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Self-Regulation of Common Age-Related Challenges: Benefits for Older Adults' Psychological and Physical Health

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This article addresses the role played by adaptive self-regulation in protecting older adults' psychological and physical health. A theoretical model is outlined illustrating how common age-related challenges (i.e., physical challenges and life regrets) can influence older adults' health. In addition, the proposed model suggests that older adults can avoid the adverse health effects of encountering these problems if they engage in adaptive self-regulation. Finally, this article reviews recent studies that examined the adaptive value of self-regulation processes for managing physical challenges and life regrets in the elderly. The findings from cross-sectional, longitudinal, and experimental studies document the importance of adaptive self-regulation for maintaining older adults' health.

KEY WORDS: aging; health; depression; self-regulation; goal adjustment; regret.

People are living longer than ever before in human history and an increasing proportion of the population is growing into old age (Oeppen and Vaupel, 2002). However, older adults' quality of life is often compromised by the experience of common health problems, such as arthritis, heart disease, or diabetes (National Center for Health Statistics, 1999). In this regard, it is widely recognized that physical health problems are associated with symptoms such as pain or restrictions in daily activities that adversely affect a person's emotional well-being (e.g., Dew, 1998; Lenze *et al.*, 2001). For example, depressive symptomatology has been shown to be considerably higher among elderly individuals who exhibit specific medical conditions (e.g., arthritis or cardiovascular disease, Creed and Ash, 1992; McKhann *et al.*, 1997), experience pain (Green *et al.*, 1994), or confront limitations in instrumental or basic activities of daily living (Lenze *et al.*, 2005; Williamson and Schulz, 1995).

Psychological challenges also have the potential to compromise an older person's quality of life. A common psychological challenge, affecting up to 90% of older adults, is the experience of life regrets (Landman, 1987; Wrosch *et al.*, 2005). Life regrets involve counterfactual scenarios (e.g., "what would have happened if . . ."; Kahneman, 1995), frequently associated with major developmental pathway decisions in the work and family domains (e.g., not having finished a university education or having married the wrong person, Wrosch and Heckhausen, 2002; Roese and Summerville, 2005). Importantly, there are individual differences in people's intensity of regret experiences, associated with the frequency of regret-related intrusions or the extent to which people are angry or desperate about their regretted behaviors (Gilovich *et al.*, 1998; Wrosch *et al.*, 2005). In this regard, research has demonstrated that the experience of intense life regrets predicted older adults' depressive symptomatology, as older adults often lack the opportunities to undo the negative consequences of their regretted behaviors (Wrosch *et al.*, 2005).

The adverse effects of age-related challenges (such as experiencing physical challenges or intense

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life regrets) on older adults' depressive symptoms have important implications for physical health. Figure 1 illustrates a highly simplified model of this relation, suggesting that the negative emotional consequences of experiencing age-related challenges (Fig. 1, path *a–b*) may instigate motivational, behavioral, and biological problems (Fig. 1, path *b–c*), thereby influencing physical health declines in the elderly (Fig. 1, path *c–d*). For example, a depressed person may be less motivated to overcome a health problem (Bruce, 2000), or emotional distress may prompt health-compromising behaviors (e.g., smoking, drinking, or not exercising). In addition, emotional distress has the potential to modify biological processes in the endocrine and immune systems (e.g., cortisol dysregulation and immunosuppressive effects) in a way that increases vulnerability to disease (Heim *et al.*, 2000). Furthermore, such adverse effects of distressing experiences on biological and health variables increase with age, as suggested by recent meta-analytic reviews (Otte *et al.*, 2005; Segerstrom and Miller, 2004). Thus, it is reasonable to assume that the emotional consequences resulting from the experience of common age-related challenges may be profound enough to influence an older person's physical health.

