e.g., Carstensen, Isaacowitz, & Charles, 1999), a decreasing future time perspective might induce focusing on the essential rather than diversifying. Taken together, the results on prioritization and on horizontal and vertical facilitation suggest that age-related increases in motivational selectivity are one way of managing the increasing limitation of resources in adulthood.

SHifting FROM GAIN TO LOSS ORIENTATION DURING ADULTHOOD

Is the shift in resources during adulthood also reflected in the orientation of goals towards achieving gains (optimization) or avoiding losses (compensation)? Being oriented towards approaching gains can also be conceptualized in terms of an accumulation of resources (Freund & Riediger, 2001). Gaining and accumulating resources is clearly of evolutionary advantage as they are essential for survival, of oneself and one’s offspring, and enhance one’s attractiveness as a potential mate (Buss, 1999). Therefore, young adults who are, from an evolutionary perspective, at a point in their lives when one of their most important motives is to
produce offspring should hence be particularly motivated to gain and accumulate resources.

Although personal reproductive concerns decrease in older adulthood, resources remain important as they ensure survival throughout the entire life span. However, one could argue that it is the conservation of resources, rather than the acquisition of resources, that increases in importance with age. There are three interrelated reasons for this trend. First, with increasing age, adults—and, in particular, older adults—face more and more resources losses caused by declining health and cognitive functioning, retirement, and death of loved ones (Baltes & Smith, 2003). Given that losses are highly aversive (Hobfoll, 1989; Kahnemann & Tversky, 1979), threats to one’s resources should increase one’s motivation to maintain resources and avoid losses (Freund & Baltes, 2000; Heckhausen, 1999; Staudinger, Marsiske, & Baltes, 1995). Second, due to the decline in resources, it becomes increasingly difficult to acquire new resources because it is often costly to do so (e.g., learning a new skill requires time, effort, and often also money and social support). Third, losses in resources can induce a downward spiral. For instance, losses in mobility due to health-related problems might prevent a person from going to certain social events, which, in turn, might lead to losses in social contacts. Therefore, attempting to achieve new outcomes and improve functioning instead of investing in the restoration of losses might be too costly for older adults.

Taken together, these considerations lead to the hypothesis of a shift from an orientation towards optimizing gains in young adulthood to an orientation towards maintenance or loss avoidance in later life (Freund & Ebner, 2005; Staudinger et al., 1995). Consistent with this hypothesis, cognitive experimental work on dual-task (sensorimotor and memory) performance in young and old adults showed that, compared to younger adults, older adults increasingly use compensatory aids as the performance is challenged by experimentally induced losses in goal-relevant means (Li, Lindenberger, Freund, & Baltes, 2001).

As for personal goals, there is also converging evidence supporting a shift in orientation from optimization to compensation with increasing age. Heckhausen (1997) found that younger adults reported more goals in domains associated with striving for gains and fewer goals in domains reflecting the avoidance of losses than middle-aged or older adults did. Similarly, Ogilvie, Rose and Heppen (2001) found that motivational orientation towards maintenance was more frequent in the goals of older adults as compared to middle-aged adults or adolescents although the motivation for acquiring gains was predominant in all age groups. Ebner, Freund, and Baltes (2006) directly assessed goal orientation in younger, middle-aged, and older adults and found converging evidence for the predicted shift in goal orientation. They experimentally manipulated the perceived availability of resources to address the question of whether this shift is due to the decrease in resources during adulthood. When resources were perceived as limited, younger
adults also oriented their goals towards maintenance and avoidance of loss. It seems, then, that the observed shift in goal orientation is in fact a response to a decrease in resources across adulthood.

Is the shift in goal orientation adaptive? On the level of subjective well-being, Ebner and colleagues (2006) found that older adults profit from maintenance orientation but younger adults actually feel worse when reporting high maintenance or loss-avoidance orientation in their personal goals. On the level of behavioral goal engagement, Freund (2006) found in a series of studies that younger adults persisted longer at pursuing a goal geared towards gains (optimization), while older adults showed more persistence when counteracting losses (compensation). Taken together, these studies provide evidence that goal orientation not only reflects the changing balance of gains and losses in resources across adulthood, but also that this shift in goal orientation is adaptive in terms of subjective well-being and actual goal pursuit.

OPTIMIZATION: A MATTER OF OUTCOME OR PROCESS?

The previous sections focused on goal selection and goal orientation but only marginally addressed the process of goal pursuit. Little research has been conducted on age-related changes in the way adults go about pursuing their goals. Most goal theories state that goals are more likely to be achieved when a clear and still achievable but difficult outcome is specified (e.g., Locke & Latham, 2002). Outcomes serve as a standard of comparison, providing feedback regarding the usefulness of the strategies employed (Carver & Scheier, 1995). This suggests that focusing on the outcome of goal pursuit should be related to a higher likelihood of succeeding than focusing on the means of goal pursuit (process focus).

What determines the salience of outcome versus process when setting and pursuing a goal? I argue that the availability of resources, as well as time perspective, might influence the salience of outcome or process focus during goal pursuit and also determine the adaptiveness of goal focus. Moreover, goal orientation towards gains or maintenance/loss avoidance might also be influenced if the outcome or the process of goal pursuit is more salient.

