

EMPIRICAL FINDINGS

This chapter presents the four studies of the dissertation. It reports the specific research hypotheses of each study, followed by the methods, and the results. Each study ends with a summary and a short discussion of the findings. Before describing the studies, I give some information on general statistical procedures relevant for all four studies.

General Statistical Procedures

Statistical Software Package and General Data Handling

The analyses were conducted using the statistical software package SPSS for Windows 11.5 (SPSS Inc., 2002). Prior to statistical analyses, all variables were examined for missing values, existence of univariate and multivariate outliers, departures from normality, internal consistency, and, where available, temporal stability of the measures. In addition, I checked all variables for violations of basic assumptions of the respective statistical procedures and defined the alpha-level indicating statistically significant results.

Missing Values, Outliers, Normality, Internal Consistency, and Temporal Stability

Part of the assessment procedure was to screen every questionnaire for missing data and, in cases of missing information, to ask participants to complete items with missing responses. In Studies 3a and 3b, progression of the computer program required complete data entry. Missing values therefore occurred rarely and, if at all, were missing at random. Under this assumption, regression methods are considered to outperform common incomplete data handling strategies (such as listwise or pairwise deletion or mean substitution) that assume that the pattern of missing values does not depend on any of the data values (R. J. A. Little & Rubin, 1987; Roth, 1994; Rubin, 1976). If missing values on items were part of a theoretical scale of at least three items and if 50% of the remaining sub-scale items were available, I estimated missing data by using chronological age, sex, and responses to all other items of the respective scale as predictors in a linear multiple regression (Tabachnick & Fidell, 1996). Sub-scale scores were then computed using the estimated item response. More than 50% of the sub-scale items were available in all cases, so scores were only set to missing in the case of missing single item indicators.

Existence of univariate¹⁵ and, specifically for respective analyses, multivariate¹⁶ outliers was examined separately in younger and older adults. Since outliers can lead to both Type I and Type II errors, and results then do not generalize, univariate outliers were adjusted to the closest non-outlying value in the distribution of the respective sub-sample (Tabachnick & Fidell, 1996). I identified no multivariate outliers on the basis of Mahalanobis distance indices ($p < .001$) in regression analyses. I checked the distribution of all variables for departure from normality in the total sample.¹⁷ Some variables revealed slight departures from normal distribution. Analysis of variance (ANOVA), however, is known to be fairly robust against modest violation of uni- and multivariate normality with respect to Type I error as long as the violations are not due to outliers and especially if group sizes are equal and two-tailed significance tests are used (see Bortz, 1999; Stevens, 2002; Tabachnick & Fidell, 1996). Departures from normality were therefore tolerated and variables were not transformed to normalize their distributions. Consequently, all analyses reported in the text are based on untransformed data. Nevertheless, where possible, I reanalyzed the data using nonparametric analysis procedures and reported the results in the respective footnotes (cf. Bortz, Lienert, & Boehnke, 1990).

Internal consistency (Cronbach's α) and, where available, stability (i.e., test-retest correlation) coefficients were computed to provide information on the reliability of the measures. Cronbach's α is a function of two parameters: (a) the interrelatedness of the items in a test or scale and (b) the length of the test. It indicates the extent to which items in a test have high communalities and thus low uniqueness (Cortina, 1993).¹⁸ All results including variables with internal consistencies of Cronbach's $\alpha < .60$ were interpreted with caution and regarded as preliminary because results might not have reached significance in the present data due to medium to low internal consistencies (see John & Benet-Martínez, 2000; Tabachnick & Fidell, 1996). Appendices A, B, and C provide detailed descriptive information on all variables assessed in the four studies.

¹⁵ According to Stevens (2002), univariate outliers are cases that have z scores $> |3|$ if the variable is approximately normally distributed. This rule can be extended to z scores $> |4|$ if the variable has any other type of distribution.

¹⁶ Multivariate outliers are cases characterized by unusual and discrepant patterns or combinations of scores on two or more variables. Mahalanobis distance at $p < .001$ serves as one possible criterion for multivariate outliers (Tabachnick & Fidell, 1996).

¹⁷ Satisfactory approximation of normal distribution is indicated by absolute ratios of skewness and kurtosis to their respective standard errors being smaller than 2 (Bortz, 1999; Tabachnick & Fidell, 1996). Based on the findings by Shapiro, Wilk, and Chen (1968) who showed that the combination of skewness and kurtosis coefficients and the Shapiro-Wilk test are most powerful in detecting departures from normality, I reported both in the respective Appendices. Note, however, that the Shapiro-Wilk test is very sensitive with respect to non-normal distributions (Hopkins & Weeks, 1990).

¹⁸ It is important to note that Cronbach's α does not measure the homogeneity of the inter-item correlations, nor does it indicate that the scale is uni-dimensional (cf. Schmitt, 1996).

Additional Assumptions of ANOVA

For all ANOVAs, the assumption of homogeneity of variance and variance–covariance matrices was tested. In univariate analyses, I conducted Levene’s test for homogeneity of variances. In multivariate and repeated-measures analyses including a between-subjects comparison, Box’s *M* tests were screened to test homogeneity of variance–covariance matrices. In both tests, violation of homogeneity was assumed when the tests yielded significance at the level of $p < .05$. Bortz (1999), however, states that ANOVA is relatively robust against violations of these assumptions when sample sizes are equal (see also Tabachnick & Fidell, 1996). Moreover, the Box’s *M* test is sensitive to non-normality and it is difficult to satisfy the sphericity assumption when there are more than two levels of the within-subject factor (see Weinfurt, 2000). In repeated-measures analyses, therefore, the degree of sphericity ($\epsilon = 1/(k - 1)$) was assessed using the Mauchly test. ϵ indicates the worst possible violation and k indicates the number of the levels of the within-subject variable. In cases where data departed significantly from sphericity, I applied the Greenhouse-Geisser correction to the tests of significance and reported ϵ and the corrected significance level. If the Greenhouse-Geisser correction did not alter the significance level, I referred to the conservative *F*-Test using Wilk’s Lambda as recommended by Bortz (1999).

Additional Assumptions of Multiple Regression Analysis

Pre-analysis screening procedures were conducted to verify the major assumptions of regression analysis (cf. Berry, 1993; Pedhazur, 1982; Tabachnick & Fidell, 1996). Specifically, I examined scatterplots of residuals to test for normality and homoscedasticity of residuals and linearity of independent and dependent variables. Tolerances ($1 - SMC$), with *SMC* indicating squared multiple correlations among the independent variables, smaller than .20 were used to detect singularity and multicollinearity. Cases of violation of any of these assumptions are reported in the respective footnotes.¹⁹

Significance Level and Alpha-Level Adjustment in Multiple Testing

Results were regarded as statistically significant if the alpha error was $p < .05$. The text routinely provides effect size estimates (η^2) to allow judgment of the importance of the findings. Furthermore, power estimates ($1 - \beta$) for all non-significant effects are reported to show whether the present analyses had sufficient power to detect the predicted effects.

¹⁹ Tabachnick and Fidell (1996) state that heteroscedasticity and failure of linearity of residuals in regression do not invalidate an analysis so much as they weaken it.

Where appropriate and multiple tests involved the same independent variable, multivariate statistical analyses were used. Significant multivariate effects were then complemented by univariate follow-up analyses adjusting the alpha-level for multiple testing to reduce Type I error inflation (Bonferroni adjustment). This method is considered very conservative (Jaccard & Wan, 1996). Therefore, if separate analyses were run for goal orientation toward growth, maintenance, and prevention of loss or for younger and older adults, the adjustment was conducted separately for each dimension or age group, thus reducing the number of comparisons (Bortz, 1999). I only regarded results as significant if they met the adjusted multiple-testing criterion of significance.

Study 1: Self-Reported Personal Goal Orientation I

The main purpose of Study 1 was to describe the concept of personal goal orientation, to investigate age-related differences in goal orientation, and to test age-differential associations between goal orientation and well-being on a self-report level. The goals participants generated referred to various freely chosen life contexts as well as to the specific domains of cognitive and physical functioning. There were two reasons to have participants generate goal domains freely: (1) In order to investigate if the goal domains mentioned by younger and older adults of the present study corresponded to the ones reported in the literature; (2) to be able to explore goal domains in which age-related differences in goal orientation did not exist.

I had three reasons for additionally asking participants to indicate their cognitive and physical functioning goals (see previous chapter): First, this allowed the investigation of domains that show prototypical age-related changes. Second, contextualizing the generation of personal goals to specific domains allowed for control of age-associated changes in importance of domains and their influence on differences in personal goal orientation between younger and older adults. Finally, the focus on these specific functional domains enabled the measurement of objective, in addition to subjective, information on goal-related resources.

The following sections present the specific research hypotheses raised in the context of Study 1. Then, methods administered to assess the central as well as various correlate and control variables are presented. Finally, I report the results and link them to open questions to be approached in Study 2.

Study 1: Specific Research Hypotheses

Table 2 summarizes the aims and specific empirical predictions of Study 1.