Importantly, our theoretical model incorporates several feedback loops. For example, illness may contribute to experiencing additional physical and psychological challenges (Fig. 1, path *d–a*). Moreover, illness may affect neuroanatomical and biological changes (e.g., dysregulated neurotransmission) that directly contribute to depressive symptomatology (Fig. 1, path *d–b*), or prevent a person from engaging in health-supportive behaviors (e.g., exercise; (Fig. 1, path *d–c*). This implies that psychological and health variables can reciprocally influence each other and may elicit a downward spiral characterized by the experience of common age-related challenges, emotional distress (and associated motivational, behavioral, and biological problems), as well as physical health declines (for bi-directional effects between psychological and health factors in the elderly, see also Schulz *et al.*, 2000; Wrosch *et al.*, 2004).

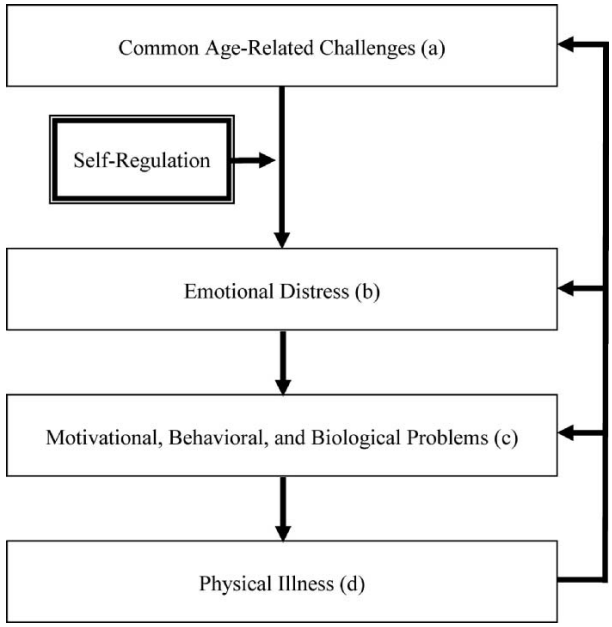

Fig. 1. Theoretical model addressing the importance of adaptive self-regulation in the associations between common age-related challenges (a), emotional distress (b), motivational, behavioral, and biological problems (c), and physical illness (d) in the elderly

The Importance of Adaptive Self-Regulation for Healthy Aging

Given the adverse effects of encountering age-related challenges on older adults' physical health, there is a pressing need to identify factors that can help people successfully cope with such circumstances. In this regard, control theories (Carver and Scheier, 1981, 1998; Leventhal *et al.*, 2003; Schulz and Heckhausen, 1996) provide a useful tool to illuminate pathways to successful and healthy aging. These theories characterize humans as active agents that can regulate or control the experience of critical situations, thereby avoiding negative consequences on their psychological and physical health. From this perspective, a person usually engages in self-regulation to reduce a discrepancy between an adversely perceived situation and a personal goal. For example, a person who intends to stay in good health may seek the advice of a physician when the person experiences a physical symptom.

It is important to note that there are different types of self-regulation processes that can fulfill two broad functions. First, self-regulation processes may help a person overcome a challenge and attain a goal. This set of behaviors is characteristic of a person who is engaged in pursuing a goal by investing time and energy, seeking help and advice, or increasing the motivation for attaining a goal (for a review of research on promoting a person's potential for what has been termed primary control, see Heckhausen and Schulz, 1995). Second, self-regulation processes

may be activated to protect the integrity of a person's self and adjust personal goals that can no longer be attained. For example, external attributions may reduce feelings of personal responsibility for encountering a problematic situation and thereby ameliorate the associated emotional distress (Heckhausen and Schulz, 1995). Moreover, a person may deal with a problem by disengaging from the pursuit of a goal and engaging in other meaningful activities (for associations between goal adjustment and subjective well-being, see Wrosch *et al.*, 2003b).

