

Perceived Control of Life Regrets: Good for Young and Bad for Old Adults

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Age differences in the associations among intensity of regret, control attributions, and intrusive thoughts were investigated ($N = 122$, age range = 20–87 years). Given that the opportunities to overcome regrettable behavior decline with age, older adults' attributions of low internal control were expected to serve self-protective functions and facilitate deactivation of regret. In younger adults, by contrast, high levels of internal-control attributions might facilitate active change of regrettable behavior, resulting in low intensities of regret. The results showed that internal-control attributions were related to high intensity of regret and intrusive thoughts in older adults. Among younger adults, however, internal-control attributions were associated with low intensity of regret and low levels of intrusive thoughts.

The experience of regret is a common and inherent phenomenon of human development (Landman, 1987). Because development is selective and human behavior is sensitive to failure, people may sometimes regret not having pursued alternative actions.¹ Regret experiences are related to counterfactual thoughts (Kahneman & Tversky, 1982) and are often accompanied by negative emotional states (Gilovich, Medvec, & Kahneman, 1998) great enough to negatively affect people's quality of life (Lecci, Okun, & Karoly, 1994). They instigate highly valued alternative scenarios of personal development (Roese, 1997) that might require individuals to either overcome or deactivate their regrets.

Although research has identified a number of different factors involved in the experience of regret (for review, see Gilovich & Medvec, 1995), we know little about age differences in the management of life regrets. Given that the opportunities to undo the consequences of regrettable behavior decline with age, we suggest that age-differential control attributions might contribute to an adaptive management of life regrets. High levels of internal-control attribution might motivate active attempts to overcome regret in young adulthood when people face favorable opportunities for goal attainment. In contrast, attributions of low internal control might serve self-protective functions in older adults and facilitate deactivation of regret.

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Selectivity in Development and Regret Experiences

Selectivity has been described as a central process of successful development (Baltes & Baltes, 1990; Heckhausen, 1999). People's resources are limited, and once invested in one activity they cannot be used for pursuing another activity. This constraint requires individuals to selectively invest their time and energy in the attainment of specific goals. Selective investment of resources results in canalized biographical tracks, which comprise sequences of developmental tasks (Havighurst, 1973; Schulz & Heckhausen, 1996). However, selective investment of personal resources in particular life paths also involves potential risks such as inappropriate selection of goals and unexpected failure (Heckhausen, 2000). Thus, individuals may fail on a given developmental path because they confront unattainable goals or they lack the necessary resources to overcome unexpected obstacles. Under such circumstances of failing developmental tasks, people may regret not having pursued an alternative life path (e.g., educational or occupational regrets, Lecci et al., 1994; Metha, Kinnier, & McWhirter, 1989). For example, athletes who have invested many years in developing their skills and recognize that their career will not be successful may regret not having accomplished more educational qualifications. Individuals who concentrate on pursuing a certain life task (e.g., developing a career) may also experience regrets that are based on decisions in their daily lives (e.g., not having enough time for personal relationships, see recent and life-long regrets; Gilovich & Medvec, 1995).

Life regrets are a psychological phenomenon that relates to both cognition and emotion (Kahneman & Tversky, 1982; Landman, 1987). Regrets involve counterfactual thoughts (e.g., "If I would have done behavior X, I would be happier"; Roese, 1997) and often the experience of negative emotions (e.g., anger, feelings of helplessness; Gilovich et al., 1998; Kahneman, 1995). Such alter-

¹ As described in more detail in the introduction, this study focused on examining regrettable omissions, although regrets are also related to regrettable commissions (e.g., Gilovich & Medvec, 1995).

native and highly valued scenarios of the past probably represent failure experiences that might negatively affect people's quality of life (e.g., depression, low life satisfaction; Lecci et al., 1994). In addition, they might motivate people's attempts to overcome regret by actively changing their lives (e.g., pursuit of hoped-for possible selves; Markus & Ruvolo, 1989). Thus, regret may also serve motivational functions by representing people's unfulfilled intentions (e.g., Gilovich & Medvec, 1995; Lecci et al., 1994).

From a developmental perspective, however, it seems relevant to note that successfully undoing the consequences of regrettable behaviors is not always possible, given that some life paths can hardly be changed if people advance in age (e.g., having a different career, establishing a family). Thus, regret may relate to both situations that can be changed by people's active investments of time and energy and situations in which successful attempts to overcome regrettable behavior have become impossible. In this regard, the distinction between long-term and short-term regrets seems to be relevant (Gilovich & Medvec, 1995). Whereas the possibilities to change life-long regrets might undergo sharp age-related declines, older people might be able to change situations concerning some of their short-term regrets (e.g., not having solved a conflict with a close relative). With respect to other short-term related regrets, however, older people might have fewer opportunities to change regrettable behavior than younger individuals (e.g., not having traveled before the onset of chronic disease).

Management of Life Regrets Across Adulthood

The experience of regret may require individuals to adaptively regulate their lives. In support for this assumption, Stewart and Vandewater (1999) have demonstrated that women who did not make regret-related career change in early midlife reported enhanced levels of rumination later in life. Thus, people who do not learn to regulate failure may continuously be confronted with recurrent thoughts and emotions concerning undesired outcomes of development (e.g., Nolen-Hoeksema, 1999; Wrosch, Scheier, Miller, Schulz, & Carver, 2002).