Table 2. *Study 1: Overview of Major Aims and Specific Research Hypotheses*

Hypotheses	
1.	<i>Description of the concept of personal goal orientation</i>
1.1	Growth, maintenance, and prevention of loss are three independent components of goal orientation.
2.	<i>Investigation of age-related differences in personal goal orientation</i>
2.1	There are age-related differences in the goal orientation of self-generated personal goals and goals across various life domains.
2.1.1	Younger adults report a primary goal orientation toward growth.
2.1.2	Older adults report a primary goal orientation toward maintenance and prevention of loss.
2.2	Age-related differences in goal orientation remain stable after controlling for education, sex, and several person variables as rival predictors.
2.3	Age-related differences in goal orientation remain stable over a two-week time interval as they comprise dispositional conditions.
2.4	There are life domains in which age-related differences in goal orientation do not exist (e.g., friends and acquaintances, leisure).
3.	<i>Investigation of associations between personal goal orientation and subjective well-being</i>
3.1	The associations between goal orientation and general subjective well-being as well as goal-specific satisfaction are age-differential.
3.1.1	In younger adults, growth goal orientation is positively associated with general subjective well-being and goal satisfaction, whereas goal orientation toward maintenance and prevention of loss are negatively associated with indicators of subjective well-being.
3.1.2	In older adults, growth goal orientation is negatively associated with general subjective well-being and goal satisfaction, whereas goal orientation toward maintenance and prevention of loss are positively associated with indicators of subjective well-being.

Study 1: Methods

Procedure

Study 1 comprised two measurement time points. The first questionnaire session (T1) took place at the Max Planck Institute for Human Development within days after the participants' recruitment (see below). These sessions were typically conducted in groups of varying size (22 sessions with 2–18 participants). T1 took place in March 2003. Younger and older adults attended separate sessions.²⁰ Two trained research assistants conducted the sessions in a standardized manner. In an introduction at the beginning of the session, participants were informed about the testing procedure before signing a consent form. They were then familiarized

²⁰ The two age groups were tested in separate sessions for two reasons: (1) Pilot work had shown that younger adults took less time to complete the questionnaires than did older adults; (2) it also suggested that there are age-graded normative beliefs with respect to goal orientation that might trigger age-stereotypical responses when being confronted with the respective other age group during the questionnaire session.

with the format and handling of the questionnaires. Next, they responded to several questions on sociodemographic information followed by two additional questionnaires. Detailed written instructions preceded the questionnaires. One of the research assistants was available throughout the session for questions and explanations. At the end of the session, three behavioral measures were applied: Spot-a-Word, Digit-Symbol Substitution, and Grip Strength. Each session typically took between 60 and 90 minutes.

The second questionnaire session (T2) took place at the Max Planck Institute after an average of $M = 14.3$ ($SD = 2.1$) days in April 2003. Twenty-five sessions took place in groups varying in size (2–13 participants). Younger and older adults again attended separate sessions. The sessions were conducted in a standardized manner by one of three trained research assistants. Again, each questionnaire began with detailed written instructions and one research assistant was available throughout the session. Completion of the questionnaires took between 60 and 90 minutes. At the end of T2, all participants were debriefed and reimbursed with 30 Euros (approximately \$ 25).

Participants

Recruitment

A professional recruitment firm randomly sampled 93 individuals from Berlin for participation in this self-report study. Requirements for participation in the study were that the person was either between 18 and 26 (younger adults) or between 65 and 85 years old (older adults) and was able and willing to come to the Max Planck Institute twice for data collection. Recruitment took place in March 2003.

Sociodemographic Characteristics

The effective sample at T1 and T2 consisted of $n = 49$ younger ($M = 22.3$ years, $SD = 2.0$) and $n = 41$ older adults ($M = 69.7$ years, $SD = 5.3$).²¹ As the sample was stratified by sex and educational level, men and women were equally represented in both age groups ($\chi^2_{(1, N = 90)} = 0.0$, n.s.) and there were no significant differences in the overall educational status of younger and older participants when comparing primary and lower secondary with higher secondary education ($\chi^2_{(1, N = 90)} = 2.01$, n.s.). Table 3 summarizes the sociodemographic characteristics of younger and older adults in Study 1.

²¹ For health reasons, one older man and two older women dropped out from the originally recruited $N = 93$ participants after T1.

Table 3. *Study 1: Sociodemographic Characteristics of Younger and Older Adults*

		Younger adults (<i>n</i> = 49)		Older adults (<i>n</i> = 41)	
Age (in years)	Range	18.19–25.97		65.06–84.32	
	<i>M</i>	22.25		69.74	
	<i>SD</i>	1.99		5.27	
Sex	Male	24	(49.0%)	20	(48.8%)
	Female	25	(51.0%)	21	(51.2%)
Marital status	Unmarried	47	(95.9%)	1	(2.4%)
	Married	2	(4.1%)	22	(53.7%)
	Divorced	0	(0.0%)	10	(24.4%)
	Widowed	0	(0.0%)	8	(19.5%)
Children	Yes	3	(6.1%)	35	(85.4%)
	No	46	(93.9%)	6	(14.6%)
Living situation	Alone	10	(20.4%)	18	(43.9%)
	With others	39	(79.6%)	23	(56.1%)
Education ^(a)	Primary	5	(10.2%)	7	(17.1%)
	Lower secondary	19	(38.8%)	7	(17.1%)
	Higher secondary	25	(51.0%)	27	(65.8%)
Apprenticeship	Yes	13	(26.5%)	26	(63.4%)
	No	36	(73.5%)	15	(36.6%)
Current occupation ^(b)	Full-time employed	5	(10.2%)	0	(0.0%)
	Part-time employed	7	(14.3%)	6	(14.6%)
	Apprentice	5	(10.2%)	0	(0.0%)
	High school student	10	(20.4%)	0	(0.0%)
	University student	21	(42.9%)	0	(0.0%)
	Homemaker	0	(0.0%)	3	(7.3%)
	Unemployed	8	(16.3%)	0	(0.0%)
	Retired	0	(0.0%)	36	(87.8%)
	Other	4	(8.2%)	1	(2.4%)

Notes.

^(a) Primary = Grund-/Volks-/Hauptschule (8–9 years); Lower secondary = Mittlere Reife/Realschule (10 years); Higher secondary = (Fach-)Abitur/Fach-/Hochschulstudium (more than 13 years)

^(b) Percentages do not add up to 100 as a person can belong to multiple categories.

Cognitive and Physical Functioning

At T1, information on cognitive and physical functioning of the sample was collected for several reasons: (1) to specifically describe the sample in terms of cognitive and physical functioning, (2) to document age-typicality of the sample with respect to cognitive and physical functioning, (3) to allow comparison of the respondents' cognitive and physical functioning across the four studies conducted in the context of this dissertation, and (4) to investigate relations between cognitive and physical functioning and the central variables.

Possibly due to the fact that the present sample had to be able to come to the Max Planck Institute for data collection, cognitive and physical performance of older adults was slightly higher than in the samples typically described in the literature on aging (e.g., S.-C. Li, Lindenberger, Hommel, Aschersleben, Prinz, & Baltes, 2004; Mayer, Baltes, Baltes, Borchelt, Delius, Helmchen et al., 1999; Salthouse, 1991). However, with respect to age-group differences in cognitive and physical characteristics the present sample was comparable to those mentioned in the literature. Both performance-based cognitive tests revealed significant age-group differences demonstrating the proposed dissociation between decline in fluid mechanics and maintenance of crystallized pragmatics of intelligence as proposed by P. B. Baltes (1997). Table 4 presents the cognitive and physical functioning of younger and older adults, observed in Study 1 (see also Tables A8 and A10 in Appendix A which provide additional descriptive information on cognitive and physical functioning in the total sample and in the younger and older sub-samples and also give psychometric information about the respective instruments).

Table 4. *Study 1: Cognitive and Physical Functioning in Younger and Older Adults: Means, Standard Deviations, Ranges, and Tests of Significant Age-Group Differences*

	Younger adults ($n = 49$)			Older adults ($n = 41$)			t
	M	SD	Range	M	SD	Range	
<i>Cognitive functioning</i>							
Knowledge	21.94	4.02	13–29	28.07	3.31	19–34	-7.81*
Perceptual-motor speed	56.82	9.13	32–72	42.41	9.14	24–62	7.45*
Subjective cognitive functioning ^(a)	5.63	1.24	1–8	5.90	.86	4–8	n.s.
<i>Physical functioning</i>							
Grip strength ^{(b)(c)}	27.14	8.38	15–45	19.93	8.54	1–34	4.03*
Subjective health ^{(d)(e)}	6.01	.99	3.5–7.8	6.23	1.35	3–7.8	n.s.

Notes. * $p < .01$ (alpha-level adjustment for 5 repeated analyses); see Table A10 for further information on the instruments to measure cognitive and physical functioning.

^(a) Mann-Whitney U test: $U = 890.5$, n.s.

^(b) Due to a broken left arm, one younger man performed the grip strength measure with his right arm only. In his case, maximal strength of his right hand was taken as indicator of maximal grip strength.

^(c) In line with the literature (e.g., Steinhagen-Thiessen & Borchelt, 1999), scores for men ($M = 30.1$, $SD = 7.6$) were almost twice as high as those for women in both age groups ($M = 17.9$, $SD = 6.0$; $t_{(88)} = 8.47$, $p < .05$). The age group x sex interaction, however, was not significant ($F_{(1, 86)} = 2.95$, n.s.).