The adaptive value of different types of self-regulation processes should depend on the available opportunities for overcoming a challenging situation. If a person faces favorable opportunities for actively addressing a challenge, processes aimed at goal attainment should be adaptive. In these circumstances, goal attainment processes should facilitate overcoming the critical situation and ameliorate the person's emotional distress as well as the associated physical health consequences. By contrast, when the opportunities for actively addressing a challenge are sharply reduced, self-protection and goal adjustment should be conducive to maintaining high levels of emotional well-being and good health. While self-protective processes may directly target a person's emotional states, goal adjustment can eliminate the psychological source of the distress, thereby preventing accumulated failure experiences and facilitating the engagement in other purposeful activities (Wrosch *et al.*, 2003a; for the association between purpose and quality of life, see also Scheier and Carver, 2001, Scheier *et al.*, 2006).

Importantly, there are reliable individual differences in people's approaches to managing challenging situations, which determine the use of specific self-regulation processes. Our model takes such differences between people into account and proposes that individual variation in the use of self-regulation behaviors should determine whether or not a challenge would influence an older person's health. As indicated in Fig. 1, we would expect that self-regulation processes have the potential to influence the associations between common age-related challenges and indicators of psychological and physical health. More specifically, people who engage in adaptive self-regulation should be protected from the experience of the negative psychological and physical consequences stemming from the experience of challenging situations. By contrast, maladaptive patterns of self-regulation should be generally associated with negative psychological and physical states.

By applying the described model to the management of common age-related challenges, we would predict that older adults should be less emotionally distressed if they adjust their self-regulation processes to the opportunities for overcoming a specific problem. In this regard, it is important to note that illness can affect different types of health symptoms. First, illness may be associated with the experience of acute physical symptoms (e.g., pain). Second, illness often results in symptoms of functional disability that limit older adults' abilities to carry out their daily activities. The distinction between acute physical symptoms and functional disability is important, as acute physical symptoms can often be successfully addressed if a person actively engages in overcoming the symptom. By contrast, functional limitations are frequently intractable and active engagements aimed at recovery of function may not be successful. Thus, among older adults who confront acute physical symptoms, goal attainment processes should ameliorate the symptoms and thereby contribute to a person's psychological and physical health. However, self-protective and goal adjustment processes may be adaptive if older adults face functional limitations, given that these processes reduce emotional distress and lead to the pursuit of other meaningful activities (for a more comprehensive discussion, see Wrosch *et al.*, 2002, 2003a, b, 2004).

In a similar vein, research on the management of life regrets has shown that older adults generally confront reduced opportunities to undo the negative consequences of their regretted behaviors (Wrosch *et al.*, 2005). However, given the adverse effects of regret experiences on indicators of quality of life, it would be important for older adults to engage in self-regulation processes that can protect their subjective well-being. For example, self-protective processes, such as external attributions or downward or lateral social comparisons, may reduce feelings of personal responsibility for a regretted event and contribute to an older person's perception that his or her own problems are not different or even less troublesome than the problems of other people. In addition, disengagement from undoing the negative consequences of a regretted behavior and the engagement in other valuable goals may prevent a person from focusing on life circumstances that cannot be changed and allow the person to redirect his or her attention to other purposeful activities. These adaptive functions of self-protection and goal adjustment should reduce an older person's intense experience of

regret, thereby protecting his or her psychological and physical health.

Empirical Evidence

Our previous work has documented empirically that adaptive self-regulation can prevent older adults from experiencing the negative psychological consequences of common age-related challenges (supporting an effect of self-regulation on the association *a–b*, see Fig. 1). For example, active engagements in overcoming health problems have been shown to buffer the adverse effect of manageable acute physical symptoms on older adults' depressive symptoms, and have led to reduced levels of depression over time (Wrosch *et al.*, 2002). In addition, research on the management of regrets confirmed that older adults who engaged in self-protective external attributions experienced a lower intensity of regret and fewer intrusive thoughts, as compared to older adults who blamed themselves for a regretted event (Wrosch and Heckhausen, 2002).