In principle, the negative consequences of regret can be regulated in two ways. Individuals either actively change the conditions that have led to the regretted event or adapt internally to regrettable behaviors by adjusting their perceptions about the personal responsibility and control for the regret. These two ways of coping with regret are consistent with the distinction between primary and secondary control, originally introduced by Rothbaum, Weisz, and Snyder (1982) and elaborated in a developmental context by Heckhausen and Schulz (1995; Schulz & Heckhausen, 1996). Primary control strategies are directed at producing change in the external world, and secondary control strategies are directed at optimizing motivational resources and self-related perceptions within the individual.²

The adaptive value of primary and secondary control depends on the objective opportunities for goal attainment (Heckhausen, 1999). If a person faces favorable opportunities to realize a goal, then processes aimed at producing change in the external world (e.g., attempts of goal attainment) are expected to result in successful development. In contrast, if the opportunities for adaptive action are sharply reduced, then internal adaptation of self-related perceptions of responsibility or control may preserve people's motivational and emotional resources and help to disengage from

unattainable goals. Given the radical decline in people's opportunities to attain personal goals in later adulthood, secondary control is expected to become increasingly important at older ages. Research based on the life-span theory of control has demonstrated in different areas of life (health, finances, childbearing, intimate relationships) that primary and secondary control strategies are used in close adaptation to changing opportunities across the life course. Thereby primary and secondary control strategies facilitate subjective well-being and mental health (e.g., Heckhausen, Wrosch, & Fleeson, 2001; Wrosch & Heckhausen, 1999; Wrosch, Heckhausen, & Lachman, 2000; Wrosch, Schulz, & Heckhausen, 2002). The notion of opportunity-adapted control processes has also been supported by research on coping, showing that in situations that were perceived as changeable, problem-focused coping was related to low levels of depression, whereas emotion-focused coping was related to high levels of depression (Vitaliano, DeWolfe, Maiuro, Russo, & Katon, 1990).

Studies on age differences in the management of regret experiences are scarce. Initial evidence reported by Lecci et al. (1994) showed that the number of regrets contributes to low levels of life satisfaction in older but not in younger adults. Lecci et al. suggested that regrets in later stages of life might have more profound consequences because older adults have fewer opportunities to make effective change. Indeed, on the basis of sociostructural, biological, and normative constraints (Baltes, Cornelius, & Nesselroade, 1979; Neugarten, Moore, & Lowe, 1968), older as opposed to younger people may have fewer opportunities to undo the consequences of regrettable situations. In addition, declines of personal resources and a shortage of remaining life time in older adults (Baltes, 1987; Carstensen, Isaacowitz, & Charles, 1999) may obstruct active attempts to change regrettable behaviors in people's daily lives. As aforementioned, however, some of older people's short-term regrets might also relate to situations that involve sufficient opportunities to produce active change, comparable to younger adults.

In general, we expect for those situations that involve age-related opportunities to undo the consequences of regrettable behavior that active attempts to overcome regret-related situations are particularly beneficial in young adults (favorable opportunities). Processes aimed at adapting self-related perceptions of control, by contrast, should facilitate successful management of regret in the elderly (unfavorable opportunities).

To examine the role played by age-related control processes in the management of regret, we focused in this study on examining regrettable omissions, although regret experiences are also related to commissions (e.g., Gilovich & Medvec, 1995; Hattiangadi, Medvec, & Gilovich, 1995; Kahneman & Miller, 1986). We concentrated on examining regrettable omissions because causal factors having led to commissions are often more salient than those that inhibit behavior (Gilovich & Medvec, 1995). We expected that beneficial effects of age-adapted control processes (e.g., causal attributions) should be particularly identifiable for regrettable omissions, given that individuals are probably more success-

² Comparable theoretical distinctions have been suggested as problem-focused versus emotion-focused coping (Folkman & Lazarus, 1980) and assimilation versus accommodation (Brandstatter & Renner, 1990).

ful in adjusting self-related perceptions for situations in which the causal factors are less salient and, thus, more malleable.

The literature on control and self-regulation has suggested a number of processes that facilitate either adaptive change in the external world (e.g., perceived control, optimism; Carver et al., 1993; Skinner, 1995) or internal adaptation of self-related perceptions (e.g., social comparisons; Wills, 1981). In this study, we focused on examining a psychological process that may be functionally related to both adaptive changes in the external world and adaptation of the self: the attribution of control for negative events. Such attributions represent estimates about how much control people had over the occurrence of a specific event (Brown & Siegel, 1988) or the extent to which they blame themselves for the outcome of a specific situation (Janoff-Bulman, 1979).

It has been argued that external as opposed to internal-control attributions may protect the individual from developing negative emotional states in uncontrollable situations (e.g., Abramson, Seligman, & Teasdale, 1978; Heckhausen, 1999). Attributions of low internal control may reduce the responsibility for uncontrollable failure, make failure less important for the self, and, thus, may help to deactivate problems that cannot be solved. Thus, low levels of internal-control attributions should reduce negative emotional states in uncontrollable situations (for reviews, see Abramson et al., 1978; Heckhausen & Schulz, 1995). However, research has also demonstrated an inverse relationship between control attributions and negative emotional states if individuals confront controllable negative events (e.g., Brown & Siegel, 1988). High levels of internal attributions for the occurrence of a negative event in controllable situations are probably related to adaptive change in people's actual behavior and, thus, might result in successful development (see also control attributions in victims of violent crime; Janoff-Bulman, 1979, 1982).

On the basis of the described theoretical framework, we proposed that individuals' control attributions might affect the management of life regrets of younger and older adults in contrasting ways. First, high levels of internal-control attributions might instigate action that overcomes regrettable behavior particularly in young adulthood when people face favorable opportunities for goal attainment. A successful pursuit of such regret-related intentions should result in a deactivation of the regret—the cause of the regret is likely to be eliminated. Second, low levels of internal-control attributions toward regrettable behavior should be beneficial in old age when individuals confront reduced opportunities for goal attainment. Attributions of low internal control might reduce the perceived responsibility and the importance of regrettable situations for the self and thereby facilitate deactivation of regret. In sum, an age-adapted use of control attributions should promote the adaptive management of regret across the life course. High control attributions should benefit younger adults, and low control attributions should be advantageous for older adults.

Present Research and Predictions

The study examined the experience of omission regrets in a sample of young, middle-aged, and older adults. We investigated whether the management of regret is related to an age-differential use of regret-specific control attributions. First, we hypothesized that age-differential control attributions are related to the intensity of regret. That is, attributions of high internal control should be

associated with low levels of regret in young adulthood. In contrast, low ratings in internal-control attributions were expected to relate to a reduced intensity of regret in old age. In addition, we expected older people to report lower levels of internal-control attributions than young adults, given that people's motivational processes are adaptively tailored to the age-graded opportunities for development. This also implies that we expected no age differences in the intensity of regret, based on an age-differential use of control attributions.