^(d) Levene's test ($p < .05$) indicated departures from equality of error variances in the two age groups.

^(e) Mann-Whitney U test: $U = 828.5$, n.s.

Measures

The next section describes the variables measured in Study 1. First, assessment of the central constructs is presented, that is (a) the generation of personal goals, (b) personal goal orientation of self-generated goals, (c) personal goal orientation of goals across various life domains, and (d) general subjective well-being and goal-specific satisfaction. Next, I outline the measurement of

correlates of goal orientation (i.e., concepts of self-regulation, goal resources, and additional goal characteristics) followed by the assessment of person control variables. Unless otherwise indicated, respondents gave their responses on eight-point scales ranging from 1 to 8. Table 6 contains the overview, specific instructions, and psychometrical information on the central instruments administered in Study 1.

Generation of Personal Goals

At the beginning of T1, participants generated a list of their six most important personal goals. To facilitate personal goal generation, a short explanation of the concept of personal goals including sample goal domains and goals was included in the instruction (see Appendix A, Box A1). Participants were instructed to list two goals freely (*“Please write down what you wish for personally, what you would like, and what you would not like at present and in the following weeks, months, and years...”*), two goals relating to the domain of cognitive functioning (*“...in the domain of thinking and cognition...”*), and two goals relating to physical functioning (*“... in the domain of physical activity and fitness...”*). The questionnaire always asked for self-generated goal domains first, followed by cognitive or physical functioning goals.²² The order of listing of cognitive or physical goals was counterbalanced. Respondents described each goal in a few words and assigned a keyword to facilitate handling of the subsequent goal-specific questions. At T2, respondents were instructed to once again respond to the goal-related questions with respect to their six personal goals listed at T1. Box 1 gives examples of goal descriptions and respective keywords generated by two younger and two older respondents.

To be able to assign the goals relating to self-generated domains to specific goal contexts, a coding taxonomy was developed on the basis of theoretical considerations and empirical findings (Filipp & Ferring, 1991; Nurmi, 1992; Riediger, 2001; Staudinger, Freund et al., 1999). The coding scheme comprised twelve different goal domains. Two independent trained coders categorized the listed 180 goals to their respective goal contexts.²³ Inter-rater-reliability was good (Cohen’s $\kappa = .83$). In a consensus conference, initially deviating categorizations were discussed and goals were assigned to one of the categories. Figure 4 presents the percentages of goal domains generated by younger and older respondents. The picture that emerged is typical for age-related differences in the salience of life domains reported (Freund, 1995; J. Heckhausen, 1997; Nurmi, 1992; Staudinger, 1996; Staudinger & Pasupathi, 2000).

²² At the time when participants listed the two goals referring to self-generated goal domains, they did not know yet that they were also asked to report about their cognitive and physical goals.

²³ One of the coders developed the coding taxonomy and conventions, whereas the other coder was independent. Both coders participated in a training procedure. It involved the coding and a subsequent consensus discussion of 70 goals generated in the context of pilot research.

Box 1. *Study 1: Examples of Self-Generated Goals and Respective Keywords in Parentheses*

Younger man, 24 years, student:

Self-generated goal domains

- (1) Successfully finish my studies (Studies)
- (2) Lead a secure life—financially and socially (Life)

Cognitive functioning

- (1) Pass all my exams (Exams)
- (2) Read more instead of watching TV (Reading)

Physical functioning

- (1) Do more sports or join a sports club (Sports club)
- (2) Do more bicycling instead of driving a car (Bicycling)

Younger woman, 18 years, apprentice:

Self-generated goal domains

- (1) Pass my exams well, in order to finish my apprenticeship successfully (Apprenticeship)
- (2) Spend more time with my parents and care more about them (Family)

Cognitive functioning

- (1) Learn more in my profession in order to increase my job opportunities (Learning)
- (2) Watch the news more often to know what is going on in the world and avoid becoming uncritical (News)

Physical functioning

- (1) Do sports regularly to strengthen my immune system and to keep my body fit (Sports)
- (2) Eat more healthy food, fruit, and vegetables to give my body necessary vitamins and avoid becoming fat (Diet)

Older woman, 65 years, homemaker:

Self-generated goal domains

- (1) Have time for my husband, children, and grandchildren, no war, two grandchildren going to school and the seventh grandchild will be born soon (Time)
- (2) Stay in good health (Health)

Cognitive functioning

- (1) Read a book in addition to the daily newspaper (Reading)
- (2) Write letters (Social contacts)

Physical functioning

- (1) Trips to the surrounding countryside by train or on foot (Discover new things)
- (2) Stay in good health to achieve my goals (Exercising/healthy)

Older man, 65 years, retired:

Self-generated goal domains

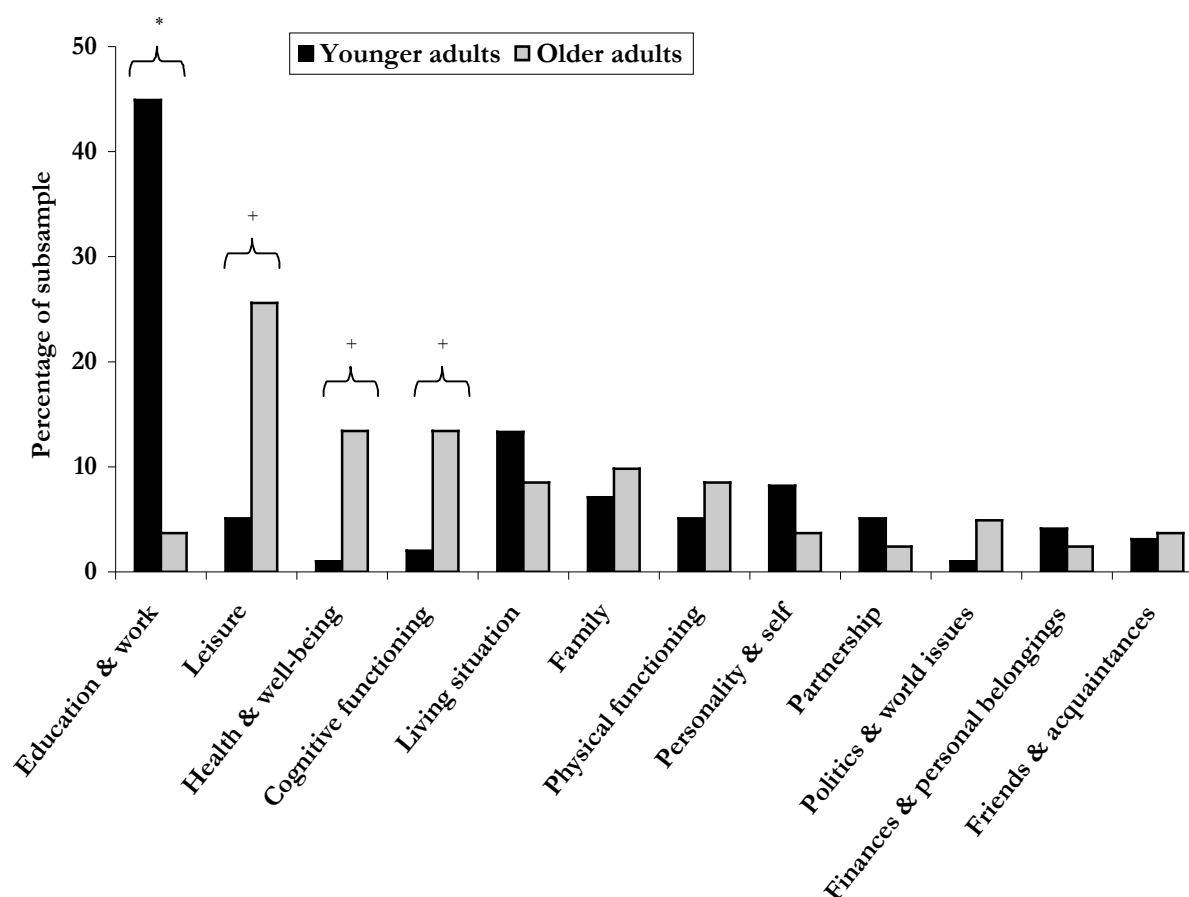
- (1) Continue taking part in intellectual and cultural activities: media, theatre, exhibitions (Mental activities)
- (2) Maintain my physical fitness and do my preferred sporting activities (Physical activity)

Cognitive functioning

- (1) Read a daily and a weekly newspaper, visit a theatre play or an art exhibition twice a month (Cultural activity)
- (2) Continue and finish my former professional scientific activities (Scientific activity)

Physical functioning

- (1) Continue participation in indoor sports twice a week (Indoor sports)
- (2) Continue hiking in the local area, alpine hiking, and climbing (Hiking)



Note. χ^2 -test for age-group differences: + $p < .05$; * $p < .004$ (alpha-level adjustment for 12 repeated analyses)

Figure 4. Study 1: Percentages of goal domains generated by younger and older adults

Personal Goal Orientation in Self-Generated Goals

Based on lifespan developmental theory, Study 1 distinguished between three components of personal goal orientation: (1) *growth*, (2) *maintenance*, and (3) *prevention of loss*. At T1, participants rated each of their six self-generated goals separately on these three dimensions. Growth goal orientation involved being directed toward improving functions or trying to acquire skills. Maintenance goal orientation reflected a focus on conservation of one's functional level. Prevention of loss goal orientation expressed the avoidance of negative outcomes and losses. Table 6 gives the exact wording of the three items on goal orientation as presented in the questionnaire. At T2, participants once again evaluated their orientation toward growth, maintenance, and prevention of loss for each of their goals listed at T1.