While these earlier studies were predominantly concerned with predicting a person's psychological well-being, we have also tested other aspects of the proposed model by examining biological and physical indicators of health. In a recently conducted study, including more than 200 community-dwelling older adults from the Montreal area, we assessed participants' diurnal rhythms of cortisol secretion in addition to levels of common health problems, depressive mood, and goal attainment processes. We were particularly interested in the measurement of cortisol, as elevated levels of cortisol secretion are widely thought to represent a biological mechanism that can link challenging encounters with the development of physical health problems (e.g., Heim *et al.*, 2000; McEwen, 2003).

The study's findings demonstrated that common health problems (e.g., arthritis, diabetes, high blood pressure) predicted high levels of older adults' depressive mood, but only among participants who were not actively engaged in overcoming their health problems. By contrast, participants who actively addressed their health problems were protected from experiencing elevated levels of depressive mood (Wrosch *et al.*, in press). These findings were controlled for levels of functional disability to account for symptoms of physical illness that are difficult to overcome in the elderly. Interestingly, the buffering effect of active health engagements on depressive mood was significant only if the association between functional disabilities and depressive mood was taken into account. This pattern of results supports our argument that the adaptive value of active health engagement processes is reduced among older adults who experience health symptoms that can hardly be addressed (such as functional disabilities), and increased among people who do not confront these symptoms. Thus, active health engagements are not a general-purpose mechanism. Instead, these self-regulation processes are most effective when people have favorable opportunities for attaining their health-related goals.

In addition, the findings of the study showed that engagement in overcoming health problems also buffered the adverse effect of participants' health problems on increased levels of diurnal cortisol secretion. Similar to the previously reported results, the analysis controlled for levels of functional disability and the results suggest that elevated levels of cortisol secretion were found only among older adults who experienced high levels of health problems and did not actively engage in overcoming their physical problems (Wrosch *et al.*, in press). Finally, the analyses demonstrated that individual differences in depressive mood completely mediated the buffering effect of health engagement processes on levels of diurnal cortisol secretion. Consistent with our theoretical model, these findings indicate that active engagements in overcoming potentially manageable health problems protect an older person's emotional well-being. In addition, the emotional benefits of these self-regulation processes were shown to further predict adaptive levels of diurnal cortisol secretion, a biological process that is thought to play an important role in the maintenance of good physical health (supporting an effect of self-regulation on the associations *a–b–c*, see Fig. 1).

Our empirical work to date has focused on the role of goal attainment processes in the context of manageable health problems. This is partly due to the fact that it has been more difficult to construct appropriate measures of health goal adjustment and self-protective processes in response to a health challenge. As a result, it has not yet been possible to address empirically that these responses lead to benefits if older adults confront chronic functional disabilities. However, we believe that it is just as important to study the adaptive processes for functional disabilities where complete recovery of function is not possible. In this regard, future research

should devise appropriate measures that capture self-protective and goal adjustment processes that minimize the adverse consequences of functional declines on well-being and other aspects of health (see also Conclusions section).

Over the past years, we have also conducted several studies on the health effects of older adults' most severe life regrets. In a recently published study, examining young and older adults, we demonstrated that intense life regrets predicted depressive symptoms (CES-D) and reports of health problems (e.g., stomach trouble, constipation, headaches, asthma) among older, but not younger, adults. Moreover, the effect of regret intensity on increased levels of physical health problems could be statistically explained by individual differences in older adults' depressive symptomatology (Wrosch *et al.*, 2005). This pattern of results is consistent with our argument that the emotional consequences of challenging situations can further affect a person's physical health (supporting paths *a–b–d*, see Fig. 1).