Second, we expected that an age-adapted management of regrettable behavior might also protect individuals from developing more general states of maladjustment such as high levels of intrusive thoughts. Older people who do not deactivate regret and younger people who do not overcome the consequences of regrettable behavior may continuously be confronted with recurrent thoughts about failure. Thus, we hypothesized that low levels of internal-control attributions would be associated with high levels of intrusive thoughts in young adulthood. Older adults, in contrast, were expected to experience high levels of intrusive thoughts if they attribute high levels of internal control to their regrettable behaviors.

Finally, we explored whether age-differential control attributions are beneficial for the management of both long-term and short-term regrets. We have argued that age-related declines in the opportunities to produce active change in people's lives may be particularly related to long-term regrets. In addition, we have discussed the possibility that some of older people's short-term regrets might indeed be controllable, whereas the opportunities to overcome other short-term regrets might be obstructed in older adults. This could imply that we might find less pronounced effects of age-differential control attributions for people's short-term regrets.

Method

Participants

The participants of the study were 122 young, middle-aged, and older residents of the city of Berlin ($M = 49.48$ years, $SD = 18.30$ years, range = 20 to 87 years) who participated in a 1-hr questionnaire study. Participants were recruited via newspaper advertisement. In addition, people who had participated in unrelated studies (e.g., intelligence-related studies) were contacted by phone and asked to participate in the study. Participants were examined in group sessions and received DM 30 (\$15) for participation. Approximately half of the participants ($n = 60$) were asked to respond to their most severe long-term regret, whereas the other half of the participants ($n = 62$) answered the questionnaire with regard to the most severe short-term regret. Forty-five percent of the sample was male (short-term regrets = 46.7%, long-term regrets = 43.5%). The majority of participants received a high school diploma or went to higher education (short-term regrets = 75.0%, long-term regrets = 72.6%). Participants who responded to short-term regrets did not statistically differ in terms of age ($M = 47.65$, $SD = 17.51$) from participants who responded to long-term regrets ($M = 51.26$, $SD = 19.00$).

Materials

The main measures of the study included participants' life regrets, intensity of regret, internal-control attributions, intrusive thoughts, self-esteem, and life satisfaction. Table 1 shows zero-order correlations be-

Table 1
Zero-Order Correlations Between Constructs Used in the Study Separately for Short-Term Regret and Long-Term Regret

Construct	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Overall intensity of regret	—	.40**	.30*	.16	.15	-.05	.18	-.23	.18	-.06	.12	.02	-.20	.15
2. Hot emotions	.22	—	.63**	.11	.26*	.04	.25*	-.11	.07	-.05	-.05	.02	-.13	-.12
3. Despair-related emotions	.39**	.45**	—	.11	.37**	-.10	.26*	-.25*	.18	-.17	-.22	-.06	-.02	-.30*
4. Wistful emotions	.00	.08	-.03	—	.20	-.14	.38**	-.18	-.19	-.13	-.05	.16	.09	-.21
5. Intrusive thoughts	.34**	.08	.21	.08	—	-.17	-.01	-.27*	.15	-.50**	-.47**	.09	-.04	-.17
6. Internal attributions	.18	.20	-.13	.06	.07	—	-.02	.29*	-.21	.11	-.04	-.14	.04	.23
7. Family-partnership regrets	.32*	-.05	.34**	-.22	.18	-.03	—	-.26*	-.24	-.22	-.14	.05	.16	-.02
8. Work-education regrets	-.09	-.03	-.31*	.02	-.04	.11	-.55**	—	.28*	.04	-.07	-.27*	.04	.14
9. Self-developmental regrets	-.04	.06	.11	.07	.11	.06	-.24	-.29*	—	.09	-.02	.04	-.13	-.10
10. Self-esteem	-.19	-.09	-.26*	-.04	-.52**	.08	-.13	.03	-.09	—	.56**	.05	.00	.18
11. Life satisfaction	-.25	-.10	-.14	-.09	-.51**	-.25	-.03	.06	-.19	.50**	—	-.00	-.01	.14
12. Age	-.14	-.19	.07	-.02	.01	-.50**	-.16	-.04	.17	-.09	.19	—	.13	-.23
13. Gender ^a	-.09	.05	-.05	-.08	.00	.00	-.30*	.27*	.20	.13	-.15	.06	—	.15
14. Education ^b	-.01	-.06	-.05	-.02	.09	.11	.02	-.01	-.01	.03	-.09	-.16	-.04	—

Note. Short-term regret is indicated in the upper half of the table and long-term regret is indicated in the lower half of the table.

^a 1 = female, 2 = male. ^b 1 = less educated, 2 = more educated.

* $p < .05$. ** $p < .01$.

tween the constructs used in the study, separately for short-term (upper half of Table 1) and long-term regrets (lower half of Table 1).

Long-term and short-term regrets. We measured long-term regrets by asking the participants to report the activity that they regretted most not having pursued during their lives (mean time interval since regret = 21.6 years). With regard to short-term regrets, we asked the participants to report the activity that they regretted most not having pursued in the past couple of weeks (mean time interval since regret = 8.4 weeks). To obtain indicators of the content of reported regrets, we categorized participants' regrets in eight different life domains (work-education, family-partnership, self-development, leisure, friendship, social engagement, health, and finances).³ By using the described coding scheme, we were able to categorize 93.4% of the reported regrets (interrater agreement = 86.7%, $\kappa = .83$). For each life domain, we computed a variable that represented whether the participants did or did not mention a regret in the particular domain.

Intensity of regret. We assessed four indicators of the intensity of regret. First, as an overall estimate, we asked the participants to report how strong they regret not having pursued the reported activity by using a single item (5-point Likert-type scale, 1 = not at all, 5 = very strong; $M = 3.47$, $SD = 1.02$). On the basis of the work of Gilovich et al. (1998), we also measured the intensity of three types of regret-related emotions (despair-related, hot, and wistful emotions). Specifically, we asked the participants to report how strong they experience the following emotions if they think about the reported life regret: desperate, helpless, sorrow (despair-related emotions); irritated, angry, embarrassed (hot emotions); nostalgic, sentimental, contemplative (wistful emotions). Each emotion was rated on a 5-point Likert-type scale (1 = not at all, 5 = very strong).