There were various reasons for adopting a subjective rating procedure: Subjective ratings of goal orientation avoid external coding procedures, a process that is highly dependent on the raters' interpretation of the short goal-related statements given by respondents. Furthermore, it

allows to find out about the persons' own evaluation of their goal orientation. However, self-report measures have several disadvantages.

Aggregating the ratings on the respective dimensions, I computed separate mean scores as indicators of a person's average goal orientation toward growth, maintenance, and prevention of loss. For each component a general indicator of goal orientation across all six goals as well as domain-specific indicators were calculated. Tables A1–A4 in Appendix A provide descriptive information on these variables in the total sample and in the younger and older sub-samples. As shown in Table 6 Cronbach's α ($.74 \leq \alpha_{T1} \leq .81$ and $.77 \leq \alpha_{T2} \leq .87$) and test–retest-reliabilities ($.66 \leq r_{T1-T2} \leq .77$) were good for goal orientation across the six self-generated goals, but only medium to low for goal orientation relating to cognitive and physical functioning ($.43 \leq \alpha_{T1} \leq .82$, $.47 \leq \alpha_{T2} \leq .82$, and $.53 \leq r_{T1-T2} \leq .70$ respectively).

Personal Goal Orientation of Goals in Various Life Domains

At T1 and T2, the questionnaire assessed participants' goal orientation in their life in general as well as in each of twelve specific life domains (see Appendix A, Box A2). The specific life contexts and the original wording of the items are presented in Table 6.²⁴ Internal consistencies as indicated by Cronbach's α ($.83 \leq \alpha_{T1} \leq .92$ and $.84 \leq \alpha_{T2} \leq .92$) and test–retest-reliabilities ($.79 \leq r_{T1-T2} \leq .82$) were acceptable. Table A5 in Appendix A gives descriptive information on the three dimensions of goal orientation of goals across various life domains in the total sample and in younger and older adults.

Subjective Well-Being

As indicators for subjective well-being at both measurement points, participants responded to instruments assessing various facets of general well-being as well as two indicators of goal-specific satisfaction.

General Subjective Well-Being. To cover various aspects of the multifaceted construct of subjective well-being, participants responded to five different scales. Table 5 provides an overview of these five instruments.

²⁴ Encompassed life domains matched the domains included in the coding scheme that was used to categorize self-generated goal contexts.

Table 5. *Study 1: Instruments Assessing Facets of Well-Being: Overview and Psychometrical Information*

Construct	Description of measurement instrument
<i>Facets of subjective well-being</i>	
T1 & T2	Ryff-Scale (Positive psychological functioning)
	<i>Author:</i> Ryff & Keyes (1995); German translation by Staudinger, Freund et al. (1999)
	<i>Dimensions & Items:</i> 6 dimensions (18 items): Self-acceptance (3), Personal growth (3), Purpose in life (3), Positive relations with others (3), Environmental mastery (3), Autonomy (3)
	<i>Modification:</i> Short version, response options
	<i>Response format:</i> 1 “does not apply at all” to 8 “applies very well”
	<i>Scale aggregation:</i> Mean score after recoding negatively pooled items
	<i>Internal consistency:</i> $\alpha_{T1} = .62, \alpha_{T2} = .73$
	<i>Test–retest-reliability:</i> $r_{T1-T2} = .76$
T1 & T2	Life Evaluation Scale [Skala zur Lebensbewältigung] (Cognitive-subjective life satisfaction)
	<i>Author:</i> Ferring, Filipp, & Schmidt (1996)
	<i>Dimensions & Items:</i> 3 dimensions (15 items): Current life satisfaction (6), Retrospective life satisfaction (4), Prospective life satisfaction (5)
	<i>Modification:</i> Response scale
	<i>Response format:</i> 1 “does not apply at all” to 8 “applies very well”
	<i>Scale aggregation:</i> Mean score after recoding negatively pooled items
	<i>Internal consistency:</i> $\alpha_{T1} = .87, \alpha_{T2} = .91$
	<i>Test–retest-reliability:</i> $r_{T1-T2} = .91$
T1 & T2	Pressure-to-Change Scale [Veränderungsdruckskala] (Desire for general and domain-specific change)
	<i>Author:</i> After Filipp & Ferring (1991)
	<i>Item:</i> Single item: “To what degree do you wish for a change in your life in general (in the domain of ...)?” [German wording: <i>Inwieweit wünschen Sie sich in Ihrem Leben insgesamt (im Bereich ...) eine Veränderung?</i>]
	<i>Modification:</i> Response scale, specific goal domains (exclusion of life domains only relevant in clinical populations)
	<i>Response format:</i> 1 “not at all” to “very much”
	<i>Score aggregation:</i> Mean score across all life domains (life in general, partnership, physical functioning, cognitive functioning, family, health and well-being, personality and self, friends and acquaintances, leisure, finances and personal belongings, education, work, and work-related activities, living situation, politics and world issues)
	<i>Internal consistency:</i> $\alpha_{T1} = .85, \alpha_{T2} = .83$
	<i>Test–retest-reliability:</i> $r_{T1-T2} = .77$
T1 & T2	Positive and Negative Affect Schedule (Emotional well-being)
	<i>Author:</i> Watson, Clark, & Tellegen (1988); German translation by Staudinger, Freund et al. (1999)
	<i>Dimensions & Items:</i> 2 dimension (40 items): Positive affect (20), Negative affect (20)
	<i>Modification:</i> Short version extended by 20 adjectives referring to the dimensions of the <i>Circumplex Model</i> (Watson & Tellegen, 1985), response scale, time frame (last year)
	<i>Response format:</i> 1 “not at all” to 8 “very often”
	<i>Scale aggregation:</i> Mean scores
	<i>Internal consistency:</i> Positive affect: $\alpha_{T1} = .90, \alpha_{T2} = .94$; Negative affect: $\alpha_{T1} = .95, \alpha_{T2} = .95$
	<i>Test–retest-reliability:</i> Positive affect: $r_{T1-T2} = .90$; Negative affect: $r_{T1-T2} = .87$

(Table continues)

Table 5 (continued)

Construct	Description of measurement instrument
T1 & T2	General Depression Scale [Allgemeine Depressions-Skala] (General depressive affect)
	<i>Author:</i> Hautzinger & Bailer (1993)
	<i>Items:</i> 15 items (measuring subjective prevalence of depressive affect, frequency of limitations by depressive affects, physical constraints, motor inhibition, motivational deficits, and negative cognitive styles)
	<i>Modification:</i> Short version, response options, time frame (2 weeks)
	<i>Response format:</i> 1 “very seldom/not at all” to 4 “most/all of the time (5 to 7 days)”
	<i>Scale aggregation:</i> Mean score after recoding negatively pooled items
	<i>Internal consistency:</i> $\alpha_{T1} = .85, \alpha_{T2} = .85$
	<i>Test–retest-reliability:</i> $r_{T1-T2} = .57$

Based on findings of bivariate Pearson correlations ($.42 \leq r_{T2} \leq .76$) presented in Table A7 in Appendix A, I collapsed the \bar{x} -scores of the five facets of well-being into one mean composite score indicating general subjective well-being. In addition, I conducted exploratory factor analyses using principal components extraction with oblimin direct rotation for the total sample and for the younger and older sub-samples. These analyses consistently yielded solutions with one factor (Eigenvalues > 1). The scree test (Cattell, 1966) graphically supported this one-factor solution. It substantially accounted for 65.1% of the variance (younger sample: 62.5%; older sample: 59.1%). Factor loadings ranged from .92 to .69 (younger sample: .92–.63; older sample: .90–.72). Thus, the single factor unambiguously reflected general subjective well-being in the total sample and in the two sub-samples. Table 6 indicates that Cronbach’s α ($\alpha_{T1} = .84$ and $\alpha_{T2} = .89$) and test–retest-reliabilities ($r_{T1-T2} = .92$) of the composite score were good. Table A6 in Appendix A presents additional descriptive information on general subjective well-being and separately for each facet of well-being in the total sample and in younger and older adults.

Goal Satisfaction. In addition to measuring general subjective well-being, I collected information on goal-specific satisfaction. At T1 and T2, participants indicated their satisfaction with goal attainment and their satisfaction with goal progress separately for each of their six self-generated goals. Table 6 provides information on these measures. Internal consistencies ($.68 \leq \alpha_{T1} \leq .78$ and $.75 \leq \alpha_{T2} \leq .79$) and test–retest-reliabilities ($.71 \leq r_{T1-T2} \leq .78$) for both indicators of goal satisfaction were acceptable. Detailed descriptive information on the variables for the total sample and younger and older adults are given in Table A6 in Appendix A.