As the latter study also incorporated measures of self-regulation, we were able to assess the extent to which participants were disengaged from undoing the negative consequences of their regretted behaviors and their availability of meaningful future goals. As previously mentioned, we expected these processes to be adaptive among older adults, as they reduce a person's focus on regrets that cannot be overcome and keep the person engaged in other meaningful activities. In support of this assumption, the findings showed that those older adults who were disengaged from undoing the negative consequences of their regretted behaviors, and who had several viable future goals, reported a particularly low intensity of regret. Moreover, the beneficial effects of disengagement and available future goals on reduced levels of regret intensity further mediated adaptive levels on indicators of subjective well-being (e.g., low depression, high life satisfaction) and physical health (Wrosch *et al.*, 2005). Given that it is often impossible for older adults to undo the negative consequences of their regretted behaviors, the study's results indicate that processes associated with successful goal adjustment (i.e., goal disengagement and goal reengagement) have the potential to reduce regret intensity, thereby helping older adults to avoid the negative consequences on their psychological and physical health (supporting an effect of self-regulation on the associations *a–b–d*, see Fig. 1).

While the previously reported findings suggest that self-regulation may influence older adults' regret experiences and physical health, we note that these studies also included important limitations associated with cross-sectional data and self-reports of physical health. For example, health reports can be affected by underlying personality traits (such as negative affectivity, see Watson and Pennebaker, 1989) and the cross-sectional nature of the studies precluded us from drawing conclusions about the direction of effects.

To overcome these limitations, we conducted two additional studies. In one study, we selected a subsample from the previously described sample of older adults from the Montreal area (those older adults who reported having a life regret, $n = 183$). This study was designed to examine whether intense life regrets can also predict a health relevant biological process that is not based on self-reports: the diurnal secretion of cortisol. The results revealed that older adults who experienced more intense life regrets secreted a larger volume of diurnal cortisol than older adults who experienced less intense life regrets (Wrosch *et al.*, 2006, Study 1). In addition, this finding remained significant after controlling for sociodemographic characteristics, negative affectivity, and levels of illness, and thus provides strong evidence that life regrets are not only associated with self-reports of older adults' health, but can also predict patterns of biological dysregulation (supporting path *a–c*, see Fig. 1).

Another study on the association between regret and health incorporated a longitudinal and experimental design (Wrosch *et al.*, 2006, Study 2). In this study, we assessed life regrets and indicators of health (i.e., cold symptoms and sleep problems) across three months in a sample of 103 older adults. The study was designed to examine whether regret can affect changes in older adults' health problems. In addition, the study incorporated an experimental manipulation aimed at engaging older adults in self-protection and goal adjustment processes. We expected that this experimental manipulation would buffer the adverse effects of regret on changes in physical health.

To elicit adaptive self-regulation processes, we implemented a three-day writing intervention designed to foster self-protection and facilitate disengagement from undoing regrets. Participants in the experimental group were instructed to write about external factors that contributed to the regretted event (to elicit self-protective external attributions),

other people's life regrets (to elicit adaptive lateral and downward social comparisons), and their meaningful future goals (to facilitate goal adjustment). Participants in the control group wrote about their daily non-emotional events.

The results of the study confirmed that intense life regrets predicted increased levels of health problems over time. By contrast, levels of health problems (i.e., cold symptoms and sleep problems) did not predict changes in regret intensity over time (Wrosch *et al.*, 2006, Study 2). Importantly, a significant interaction effect suggested that regret intensity was associated with increases in sleep problems among participants in the control group, but not among participants who had engaged in self-protection and goal adjustment (i.e., the experimental group). Similar to the previously reported study, these findings were statistically independent of sociodemographic characteristics, negative affectivity, and levels of illness. Together, the reported results indicate that regret can affect older adults' physical health problems over time, but that engagement in self-protection and goal adjustment may prevent some of the adverse health effects of life regrets (supporting an effect of self-regulation on the association *a–d*, see Fig. 1).