To examine whether the nine regret-related emotions represent three empirically distinct constructs, we conducted a three-factor (despair, hot, and wistful emotions) confirmatory factor analysis by using LISREL 8 (Jöreskog & Sörbom, 1993). The estimated three-factor model revealed satisfactory fit statistics, $\chi^2(33, N = 122) = 49.44$, nonnormed fit index = .94, incremental fit index = .94, root-mean-square error of approximation = .06. All of the loadings were significant at $p < .01$ and ranged between .41 and .85. The experience of depressive emotions was positively correlated with the experience of hot emotions ($r = .76$, $p < .01$). Wistful emotions were statistically independent from hot emotions and depressive emotions. The scales of despair-related emotions ($M = 2.09$, $SD = 0.97$, $\alpha = .78$), hot emotions ($M = 1.99$, $SD = 0.91$, $\alpha = .64$), and wistful emotions ($M = 1.77$, $SD = 0.76$, $\alpha = .64$) showed acceptable empirical characteristics.

Internal-control attributions. We measured internal-control attributions by asking the participants to report the amount of personal influence that they had on the situation at the time when they did not pursue the reported activity (5-point Likert-type scale, 1 = no influence, 5 = very much influence; $M = 3.60$, $SD = 1.32$).

Intrusive thoughts, self-esteem, and life satisfaction. We measured intrusive thoughts about problems by using a 6-item scale (Wrosch, Scheier, et al., 2002). The Intrusive Thoughts scale assesses general tendencies of experiencing intrusive thoughts about problems. Exemplar items include, "I wake up at night thinking about my problems" and "I have difficulties concentrating on my work or daily activities because thoughts about my problems keep entering my mind" (5-point Likert-type scale, 1 = not true at all, 5 = very true; $M = 2.13$, $SD = 1.04$, $\alpha = .88$). In

³ We combined family and partnership-related regrets into one category because only 9 participants reported partnership-related regrets. With regard to significant effects for the partnership-family domain, no significant differences were found between participants who reported family-related regrets and participants who reported partnership-related regrets.

addition, we measured people's self-esteem (Rosenberg, 1965) by using a 10-item scale ($M = 4.80$, $SD = 0.67$, $\alpha = .69$). We also assessed life satisfaction by asking the participants how satisfied they are presently with their life (5-point Likert-type scale, 1 = *not satisfied*, 5 = *very satisfied*; $M = 3.68$, $SD = 0.95$).

Analyses

The analyses are presented in three separate sections. Given the small number of empirical studies on aging and regret, we presented in the first section descriptive results. This set of analyses provided basic information about the nature of people's life regrets and examined whether the intensity of regret and regret-related control attributions are associated with sociodemographic factors and characteristics of the reported regrets. In particular, we conducted logistic regressions to examine whether the report of regret in different life domains was related to sociodemographic characteristics and characteristics of the reported regrets (long-term vs. short-term regrets). In addition, we conducted regression analyses to examine whether regret-specific control attributions and the intensity of regret were influenced by sociodemographic variables and characteristics of the reported regrets. Finally, by using correlational analyses, we explored whether control attributions were differently related to the intensity of regret, dependent on the life domain of regret.

The second section addressed our main hypotheses of age-differential effects of control attributions on the intensity of regret. We conducted regression analyses to predict indicators of the intensity of regret by the interaction between age and control attributions. The results were also controlled in subsequent analyses for different sets of possibly influencing factors.

In the third section, we reported results concerning our hypothesis that age-adapted control attributions are also related to a person's tendency to perceive intrusive thoughts. By using regression analyses, we examined whether the interaction between age and control attributions predicted participants' intrusive thoughts. We also examined the independence of the findings from different sets of control variables.

Results

Descriptive Analyses: Life Regrets, Control Attributions, and Intensity of Regret

Table 2 displays frequencies and examples as well as participants' average age, gender, and long-term versus short-term distributions of life regrets reported in each of the eight life domains. For the entire sample, participants mentioned most frequently regrets related to work-education (32%), family-partnership (24%), and self-development (15.5%). Regrets in the remaining life domains were less frequently mentioned and were not considered in subsequent descriptive analyses and control analyses. Sixty-four percent of the work-education-related regrets were long-term regrets ($n = 25$), whereas 63% of family-partnership-related regrets ($n = 19$) and 37% of self-developmental regrets ($n = 7$) were long-term regrets.

To examine individual differences in the report of regrets in different life domains, we conducted logistic regression analyses. We predicted in separate analyses the report of regrets in the domains of work-education, family-partnership, and self-development by participants' age, gender, educational level, and long-term versus short-term regrets. We only found a significant effect for short-term versus long-term regrets in predicting work-education-related regrets. Participants who were asked to report long-term regrets mentioned work-education-related regrets more

frequently than participants who reported short-term regrets, $B(1) = .93$, $SE = .42$, $p < .05$. No further significant effects were obtained.⁴

We also examined whether sociodemographic variables and characteristics of the reported regrets may have influenced participants' regret-specific control attributions. Thus, we conducted a regression analysis for predicting control attributions by sociodemographic variables (i.e., age, gender, education) and characteristics of reported regrets (e.g., short term vs. long term, life domain of regret).⁵ We also tested the interaction between age and short-term versus long-term regrets for significance because of the possibility that age differences were only related to either long-term or short-term regrets. As reported in Table 3, no significant effects were found for gender, education, and domain of regret. In support for our hypotheses, participants' age significantly predicted regret-specific control attributions. Older as compared with younger participants reported lower levels of internal-control attributions. However, we also found a significant interaction between people's age and short- versus long-term regrets, indicating that the reported age effect needed to be qualified. Follow-up analyses of the simple slopes showed negative relations between age and internal-control attributions for both short-term and long-term regrets. However, the age effect on control attributions was more pronounced for long-term regrets ($\beta = -.50$, $t = -4.29$, $p < .01$) and did not reach significance for short-term regrets ($\beta = -.15$, $t = -1.19$, $p > .10$).