Table 6. *Study 1: Instruments Assessing the Central Variables: Overview and Psychometrical Information*

Construct	Description of measurement instrument
<i>Generation of personal goals</i>	
T1	Self-generated personal goals
	<i>Author:</i> Modified after B. R. Little (1983)
	<i>Task:</i> List of six personal goals: self-generated domains (2 goals), cognitive domain (2 goals), physical domain (2 goals)
<i>Personal goal orientation in self-generated personal goals</i>	
T1 & T2	Growth
	<i>Author:</i> Newly developed
	<i>Item:</i> Single item: “ <i>With this goal, I would like to improve something or achieve something new.</i> ” [German wording: <i>Ich möchte mit diesem Ziel etwas verbessern oder Neues erreichen.</i>]
	<i>Response format:</i> 1 “ <i>does not apply at all</i> ” to 8 “ <i>applies very well</i> ”
	<i>Score aggregation:</i> Mean scores across all self-generated goals (6 goals), across self-generated domains (2 goals), across cognitive domain (2 goals), across physical domain (2 goals)
	<i>Internal consistency:</i> All self-generated goals: $\alpha_{T1} = .74$, $\alpha_{T2} = .77$; self-generated domains: $\alpha_{T1} = .56$, $\alpha_{T2} = .55$; cognitive domain: $\alpha_{T1} = .59$, $\alpha_{T2} = .70$; physical domain: $\alpha_{T1} = .62$, $\alpha_{T2} = .59$
	<i>Test–retest-reliability:</i> All self-generated goals: $r_{T1-T2} = .66$; self-generated domains: $r_{T1-T2} = .67$; cognitive domain: $r_{T1-T2} = .57$; physical domain: $r_{T1-T2} = .53$
T1 & T2	Maintenance
	<i>Author:</i> Newly developed
	<i>Item:</i> Single item: “ <i>With this goal, I would like to maintain something.</i> ” [German wording: <i>Ich möchte mit diesem Ziel etwas aufrechterhalten.</i>]
	<i>Response format:</i> 1 “ <i>does not apply at all</i> ” to 8 “ <i>applies very well</i> ”
	<i>Score aggregation:</i> Mean scores across all self-generated goals (6 goals), across self-generated domains (2 goals), across cognitive domain (2 goals), across physical domain (2 goals)
	<i>Internal consistency:</i> All self-generated goals: $\alpha_{T1} = .74$, $\alpha_{T2} = .79$; self-generated domains: $\alpha_{T1} = .59$, $\alpha_{T2} = .64$; cognitive domain: $\alpha_{T1} = .43$, $\alpha_{T2} = .47$; physical domain: $\alpha_{T1} = .57$, $\alpha_{T2} = .71$
	<i>Test–retest-reliability:</i> All self-generated goals: $r_{T1-T2} = .70$; self-generated goal domains: $r_{T1-T2} = .67$; cognitive domain: $r_{T1-T2} = .65$; physical domain: $r_{T1-T2} = .64$
T1 & T2	Prevention of loss
	<i>Author:</i> Newly developed
	<i>Item:</i> Single item: “ <i>With this goal, I would like to prevent a loss.</i> ” [German wording: <i>Ich möchte mit diesem Ziel einen Verlust vermeiden.</i>]
	<i>Response format:</i> 1 “ <i>does not apply at all</i> ” to 8 “ <i>applies very well</i> ”
	<i>Score aggregation:</i> Mean scores across all self-generated goals (6 goals), across self-generated domains (2 goals), across cognitive domain (2 goals), across physical domain (2 goals)
	<i>Internal consistency:</i> All self-generated goals: $\alpha_{T1} = .81$, $\alpha_{T2} = .87$; self-generated goal domains: $\alpha_{T1} = .53$, $\alpha_{T2} = .77$; cognitive domain: $\alpha_{T1} = .62$, $\alpha_{T2} = .77$; physical domain: $\alpha_{T1} = .82$, $\alpha_{T2} = .82$
	<i>Test–retest-reliability:</i> All self-generated goals: $r_{T1-T2} = .77$; self-generated goal domains: $r_{T1-T2} = .65$; cognitive domain: $r_{T1-T2} = .67$; physical domain: $r_{T1-T2} = .70$

(Table continues)

Table 6 (continued)

Construct	Description of measurement instrument
<i>Personal goal orientation of goals in various life domains</i>	
T1 & T2 Growth	<p><i>Author:</i> Newly developed</p> <p><i>Item:</i> Single item: “<i>With my goals in my life in general (in the domain of...) I would like to improve something or achieve something new.</i>” [German wording: <i>Mit meinen Zielen in meinem Leben insgesamt (im Bereich ...) möchte ich etwas verbessern oder Neues erreichen.</i>]</p> <p><i>Response format:</i> 1 “<i>does not apply at all</i>” to 8 “<i>applies very well</i>”</p> <p><i>Score aggregation:</i> Mean scores across list of 13 life domains and separate for each domain (life in general, partnership, physical functioning, cognitive functioning, family, health and well-being, personality and self, friends and acquaintances, leisure, finances and personal belongings, education, work, and work-related activities, living situation, politics and world issues)</p> <p><i>Internal consistency:</i> All life domains: $\alpha_{T1} = .83$, $\alpha_{T2} = .84$</p> <p><i>Test–retest-reliability:</i> All life domains: $r_{T1-T2} = .81$</p>
T1 & T2 Maintenance	<p><i>Author:</i> Newly developed</p> <p><i>Item:</i> Single item: “<i>With my goals in my life in general (in the domain of...) I would like to maintain something.</i>” [German wording: <i>Mit meinen Zielen in meinem Leben insgesamt (im Bereich ...) möchte ich etwas aufrechterhalten.</i>]</p> <p><i>Response format:</i> 1 “<i>does not apply at all</i>” to 8 “<i>applies very well</i>”</p> <p><i>Score aggregation:</i> Mean scores across list of 13 life domains and separate for each domain (see above)</p> <p><i>Internal consistency:</i> All life domains: $\alpha_{T1} = .85$, $\alpha_{T2} = .87$</p> <p><i>Test–retest-reliability:</i> All life domains: $r_{T1-T2} = .82$</p>
T1 & T2 Prevention of loss	<p><i>Author:</i> Newly developed</p> <p><i>Item:</i> Single item: “<i>With my goals in my life in general (in the domain of...) I would like to prevent a loss.</i>” [German wording: <i>Mit meinen Zielen in meinem Leben insgesamt (im Bereich ...) möchte ich einen Verlust vermeiden.</i>]</p> <p><i>Response format:</i> 1 “<i>does not apply at all</i>” to 8 “<i>applies very well</i>”</p> <p><i>Score aggregation:</i> Mean scores across list of 13 life domains and separate for each domain (see above)</p> <p><i>Internal consistency:</i> All life domains: $\alpha_{T1} = .92$, $\alpha_{T2} = .92$</p> <p><i>Test–retest-reliability:</i> All life domains: $r_{T1-T2} = .79$</p>

(Table continues)

Table 6 (continued)

Construct	Description of measurement instrument
<i>General subjective well-being</i>	
T1 & T2	General subjective well-being
	<i>Scales & Authors:</i> Ryff-Scale (Ryff & Keyes, 1995), Life Evaluation Scale (Ferring et al., 1996), Pressure-to-Change Scale (after Filipp & Ferring, 1991), Positive and Negative Affect Schedule (Watson et al. 1988), General Depression Scale (Hautzinger & Bailer, 1993); see Table 5
	<i>Scale aggregation:</i> Mean score after z -standardization: (1) Positive psychological functioning, (2) Cognitive-subjective life satisfaction, (3) Desire for change (reflected), (4) Positive and negative (reflected) emotional well-being, (5) General depressive affect (reflected)
	<i>Internal consistency:</i> $\alpha_{T1} = .84, \alpha_{T2} = .89$
	<i>Test-retest-reliability:</i> $r_{T1-T2} = .92$
<i>Goal satisfaction</i>	
T1 & T2	Satisfaction with goal attainment
	<i>Author:</i> Modified after B. R. Little (1983)
	<i>Item:</i> Single item: “When I reach this goal, I will be happy.” [German wording: <i>Wenn ich dieses Ziel erreiche, bin ich glücklich.</i>]
	<i>Response format:</i> 1 “does not apply at all” to 8 “applies very well”
	<i>Score aggregation:</i> Mean score across all self-generated goals (6 goals)
	<i>Internal consistency:</i> $\alpha_{T1} = .78, \alpha_{T2} = .79$
	<i>Test-retest-reliability:</i> $r_{T1-T2} = .71$
T1 & T2	Satisfaction with goal progress
	<i>Author:</i> Modified after Brandtstädter (1984b)
	<i>Item:</i> Single item: “With respect to this specific goal, how satisfied are you currently with yourself and your development?” [German wording: <i>Inwiefern sind Sie gegenwärtig im Hinblick auf dieses Ziel mit sich und Ihrer Entwicklung zufrieden?</i>]
	<i>Modification:</i> Response options, time frame
	<i>Response format:</i> 1 “very dissatisfied” to 8 “very satisfied”
	<i>Score aggregation:</i> Mean score across all self-generated goals (6 goals)
	<i>Internal consistency:</i> $\alpha_{T1} = .68, \alpha_{T2} = .75$
	<i>Test-retest-reliability:</i> $r_{T1-T2} = .78$

Correlate and Control Variables

In addition to responding to the central variables of this study, participants completed a set of questionnaires on correlate and control variables over the two sessions. Detailed descriptive information on these variables in the total sample and the younger and older sub-samples are presented in Tables A8 and A9 in Appendix A.