Maintaining a particular state (e.g., staying healthy) requires constant work on the respective goal. Therefore, as compared to goals with a specific end point (e.g., passing an exam), this type of goal might be more suitable for a process focus. Therefore, maintenance goals may be more likely to be associated with a process focus, whereas goals involving the achievement of new outcomes (i.e., growth) should be more likely to invoke an outcome focus. Moreover, when resources are perceived as being limited, people might feel that achieving new
outcomes is less likely and desirable than focusing on the task at hand (i.e., the process of goal pursuit).

Similarly, as suggested by construal level theory (Trope & Liberman, 2003), temporally distant goals are more likely to be represented in an abstract way and in terms of ends, whereas temporally proximate goals are more likely to include a more concrete representation of the means (“do” goals, according to Carver & Scheier, 1995). In line with construal-level theory, findings from research on socioemotional selectivity theory by Carstensen and colleagues (for a summary see Carstensen et al., 1999) suggest that an extended future time perspective is likely to be associated with a focus on distal outcomes (e.g., interacting with social partners to gain useful information that might facilitate the achievement of one’s goals) whereas a limited time perspective brings about a focus on the present and, therefore, a more immediate payoff (e.g., a preference for social interactions that are emotionally meaningful). With a limited future time perspective, then, people should be more concerned with the more immediate process of goal pursuit than with the more distant outcome thereof.

Taken together, preference for a certain goal focus might vary by variables such as time perspective (Carstensen et al., 1999) and availability of resources (e.g., Freund & Ebner, 2005). As time perspective and available resources have been shown to correlate negatively with chronological age (e.g., Baltes & Smith, 2003; Lang & Carstensen, 2002), one could expect an increase in process focus and a decrease in outcome focus during adulthood.

This hypothesis is consistent with Kanfer’s resource model (e.g., Kanfer, 2005; Kanfer & Ackerman, 2004), which proposes that motivation (defined here as effort) depends on the expected effort-performance function (i.e., the expected level of performance upon investing a certain amount of effort into a task at hand), the performance-utility function (i.e., the consequences of attaining a certain level of performance), and the effort-utility function (i.e., the payoff for investing a certain amount of effort into the task at hand). When resources are decreasing (e.g., fluid intelligence during adulthood), the expected payoff from an investment of effort declines, so older adults are expected to invest less effort in tasks involving declining resources. When resources are plentiful or even increasing (e.g., crystallized intelligence during adulthood), the expected payoff from an investment of effort increases, so effort will be invested in tasks involving resources that are increasing. Applied to the work domain, Kanfer and Ackerman (2004) propose that “among older workers, work motivation will be less determined by level of performance achievement and, rather, more determined by judgments of how much effort is required for requisite performance . . . and the utility of allocating that effort” (p. 451). This proposition is consistent with the view that older adults’ primary goal focus shifts from achieving a specific outcome (here, performance level) to the process of goal achievement (i.e., investment of effort).
DOES PROCESS AND OUTCOME GOAL FOCUS CHANGE WITH AGE?

A minilongitudinal study by Freund, Riediger, and Hennecke (in press) provides initial evidence for an age-related shift in primary goal focus. In this study, we used an exercise motivation scale to assess the process and outcome focus of younger and older individuals who had started exercising regularly. Outcome focus comprised items such as “losing weight” or “improving my appearance” and process focus items such as “having fun” or “socializing.” As expected, younger adults focused more on the outcome of their exercise goal, whereas older adults focused more on the process of achieving their goal. Moreover, outcome and process focus were differentially associated with goal-relevant exercise outcomes. As compared to adults with an outcome focus, those with a process focus tended to experience a decrease in the distance to their goal over time and rated it as more attainable and important; they also reported being more involved and satisfied with their goal. Moreover, the findings suggest that older adults’ preferring to focus on the process rather than the outcome is beneficial when they engage in goal pursuit and goal attainment.

CONCLUSIONS

Life-span psychology holds that, throughout the life span, development is best characterized as multidirectional, encompassing gains and losses (Baltes, 1987). Although we strive to maximize gains, losses are an inevitable part of life. Successfully managing this changing ratio of gains and losses can, therefore, be seen as the essence of successful development. According to the SOC theory, development can best be understood as the interplay of selection, optimization, and compensation (Baltes & Baltes, 1990). There is converging evidence from studies using different methods (e.g., self-report, behavioral, correlational, experimental) that selection, optimization, and compensation are, in fact, effective in fostering successful development. Although recent research has attempted to specify what aspects of selection (e.g., prioritizing, focusing), optimization (e.g., focusing on the process of goal pursuit), and compensation (e.g., use of aids in threatened functional domains) are associated with successful aging, little is known about the interplay of these three processes. Clearly, each of the processes can be viewed as uniquely contributing to successful development. However, it might also be the case that the three processes especially have an effect on successful aging in interaction with each other (Freund et al., 1999). When first introduced by Paul and Margret Baltes (1990), selection, optimization, and compensation were conceived of, at a higher level of aggregation, as three facets
of a single process of adaptive mastery (see also Marsiske, Lang, Baltes, & Baltes, 1995). Although the specification of each of the individual processes is necessary and fruitful for understanding how adults manage changes in resources occurring throughout adulthood, Paul Baltes always pointed out that we need to adopt a holistic view on SOC when attempting to conceptualize successful development. This is one of the challenges Paul Baltes left to us and a direction for future research.

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