To examine whether the intensity of regret was related to sociodemographic variables and characteristics of the reported regrets, we conducted separate regression analyses, parallel to the aforementioned analyses, for predicting each indicator of the intensity of regret.⁶ The results of the analyses are presented in Table 3. People's age, gender, and education level were not related to any of the four indicators of the intensity of regret. We found no differences between short-term and long-term regrets with regard to the overall estimate of regret, despair-related emotions, and hot emotions. However, long-term as opposed to short-term regrets were related to a more intense experience of wistful emotions. In addition, we found significant effects for the life domain of regret in predicting the overall estimate of the intensity of regret and despair-related emotions. As documented in Table 3, participants who reported family-partnership-related regrets experienced more intense regret than participants who did not report family-partnership-related regrets. The significant zero-order correlations, as presented in Table 1, between work-education-related regrets and low levels of despair-related emotions were no longer significant in the multivariate approach. We obtained no significant

⁴ We also tested the interactions between age and short-term versus long-term regrets for significance. None of the interaction terms were significant.

⁵ To account for differences in reported life domains, we included three variables as one set of variables in the analyses (work-education-related, family-partnership-related, and self-developmental regrets).

⁶ It should be mentioned that the overall intensity of regret was positively associated with the experience of despair-related emotions ($r = .34$, $p < .01$) and hot emotions ($r = .28$, $p < .01$), but statistically unrelated to the experience of wistful emotions.

Table 2
Regrets in Different Life Domains: Examples, Frequencies, Age, and Gender

Life domain	Examples of regret	Frequency (n)	Age (M) in years	Female (%)	Long-term regret (%)
Work–education	“I did not study psychology.”	39	46.4	43.6	64.1
Family–partnership	“I did not improve the relationship with my father.”	30	47.8	63.3	63.3
Self-development	“I did not continue learning Russian language.” ^a	19	53.3	52.6	36.8
Leisure	“I did not go on vacation.” ^a	8	51.1	62.5	25.0
Friendship	“I did not work enough on maintaining my friendships.” ^a	7	42.9	100.0	28.6
Social engagement	“I did not give enough money to a homeless person.” ^a	7	61.0	57.1	28.6
Health	“I did not get a flu shot.” ^a	2	59.5	50.0	0
Finances	“I did not buy a house.”	2	53.0	50.0	50.0

^a Example presents a short-term regret.

effects for the interaction between age and short- versus long-term regrets.

Finally, we examined whether control attributions were differently related to regret experiences, dependent on the life domain of regret. We computed zero-order correlations between internal-control attributions and each indicator of regret separately for participants who reported work–education-related regrets, family–partnership-related regrets, and self-developmental related regrets. We found a significant correlation between internal-control attributions and despair-related emotions ($r = -.32, p < .05$) among participants who reported work–education-related regrets. High levels of internal-control attributions were related to low levels of despair-related regret in the work–education domain. No further significant effects were obtained.

The Age-Differential Role of Control Attributions in the Experience of Regret

The descriptive results have shown that the intensity of regret does not vary as a function of people’s age. In addition, the results confirmed that older, as compared to younger people, reported having had less internal control over their long-term regrets. These results are consistent with our broader theoretical framework, suggesting that people’s control attributions are adaptively tailored

to the age-graded opportunities and constraints of development and, thus, may contribute to successful development across life.

To test our hypotheses of age-differential functions of control attributions more directly, we examined whether the intensity of regret can be explained by the moderation between people’s age and internal-control attributions. We conducted separate regression analyses for predicting each of the indicators of people’s intensity of regret. In a first step, we tested the main effects of age and control attributions for significance. In a second step, we included the interaction term between age and control attributions into the regression equation. We performed these analyses by using the entire sample (short- and long-term regrets) and controlled in subsequent analyses for differences between short-term and long-term regrets and other possibly intervening factors (see the control analyses discussion later in this section).

The results of the main analyses are reported in Table 4. The main effects of age and regret-specific control attributions did not explain variance in the intensity of people’s regret. It is most important to note that as predicted by our hypotheses, the interaction between age and control attributions significantly predicted the overall intensity of regret, despair-related emotions, and hot emotions. No interaction effect was found for the experience of wistful emotions.

Table 3
Regression Analyses Predicting Intensity of Regret and Internal-Control Attributions by Sociodemographic Variables and Characteristics of Reported Regrets

Predictor	Internal control attributions		Overall intensity of regret		Hot emotions		Despair-related emotions		Wistful emotions	
	R^2	β	R^2	β	R^2	β	R^2	β	R^2	β
Age	.08**	-.30**	.00	-.04	.01	-.11	.00	-.04	.00	.02
Gender	.00	.02	.01	-.12	.00	-.01	.00	.02	.00	.00
Education	.01	.10	.00	.05	.01	-.11	.03	-.16	.01	-.07
Short-term vs. long-term regrets	.00	-.07	.00	.06	.01	-.10	.00	-.05	.09**	.31**
Life domain of regrets	.02		.08*		.01		.14**		.01	
Work–education		.14		.04		-.01		-.11		-.10
Family–partnership		.01		.30**		.09		.30**		-.08
Self-development		-.01		.15		.09		.18		-.09
Age \times Short- vs. Long-Term Regrets	.04*	-.64*	.00	-.24	.01	-.29	.01	.36	.00	-.21

* $p < .05$. ** $p < .01$.

Table 4
Regression Analyses Predicting Intensity of Regret by the Moderation Between Internal-Control Attributions and Age

Predictor	Overall intensity of regret		Hot emotions		Despair-related emotions		Wistful emotions	
	R^2	β	R^2	β	R^2	β	R^2	β
Age	.00	-.04	.00	-.06	.00	-.04	.00	.07
Internal-control attributions	.00	.07	.01	.11	.01	-.12	.00	-.01
Age \times Internal-Control Attributions	.06**	.25**	.06**	.24**	.05*	.22*	.00	-.01

* $p < .05$. ** $p < .01$.