Concepts of Self-Regulation, Goal Resources, and Additional Goal Characteristics. Participants responded to questions on several concepts of self-regulation: (1) the life-management strategies of elective selection, loss-based selection, optimization, and compensation, (2) proactive and preventive coping styles, and (3) tenacious goal pursuit and flexible goal adjustment. Table A10 in Appendix A summarizes these measures. Internal consistencies were acceptable, with the

exception of elective selection, loss-based selection, optimization, and compensation displaying low internal consistencies ($.40 \leq \alpha \leq .78$).

Study 1 assessed various information on goal resources: (1) two indicators of objective cognitive functioning (knowledge and perceptual-motor speed), (2) objective physical functioning (grip strength), (3) subjective cognitive functioning, (4) subjective health, (5) general subjective resources, (6) expectation of goal-specific resource demands, and (7) subjective availability of goal-specific resources. An overview of these measures is presented in Table A10 in Appendix A. Internal consistencies were acceptable ($.60 \leq \alpha_{T1} \leq .87$ and $.76 \leq \alpha_{T2} \leq .77$). Where available, test–retest stabilities were moderate to low ($.19 \leq r_{T1-T2} \leq .42$).

At T1 and T2, participants evaluated each of their goals with respect to seven additional goal features: (1) importance of their goal, (2) recent approach and close distance to goal attainment²⁵, (3) state satisfaction before goal setting, (4) goal-related future orientation, (5) goal engagement, (6) concreteness of goal attainment, and (7) control over goal attainment. Table A10 in Appendix A gives information on these items. Cronbach's α ($.60 \leq \alpha_{T1} \leq .80$ and $.67 \leq \alpha_{T2} \leq .85$) and test–retest-reliabilities were acceptable ($.60 \leq r_{T1-T2} \leq .74$).

Person Control Variables. Here, (1) the tendency to respond in socially desirable ways, (2) the five personality traits of neuroticism, extraversion, openness to new experiences, agreeableness, and conscientiousness, (3) dispositional optimism and pessimism, (4) generalized perceived self-efficacy, and (5) agency beliefs were measured. Table A11 in Appendix A presents these scales. Cronbach's α were satisfactory with the exception of extraversion, openness, and agreeableness displaying low internal consistencies ($.18 \leq \alpha_{T1} \leq .91$).

Study 1: Results

The presentation of the results is structured along the three main research aims of Study 1. First, the three dimensions of personal goal orientation are described in terms of their interrelatedness. Second, age-related differences in goal orientation of self-generated goals and of goals in various life domains are reported. The section closes by presenting age-group differences in the associations between goal orientation and general subjective well-being as well as goal-specific satisfaction.

²⁵ As these two items were highly correlated ($r_{T1} = .73, p < .05$), I collapsed them into one composite score indicating 'goal progress'.

Description of Goal Orientation Toward Growth, Maintenance, and Prevention of Loss

Interrelatedness of Goal Orientation Toward Growth, Maintenance, and Prevention of Loss

Are growth, maintenance, and prevention of loss separate components of personal goal orientation or are they interrelated? Table 7 presents bivariate Pearson correlations (at T1) and two-week test–retest stabilities of the three dimensions of goal orientation. The table contains information on the different composite scores of goal orientation, respectively (i.e., across all six self-generated goals, across two goals referring to self-generated goal domains, across two cognitive functioning goals, across two physical functioning goals, and across the list of various life domains). All bivariate correlations were tested for age-group differences after Fisher’s Z-transformation (see J. Cohen & Cohen, 1975).²⁶ Unless otherwise indicated, they were not different at the level of $p < .05$.

The test–retest stabilities were high for all three dimensions of goal orientation. In cases of age-group differences in the test–retest correlations, younger adults showed higher temporal stabilities than older adults. The high test–retest stabilities suggest that personal goal orientation as conceptualized in this study was stable over time, which may imply dispositional aspects. Growth goal orientation did not correlate with goal orientation toward maintenance or prevention of loss and hence seems to capture an independent aspect of the construct. There was one exception to this: Goal orientation toward growth and maintenance across the two goals referring to self-generated domains revealed a moderate negative correlation. The interrelations between maintenance and prevention of loss were consistently high across goal contexts and within the specific domains of cognitive and physical functioning in the total sample and separate for the two age groups. This suggests that maintenance and prevention of loss measure overlapping aspects of personal goal orientation.

For a supplement to this conclusion, exploratory factor analyses using principal components extraction with oblimin, direct rotation for the total sample and for the younger and older sub-samples were run. The analyses consistently yielded solutions with two factors (Eigenvalues ≥ 1) and small factor correlations ($r_{\text{total}} = -.11$; $r_{\text{younger}} = .14$; $r_{\text{older}} = -.15$). The scree test graphically supported these findings. The two-factor solution substantially accounted for 87.0% of the variance (younger adults: 86.5%; older adults: 85.2%). With factor loadings of $\geq .40$, these two factors unambiguously reflected goal orientation toward growth and maintenance–prevention of loss in the total sample as well as in the younger and older sub-samples.

²⁶ Fisher’s Z-transformation (Bortz, 1999): $Z_1 = 0.5 \times \ln((1 + r_1) / (1 - r_1))$; $Z_2 = 0.5 \times \ln((1 + r_2) / (1 - r_2))$; Significance test for differences in independent correlations: $z = (Z_1 - Z_2) / \sigma_{Z_1 - Z_2}$, with: $\sigma_{Z_1 - Z_2} = \sqrt{1 / (n_1 - 3) + 1 / (n_2 - 3)}$; n_1, n_2 size of samples; r_1, r_2 correlations in samples.

Table 7. *Study 1: Bivariate Pearson Correlations (at T1) and Two-Week Test–Retest Stabilities (Diagonal) of Goal Orientation Toward Growth, Maintenance, and Prevention of Loss*

Goal orientation ^(a)	Growth <i>r</i>	Maintenance <i>r</i>	Prevention of loss <i>r</i>
<i>Across all self-generated goals (6 goals)</i>			
Growth	.66*		
Maintenance	-.13	.70*^(c)	
Prevention of loss	-.07	.61*	.77*
<i>Across self-generated domains (2 goals)</i>			
Growth	.67*		
Maintenance	-.32*	.67*	
Prevention of loss	-.21 ⁺	.58*	.65*^(d)
<i>Across cognitive domain (2 goals)</i>			
Growth	.57*		
Maintenance	-.09	.65*	
Prevention of loss	-.15	.50*	.67*^(e)
<i>Across physical domain (2 goals)^(b)</i>			
Growth	.53*^(f)		
Maintenance	-.11	.64*	
Prevention of loss	.09	.60*	.70*
<i>Across goals in list of life domains (13 domains)</i>			
Growth	.81*		
Maintenance	-.15	.82*^(g)	
Prevention of loss	-.00	.66*	.79*

Notes. ⁺ $p < .05$; * $p < .003$ (alpha-level adjustment for 15 repeated analyses). Reanalyzing the data using Spearman's rho (rank correlations) yielded the same results. Test–retest correlations are presented in the diagonal.

^(a) Refers to composite score across all self-generated goals (6 goals), across self-generated domains (2 goals), across cognitive domain (2 goals), across physical domain (2 goals), or across goals in list of life domains (13 domains), respectively.

^(b) As one younger woman did not report any physical functioning goals, the sample size reduced to $N = 89$ in the respective analyses.