Conclusions

This article outlined a theoretical model suggesting that the experience of common age-related challenges, such as physical challenges and life regrets, can compromise an older person's health. In addition, we showed how older adults could adaptively manage the occurrence of age-related challenges. We suggested that older adults' self-regulation processes should be adjusted to the opportunities for overcoming a specific challenge to protect their psychological and physical health. In circumstances in which a challenging situation can potentially be addressed (e.g., experiencing manageable acute physical symptoms), older adults should engage in active attempts directed at overcoming the challenge. By contrast, if older adults can no longer realize an important objective (e.g., undoing the consequences of a severe life regret or recovering from an intractable functional disability), they should engage in self-protection and goal adjustment.

The reported empirical evidence from cross-sectional, longitudinal, and experimental studies strongly supports our theoretical model. Common age-related challenges, such as physical challenges and life regrets, were predictive of older adults' emotional distress, diurnal cortisol dysregulation, and health problems. Moreover, the reported evidence suggests that levels of emotional distress represent a mediator in the associations between age-related challenges and biological and physical problems. Finally, the discussed studies demonstrate that adaptive self-regulation has the potential to buffer the adverse effects of age-related challenges on older adults' psychological and physical health. While older adults who attempted to overcome a manageable problem, or who engaged in self-protection and goal adjustment when they encountered an unattainable goal, were shown to be protected from the negative health effects of challenging situations, maladaptive patterns of self-regulation were generally associated with dysfunctional levels among the outcome variables.

Clearly, these findings have important implications for understanding pathways to healthy aging by pointing to the protective role played by adaptive self-regulation. Nevertheless, there are important questions that need to be addressed in future work. While our research has demonstrated evidence for the emotional, biological and physical benefits deriving from adaptive self-regulation of common age-related challenges, other parts of the proposed model would benefit from further empirical research. For example, future research should examine whether the beneficial biological effects of adaptive self-regulation can also affect a person's physical health (see path *c–d* in Fig. 1). In addition, it would be important to study whether such effects on physical health can further influence the experience of challenges, emotional distress, and biological problems (see feedback loops in Fig. 1). Given that some of the reported studies will follow the participants over time, we will be able to examine these issues in our future work.

Furthermore, it is sometimes difficult to determine a priori what the optimal strategy should be for a given health challenge. In other words, when is it appropriate to struggle to overcome a health challenge, and when is it appropriate to let go and attempt to find purpose elsewhere? In this regard, we had suggested that self-protection and goal adjustment are adaptive self-regulation factors when an important objective cannot be reached any longer. However, while some psychological challenges can clearly not be overcome in old age (e.g., not having had children earlier in life), this issue becomes less clear-cut with respect to the management of progressive functional declines. For example, in

early stages of functional disability, older adults may still be able to maintain certain levels of physical functioning and counteract prospective health declines. In such circumstances, it may be useful to abandon some health goals (e.g., complete recovery to perfect health), but to remain persistent with respect to other health-related goals (e.g., being able to walk), or to scale back the stringency of a goal in the particular domain in question (e.g., walking for 30 min a day rather than an hour). As a person's functional capacities further decline, such downward adjustments of health goals would require a careful orchestration of goal adjustment, self-protection, and persistence to protect the person's emotional well-being and facilitate the investment of time and energy in health goals that are still attainable (cf. Carver and Scheier, 2000). To study these processes more comprehensively, future research should conduct fine-grained longitudinal studies that assess key variables across several time points.

Finally, more research is needed on the application of our findings for improving older adults' quality of life. While it may not be possible to prevent people from experiencing challenging situations, the reported findings showed promising evidence suggesting that self-regulation models can be used to help people deal with challenges that often arise during the aging process. Thus, this line of research may inform intervention programs aimed at identifying problems that can be overcome and teaching older adults to act on them. Likewise, people could be taught how to protect their psychological well-being by abandoning objectives that can no longer be pursued and finding new purpose in life. As our understanding of the adaptive management of challenging life situations becomes increasingly elaborated, such applications of self-regulation theories may largely contribute to the well-being and health of the elderly population.

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