To illustrate the significant interactions, we plotted the relations between age and indicators of the overall intensity of regret 1 *SD* above and below the mean of people's control attributions, using commonly used regression techniques (Aiken & West, 1991). The significant interaction is illustrated in Figure 1. In young adulthood, attributions of high levels of control were related to low levels of the overall intensity of regret, B (for 30 years) = $-.88$ ($SE = .35$, $p = .01$). In contrast, reverse relations were obtained in older adults. Older adults who reported high, as compared to low levels of control attributions, showed higher ratings in the overall intensity of regret, B (for 80 years) = $.36$ ($SE = .13$, $p < .01$).

We also found significant crossover interactions with similar patterns of results for hot emotions and despair-related emotions. In young adulthood, attributions of high levels of control were related to low levels of hot emotions, B (for 30 years) = $-.72$ ($SE = .30$, $p < .02$), and low levels of despair-related emotions, B (for 30 years) = $-.84$ ($SE = .32$, $p = .01$). In contrast, reverse relations were obtained in older adults. Among older adults, high levels of control attributions were positively related with the experience of hot emotions, B (for 80 years) = $.34$ ($SE = .12$, $p < .01$), and despair-related emotions, B (for 80 years) = $.16$ ($SE = .12$, $p > .10$). However, the positive relation between control attributions and despair-related emotions did not reach significance because the cutting point of the crossover interaction was somewhat later in life (around age 60).

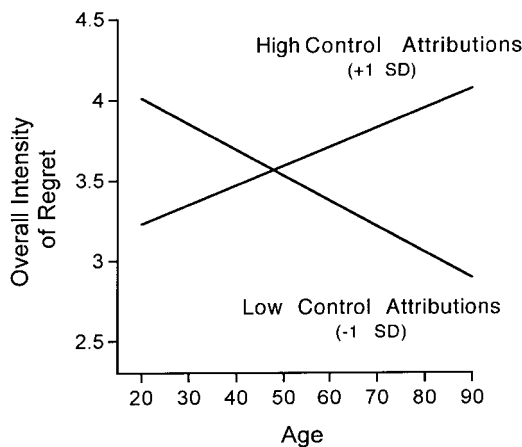


Figure 1. Predicting participants' overall intensity of regret (scale ranges from 1 to 5): Moderation between age (in years) and internal-control attributions (1 *SD* above and below the mean).

We repeated the main analyses of the study, controlling for three sets of variables. One set of variables involved characteristics of the reported regrets (e.g., short- vs. long-term regrets, time interval since regret, life domain of regrets).⁷ We controlled for these variables because we wanted to exclude the possibility that our results are simply because part of the sample referred to short-term regrets, whereas other participants addressed long-term regrets. Similarly, it could be that the age-differential effects of control attributions were related to the report of regrets in a specific life domain. We also tested the three-way interaction between age, control attributions, and short- versus long-term regrets for significance because we wanted to explore whether age-related effects of control attributions are particularly related to people's long-term regrets (see introduction). A second set of control variables included further sociodemographic variables (gender and education) that may have influenced the reported results. Finally, we controlled for people's self-esteem and life satisfaction. Given the cross-sectional nature of the study, we wanted to exclude the possibility that our findings are related to people with generally low levels of personal qualities who may have engaged in maladaptive control processes.

All of the reported interaction effects remained significant when separately controlling for sociodemographic variables, characteristics of the reported regrets, and self-esteem and life satisfaction. The amount of variance explained by the interaction effects ranged from .03 to .06 in the control analyses. However, if simultaneously including all three sets of control variables into the analyses, the interaction effect between age and control attributions on despair-related emotions was somewhat reduced ($p < .10$). We found no significant three-way interactions between age, control attributions, and short- versus long-term regrets, indicating that the beneficial effects of age-differential control attributions were related to both long-term and short-term regrets.

Predicting Intrusive Thoughts

The results presented thus far have shown that age-differential control attributions may explain people's experiences of regret. In the introduction, we discussed the possibility that an age-adapted management of regrettable behavior may also prevent individuals from developing intrusive thoughts. Before testing this hypothesis,

⁷ Given that the distinction between short-term and long-term regrets did not completely account for time-related differences in regret, we also included the time interval since regret as control variable.

we examined the associations between intrusive thoughts with indicators of the intensity of regret and broader indicators of psychological adjustment (self-esteem, life satisfaction).⁸ We attempted to exclude the possibility that individual differences in intrusive thoughts only reflect people's life regrets and do not present a broader indicator of psychological adjustment. The results revealed that intrusive thoughts were highly correlated with low levels of life satisfaction ($r = -.50, p < .01$) and low levels of self-esteem ($r = -.50, p < .01$), but they showed only moderate correlations with the overall intensity of regret ($r = .22, p < .05$), the experience of hot emotions ($r = .20, p < .05$), and despair-related emotions ($r = .30, p < .01$). No significant correlation was found between intrusive thoughts and the experience of wistful emotions. If simultaneously controlling for life satisfaction, self-esteem, and the four indicators of the intensity of regret in a regression analysis, only life satisfaction ($R^2 = .07, \beta = -.31, p < .01$) and self-esteem ($R^2 = .06, \beta = -.30, p < .01$) uniquely predicted participants' intrusive thoughts.

We tested our hypotheses of the importance of age-differential control attributions in the development of intrusive thoughts by conducting a regression analysis. First, we predicted participants' intrusive thoughts by the main effects of age and regret-specific control attributions. We then tested the interaction between age and control attributions for significance. We did not find significant main effects for age and control attributions. As expected, the interaction between age and regret-specific control attributions significantly predicted intrusive thoughts ($R^2 = .05, \beta = .23, p < .05$). The significant interaction between age and control attributions for predicting intrusive thoughts showed a similar pattern of results as reported for the indicators of regret (see Figure 1). We found that attributions of high levels of control were related to high levels of intrusive thoughts in old age, B (for 80 years) = .28 ($SE = .14, p = .05$), but to low levels of intrusive thoughts in young adulthood, B (for 30 years) = $-.90$ ($SE = .36, p = .01$).

We repeated the analysis by controlling for the same constructs that we had used as covariates in the analyses of the intensity of regret. The reported interaction effect between age and control attributions for predicting intrusive thoughts remained significant if separately controlling for characteristics of the reported regrets, sociodemographic variables, and self-esteem and life satisfaction. The amount of variance explained by the interaction effects ranged from .03 to .05 in the control analyses. However, the interaction effect was somewhat reduced ($p = .06$) if simultaneously controlling for all three sets of control variables. We found no significant three-way interaction among age, control attributions, and short-versus long-term regrets.