^(c) Age-group difference: $r_{\text{younger}} = .71^*$; $r_{\text{older}} = .42^+$

^(d) Age-group difference: $r_{\text{younger}} = .76^*$; $r_{\text{older}} = .47^*$

^(e) Age-group difference: $r_{\text{younger}} = .73^*$; $r_{\text{older}} = .46^*$

^(f) Age-group difference: $r_{\text{younger}} = .72^*$; $r_{\text{older}} = .41^+$

^(g) Age-group difference: $r_{\text{younger}} = .86^*$; $r_{\text{older}} = .67^*$

To explore the relations between goal orientation across all six self-generated goals and various concepts of self-regulation, goal resources, and additional goal characteristics, I calculated bivariate Pearson correlations. After Z -transformation, all correlations were tested for significant differences between the three dimensions using tests for differences in dependent correlations.²⁷ In addition, each correlation was tested for age-group differences using tests for differences in independent correlations at the level of $p < .05$. As Table A12 in Appendix A summarizes, the differential association pattern suggested that the three components of goal orientation were differentially related to some of the self-regulative variables, indicators of goal resources, and

²⁷ Significance test for differences in dependent correlations (Bortz, 1999): $\chi = \sqrt{(n-3)} \times (Z_{ab} - Z_{ac}) / \sqrt{(2 - 2 \times cov_1)}$, with: Z_{ab} , Z_{ac} Fisher's Z -transformed correlations r_{ab} , r_{ac} ; n size of the sample; cov_1 covariance of correlations r_{ab} , r_{ac} .

additional goal characteristics. To highlight a few of these associations, there was a positive relation between maintenance goal orientation and preventive coping style. This positive association did not hold for growth goal orientation. A negative relation between performance in perceptual-motor speed task and maintenance goal orientation emerged. This did not hold for growth or prevention of loss. There is a stronger orientation toward maintenance or loss-prevention compared to growth when possessing fewer resources in terms of perceptual-motor speed. However, the data did not prove general relations between amounts of goal resources and growth, maintenance, or prevention of loss goal orientation. It is possible that participants only reported goals they had enough resources to pursue, relatively independently of their respective goal orientation. Finally, stronger orientation toward maintenance as compared to growth and prevention of loss was positively related to goal progress, goal engagement, and higher levels of goal concreteness. This suggests that different goal orientations differ in terms of some additional goal features. However, one needs to be very cautious when interpreting these results as several of the correlate variables displayed rather low reliabilities (see Table A10 in Appendix A; cf. John & Benet-Martínez, 2000; Tabachnick & Fidell, 1996).

Personal Goal Orientation in Younger and Older Adults

Age-Group Differences in Personal Goal Orientation of Self-Generated Goals

The present research hypothesized that there are age-group differences in the goal orientation of self-reported personal goals. I proposed that younger adults primarily focused on growth, whereas older adults oriented their goals toward maintenance and prevention of loss. These age-related differences were expected to exist across all six self-reported goals, across the two goals relating to self-generated domains, and the two cognitive as well as the two physical functioning goals. To investigate these hypotheses, I conducted analyses in two steps: First, the *overall multivariate effects* were tested. Second, *follow-up analyses* comprising specific *between-* as well as *within-age-group* differences relevant to test my hypotheses were run.

A 2 (age group: younger vs. older) x 3 (goal orientation: growth vs. maintenance vs. prevention of loss) x 3 (goal domain: self-generated vs. cognitive vs. physical) repeated-measures ANOVA with goal orientation and goal domain as the two within-subject factors revealed significant main effects for age group ($F_{(1, 87)} = 5.75$, $MSE = 64.88$, $p < .05$, $\eta^2 = .06$), goal orientation (Wilks' $\lambda = .16$, $F_{(2, 86)} = 8.16$, $p < .05$, $\eta^2 = .16$), and goal domain (Wilks' $\lambda = .08$, $F_{(2, 86)} = 3.77$, $p < .05$, $\eta^2 = .08$).²⁸ The goal orientation x age group (Wilks' $\lambda = .22$, $F_{(2, 86)} = 11.79$, $p <$

²⁸ As one younger woman did not list any physical goals, the respective analyses were based on a reduced sample size ($N = 89$).

.05, $\eta^2 = .22$) and the goal domain x goal orientation interaction (Wilks' $\lambda = .20$, $F_{(4, 84)} = 5.13$, $p < .05$, $\eta^2 = .20$) proved significant. Finally, the analysis yielded a significant goal orientation x goal domain x age group three-way interaction (Wilks' $\lambda = .18$, $F_{(4, 84)} = 4.60$, $p < .05$, $\eta^2 = .18$). All other interactions were not significant.^{29,30}

Between-age-group comparisons. To understand the goal orientation x age group and the goal orientation x goal domain x age group interaction, 2 (age group) x 3 (goal orientation) multivariate analyses of variance (MANOVAs) followed by univariate ANOVAs across all domains and separately across the two goals referring to self-generated domains, the two cognitive, and the two physical functioning goals were run.^{31, 32, 33} Figures 5 to 8 and Table 8 summarize the results of the between-age-group differences in goal orientation across all self-generated goals and separately across the two goals referring to self-generated domains, the two cognitive, and the two physical functioning goals.

As expected, across all six self-reported goals older adults reported a stronger orientation toward maintenance and prevention of loss than younger adults. With respect to the goals relating to self-generated domains, younger adults showed a stronger focus on growth and a less strong orientation toward maintenance than older adults. In the cognitive domain, the two age groups differed in all three dimensions: Younger adults indicated a stronger goal orientation toward growth, whereas maintenance and prevention of loss increased in old age. Unexpectedly, there were no age-group differences in the goal orientation of physical goals.³⁴

²⁹ The Box's M test of homogeneity of variance–covariance matrices was significant ($F_{(45, 23609)} = 1.44$, $p < .05$).

³⁰ The Mauchly test indicated violation of the sphericity assumption for goal orientation ($p < .05$) and goal orientation x goal domain ($p < .05$). The Greenhouse-Geisser correction indicated that departures from sphericity were tolerable ($\epsilon = .85$; $\epsilon = .84$, respectively) and did not alter the results ($F_{(1.71, 148.46)} = 11.53$, $p < .05$; $F_{(3.34, 290.77)} = 6.93$, $p < .05$, respectively).

³¹ Levene's test ($p < .05$) indicated departures from the assumption of equality of error variances in the two age groups in several cases: growth goal orientation across all self-generated goals, growth and maintenance goal orientation across self-generated domains, and growth goal orientation across cognitive functioning goals.

³² Reanalyzing the data with the Mann-Whitney U test for two independent samples showed the same results: (1) All self-generated goals: $U_{\text{Growth}} = 757.5$, $p < .05$; $U_{\text{Prevention of loss}} = 659.0$, $p < .05$; (2) self-generated goal domains: $U_{\text{Growth}} = 639.0$, $p < .05$; $U_{\text{Maintenance}} = 448.0$, $p < .05$; $U_{\text{Prevention of loss}} = 789.0$, n.s.; (3) cognitive domain: $U_{\text{Growth}} = 718.5$, $p < .05$; (4) physical domain $U_{\text{Growth}} = 945.0$, n.s.; $U_{\text{Maintenance}} = 735.5$, $p < .05$; $U_{\text{Prevention of loss}} = 713.0$, $p < .05$.

³³ The Box's M test of homogeneity of variance–covariance matrices was significant in the analysis relating to self-generated goal domains ($F_{(6, 51484)} = 2.91$, $p < .05$) and the analysis relating to cognitive functioning ($F_{(6, 51484)} = 2.30$, $p < .05$).

³⁴ The findings on age-related differences in goal orientation across all self-generated goals were replicated at T2: A 2 (age group: younger vs. older) x 3 (goal orientation: growth vs. maintenance vs. prevention of loss) x 3 (goal domain: self-generated vs. cognitive vs. physical) repeated-measures ANOVA with goal orientation and goal domain as the two within-subject factors showed a main effect for age group ($F_{(1, 87)} = 9.04$, $MSE = 92.39$, $p < .05$, $\eta^2 = .09$), goal orientation (Wilks' $\lambda = .79$, $F_{(2, 86)} = 11.75$, $p < .05$, $\eta^2 = .22$), and goal domain (Wilks' $\lambda = .93$, $F_{(2, 86)} = 3.22$, $p < .05$, $\eta^2 = .07$). The goal orientation x age group (Wilks' $\lambda = .77$, $F_{(2, 86)} = 12.97$, $p < .05$, $\eta^2 = .23$) and the goal domain x goal orientation interaction (Wilks' $\lambda = .84$, $F_{(4, 84)} = 4.01$, $p < .05$, $\eta^2 = .16$) proved significant. All other interactions did not reach significance. Tables A13 and A14 in Appendix A summarize the results of the multi- and univariate follow-up analyses.

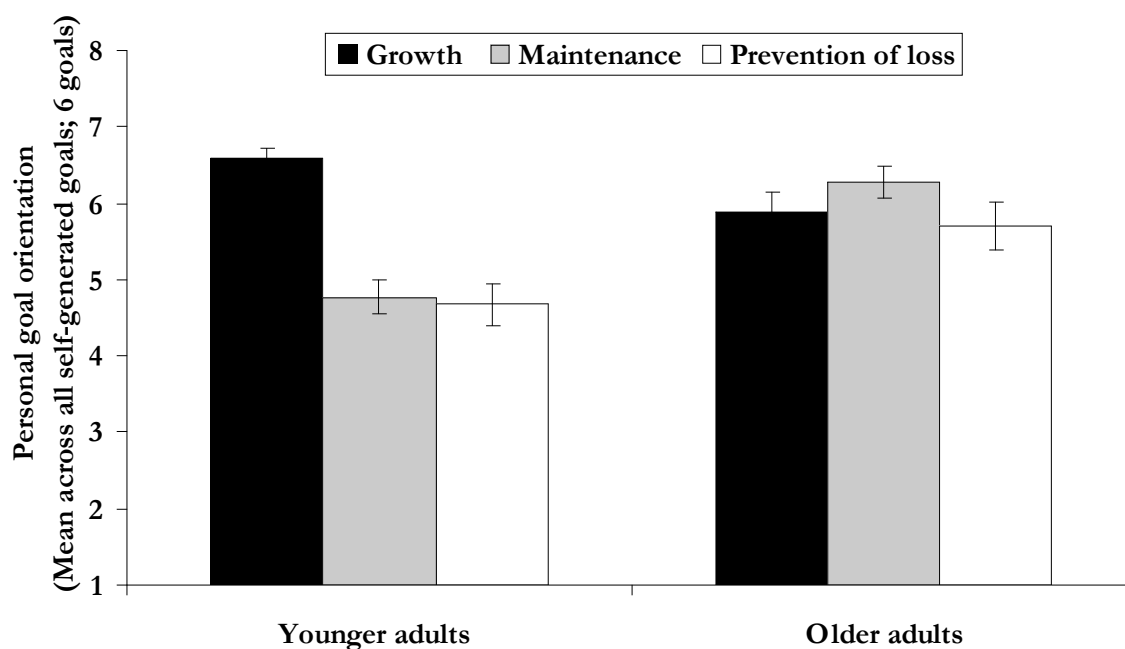


Figure 5. Study 1: Between-age-group differences in personal goal orientation across all self-generated goals (6 goals; T1)