Discussion

This study examined functional relations among age-differential control attributions, intensity of regret, and intrusive thoughts. Specifically, we hypothesized that age-differential control attributions would be related to adaptive management of life regrets across adulthood. On the basis of the life-span theory of control (Heckhausen & Schulz, 1995; Schulz & Heckhausen, 1996), we suggested that people might regulate regret experiences by either undoing or deactivating their regrets. These two ways of coping with regret should be facilitated by opportunity-adapted attributions of control. We assumed that the opportunities to overcome

regrettable behavior decline across age, although we did not assess the opportunities to overcome specific regrets directly. We expected that high levels of internal-control attributions might instigate adaptive action and, thus, lead to low levels of regret and intrusive thoughts. In older ages, by contrast, low levels of internal-control attributions should serve self-protective functions, resulting in a low intensity of regret and low levels of intrusive thoughts. We discuss, in turn, the main findings of the study, the findings concerning our control analyses, and the study's limitations.

Management of Regret Across Adulthood

The findings support our hypothesis of an age-adapted management of regrettable behavior. Older people experienced low intensities of regret if they attributed low internal control toward their regrets. In contrast, a reverse relationship was observed in young adulthood. Young adults reported a low intensity of regret if they ascribed high internal control toward their regrets. This pattern of results was obtained for the overall estimate of the intensity of regret, the intensity of hot emotions (e.g., anger), and partly for the intensity of despair-related emotions (e.g., feeling helpless). We did not find, however, the same pattern of results for people's wistful emotions. It should be mentioned that hot and despair-related emotions clustered with the overall intensity of regret but were statistically unrelated to wistful emotions. In addition, wistful emotions did not reflect the overall intensity of regret.

On the basis of our theoretical framework, we suggest that low levels of internal-control attributions might facilitate deactivation of regret in older adults. Low levels of internal-control attributions may reduce the perceived responsibility and, thus, may also reduce the negative emotional consequences of failure experience. This process should be particularly adaptive for older adults because they supposedly have only few opportunities to actively change regrettable behavior. A fundamentally different situation may hold for young adults. Compared with older individuals, young adults often face favorable opportunities to change regrettable behavior in a number of life domains. Therefore, among young adults, high levels of internal-control attributions should result in active attempts to change regrettable behavior and may result in low intensity of regret (see also Brown & Siegel, 1988; Janoff-Bulman, 1979, 1982).

In addition, there might be dispositional factors that undermine possible self-protective functions of low internal-control attributions in young adulthood. Individuals who do not exploit their control potential but instead tend to adapt their self-related perceptions to failure in controllable situations may show poor developmental outcomes and may also accumulate failure experiences. In addition, self-protective functions of low internal-control attributions may be obstructed in young adulthood, given that people's social environment (e.g., peers) and normative conceptions about development (Neugarten et al., 1968) might enhance the salience of favorable control potentials.

We also found that age-differential control attributions were related to people's intrusive thoughts. Young adults reported high

⁸ Analyses including intrusive thoughts contained only 120 participants, because 2 participants did not provide data.

levels of intrusive thoughts if they attributed low internal control to their regrettable behaviors. In contrast, older individuals showed high levels of intrusive thoughts if they reported high levels of internal control toward their regrets. We have argued that an age-adapted management of failure may prevent people from developing intrusive thoughts. In other words, people who do not adaptively regulate their failures may be continuously confronted with recurrent thoughts and emotions concerning negative outcomes of development. For example, young adults who do not overcome regrettable behavior may be confronted to a greater extent with intrusions about accumulated failure experiences than young adults who successfully undo regret-related situations. In contrast, older people who do not successfully deactivate those regrets that they can no longer overcome may perceive recurrent thoughts about failure-related developmental outcomes. These results indicate that an age-adapted use of regret-specific control attributions does not only predict regret-specific outcomes; it was also related to the experience of intrusive thoughts. In this regard, it seems relevant to note that our results indicate that intrusive thoughts represented a broader measure of psychological adjustment that showed considerable and unique relations to life satisfaction and self-esteem and was not specific to people's life regrets.

More generally, the study's findings support our theoretical claim that age-adapted control processes may result in successful development. Control processes that are aimed at goal attainment were shown to be particularly adaptive in young adulthood, whereas control processes that result in adaptation of self-related perceptions were beneficial in old age. These results complement previous work on control processes across age that has demonstrated that processes of goal engagement facilitate subjective well-being and mental health if people face favorable opportunities for goal attainment. In contrast, adaptation of self-related perceptions was found to facilitate well-being if people face sharply constrained opportunities for development (Heckhausen et al., 2001; Wrosch & Heckhausen, 1999; Wrosch et al., 2000).

Control Analyses and Influencing Factors

We have examined in control analyses whether our main findings were related to characteristics of the regrets (short- vs. long-term regrets, life domain), sociodemographic characteristics, self-esteem, and life satisfaction. The beneficial effects of age-adapted control attributions were independent from the distinction between long-term and short-term regrets. In addition, we did not find significant interactions among age, control attributions, and long-versus short-term regrets. The latter result seems particularly important, given that long-term as compared with short-term regrets are probably more impactful and showed different age trajectories. These findings point to the conclusion that an age-adapted use of control attributions is beneficial for the management of both short-term and long-term regrets. It might be that the mechanisms of adaptive management of regret are similar for short-term and long-term regrets, even if both types of regret might differ on relevant dimensions, such as importance and controllability. Short-term and long-term regrets were associated with a comparable intensity of hot and despair-related emotions, replicating findings reported by Gilovich et al. (1998). Maybe the higher importance of long-term regrets and the more recent experience of short-term

regrets result in similar emotional experiences and adaptation processes.

The strong age effect of control attributions for long-term regrets is not very surprising, given that long-term regrets, as compared with short-term regrets, were more likely related to broader developmental tasks such as the attainment of educational and occupational goals. Such developmental tasks usually show sharp declines in terms of people's opportunities to produce active change in later phases of the life course. We note that additional analyses suggested that the age effect on control attributions for long-term regrets was unrelated to the time interval since regret. If time since regret was partialled out, then age was still inversely correlated with internal-control attributions ($r = -.39, p < .01$).

The stability of control attributions across age found for short-term regrets may imply that some of older people's short-term regrets relate to issues that are indeed more controllable, comparable to their younger counterparts. An alternative explanation for the stability in short-term regrets across age would be that people used a crossdomain comparison standard (with other life regrets) rather than a temporal comparison standard (with similar life regrets in younger ages) to rate their perceived control over the reported regrets. An implicit comparison with other, presumably more profound, regret experiences may have boosted older people's internal-control attribution of short-term regrets. However, given that older people's short-term regrets might reflect both controllable and uncontrollable situations, it seems interesting to distinguish these two types of regret by assessing multiple regrets in future research (see also *Limitation and Future Research* section). Some of the reported short-term regrets seemed indeed to be controllable in old age (e.g., did not work enough on maintaining a friendship; see Table 1). Other short-term regrets, however, might be more difficult to undo in old age, for instance in the case of chronic disease (e.g., not having traveled). In this regard, we would like to note that the study materials do not reveal the controllability of people's regrets because the regret descriptions were limited. We decided to not put any pressure on the participants in terms of providing elaborated regret descriptions because we were concerned about the validity of the remaining measures.

The descriptive analyses have shown that people most frequently mentioned work-education-related regrets. This result replicates findings from other studies (Lecci et al., 1994; Metha et al., 1989) and can be interpreted as support for the validity of our study. In addition, the results were also independent from the life domains of regret, suggesting that the beneficial effects of age-differential control processes were not related to a specific domain of life. However, we found that internal-control attributions were related to low levels of despair-related emotions in work-education-related regrets. Although this finding was not directly related to the main hypotheses of the study and was not consistently observed across different indicators of the intensity of regret, it points to the possibility that opportunities to overcome regret experiences do not only vary by age but might also differ for different life domains. However, our main findings were not affected if differences in the life domains of reported regret were taken into account.

We also found that people who mentioned family-partnership-related regrets reported a higher intensity of regret than did other participants. It may be that it is more difficult to manage regrets in the family and partnership domain. For example, family- and

partnership-related regrets usually involve social counterparts who may perpetuate the negative consequences of regrettable behavior. In addition, regret-related issues such as improving the relationship with a parent may be very difficult to regulate if the parent is deceased and, thus, may affect people over a long period of time.

Finally, the results were independent from participants' socio-demographic characteristics (e.g., gender, education), self-esteem, and life satisfaction. Both gender and education did not affect the intensity of regret and the experience of intrusive thoughts. In addition, these findings may imply that our results are presumably not related to people with generally negative qualities and low well-being who have engaged in maladaptive control processes and consequently experienced high levels of regret and intrusive thoughts. In contrast, the findings support our theoretical claim of the importance and unique role of age-adapted control processes in the adaptive management of regret across the life course.

Limitation and Future Research

Although the results generally support the hypotheses, the study involves limitations that should be addressed in future research. First, our theoretical framework suggested causal effects of age-adapted control processes. However, the cross-sectional design of the study does not allow causal interpretations of the data. Thus, there might also be alternative interpretations of the findings. For instance, people who are more satisfied may have selected adaptive control processes to a greater extent. However, by showing that the results were independent from individual differences in life satisfaction and self-esteem, we argue that this alternative interpretation is not very likely. We also acknowledge that the cross-sectional design does not allow for the conclusion that control attributions of long-term regrets had decreased across age. In an effort to demonstrate such effect, however, longitudinal research is needed. In addition, future research should control more carefully the influence of broader personality dimensions such as neuroticism. We cannot exclude the possibility that our results are partly related to systematic biases in broader personality dimensions among younger and older participants. However, given the statistical independence of the results from self-esteem and life satisfaction, this interpretation is not very likely because self-esteem and life satisfaction are often related to broader personality dimensions, such as neuroticism (e.g., Francis & James, 1996).

Second, it would be useful to obtain a more complete picture about people's regret experiences. By using larger samples, future research should assess multiple regrets in different subgroups of the population (e.g., age, gender, status). The assessment of multiple regrets in larger samples would allow a more detailed content analysis of people's regrets to be conducted. It would also allow examination of the management of regret across different life domains (e.g., family vs. work).

In addition, the role played by the importance and controllability of specific life regrets should be studied more directly. Our study supposedly addressed the importance of life regrets by distinguishing between short-term and long-term regrets, considering that major life regrets less likely occur during a shorter period of time. Although we did not find much evidence for differential effects between the management of short-term versus long-term regrets, the assessment of the importance of multiple regrets could distinguish more precisely between the consequences of major and

minor regrettable behaviors. Moreover, directly assessing the perceived current controllability of multiple regrets could help us, for example, to distinguish between those regrettable behaviors of older adults that are still controllable and those regrets that should be deactivated because active attempts to overcome the regret have become futile.

Another advantage of assessing multiple regrets is that differential effects for the management of commission and omission regrets can be examined in such a design. The distinction between omissions and commissions, their relative frequency and differential emotional effects has attracted much interest in recent research about regret (Gilovich & Medvec, 1995; Hattiangadi et al., 1995; Kahneman & Miller, 1986). The results of this study are limited to regrettable omissions and, thus, cannot be generalized to the management of commission regrets. However, we would not be surprised if age-graded effects of control attributions on the intensity of regret would be less pronounced for regret of commissions, given that the causal factors that have led to regrettable commission are more salient, and thus less malleable, than those of regrettable omission (Gilovich & Medvec, 1995).

Finally, the processes that are functionally related to an adaptive use of age-differential control attributions need to be considered in future research. On the one hand, the positive relation between internal-control attributions and psychological adjustment in young adulthood should be mediated by individuals' investments of effort and time. On the other hand, older people who perceive low levels of internal-control attributions may protect their well-being by being prompted to reduce effort and commitment toward undoing regrettable behavior. To examine such processes in more detailed, however longitudinal, research is needed. Such process-oriented research may shed further light on the experience and adaptive management of people's regrets across the life course.

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