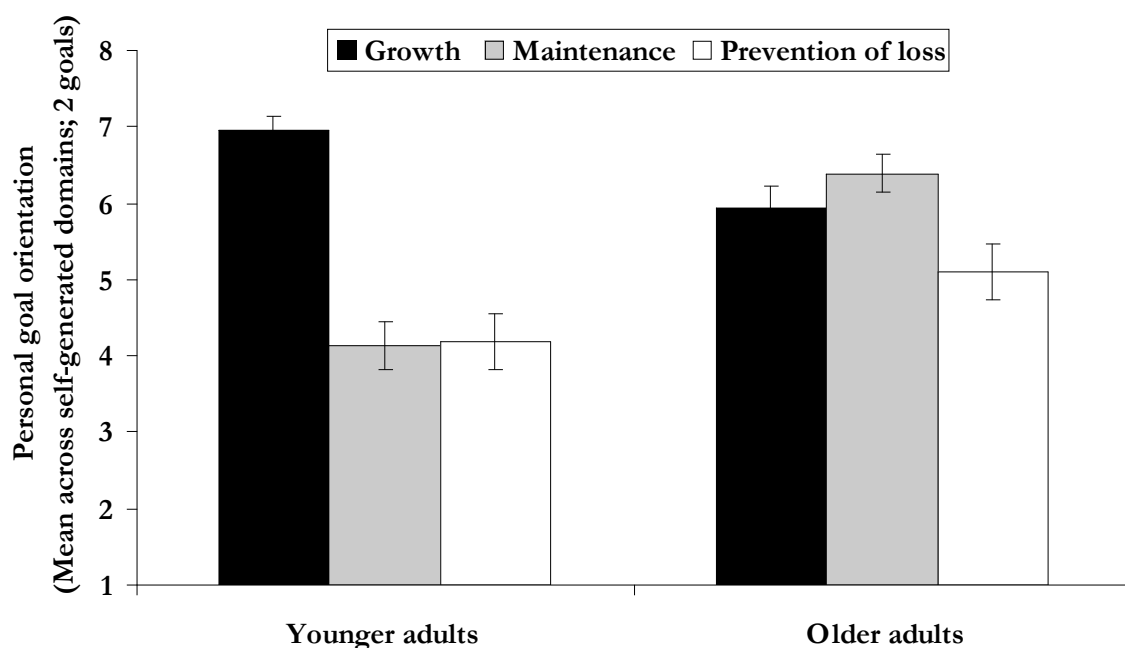


Figure 6. Study 1: Between-age-group differences in personal goal orientation across two self-generated domains (2 goals; T1)

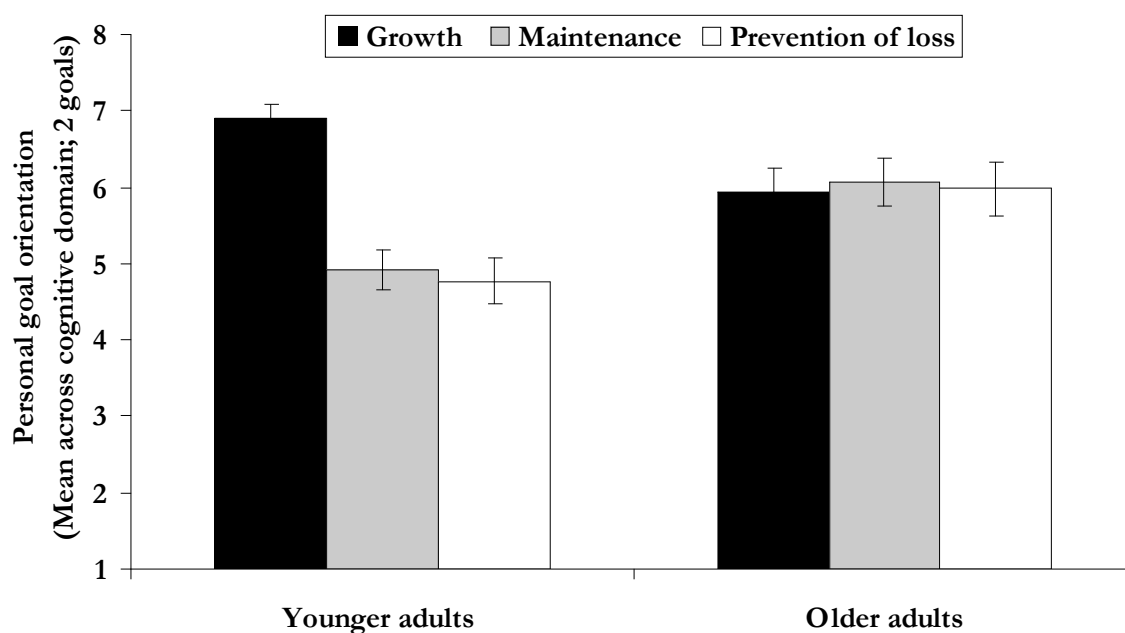


Figure 7. Study 1: Between-age-group differences in personal goal orientation across cognitive domain (2 goals; T1)

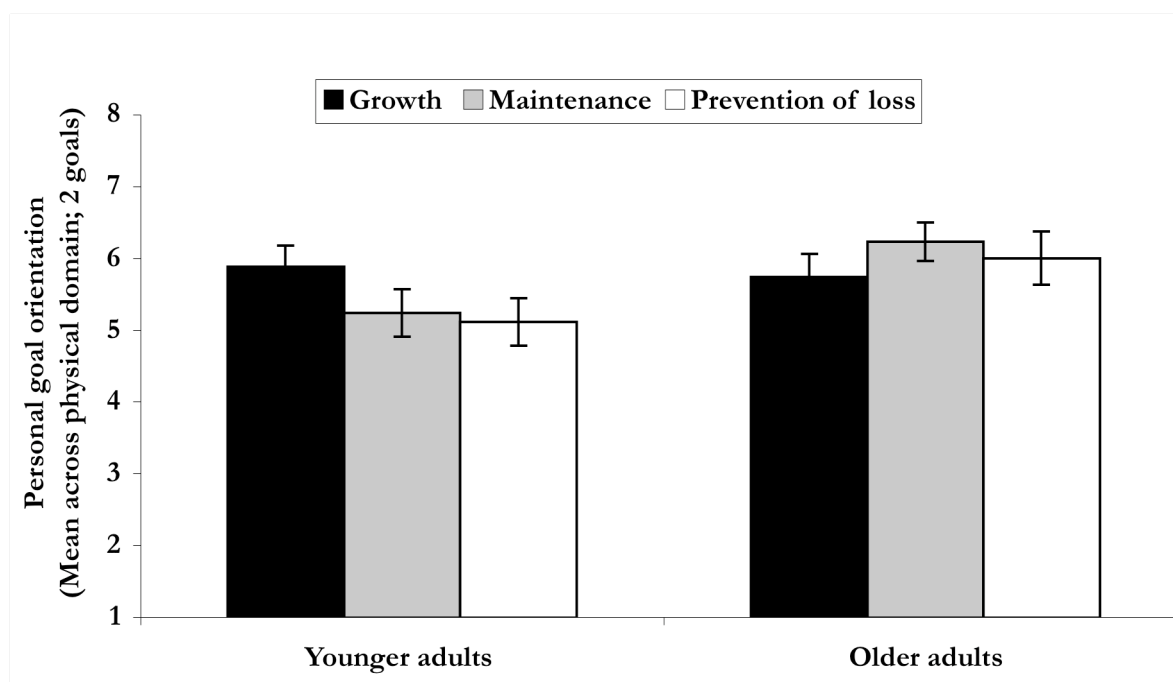


Figure 8. Study 1: Between-age-group differences in personal goal orientation across physical domain (2 goals; T1)

Table 8. *Study 1: Between-Age-Group Differences in Personal Goal Orientation of Self-Generated Goals (T1): Multi- and Univariate Follow-Up Analyses*

Goal orientation ^(a)	<i>F</i> ^(b)	<i>MSE</i>	η^2
<i>Across all self-generated goals (6 goals)</i>			
Growth	5.72 ⁺	10.83	.06
Maintenance	22.17*	50.09	.20
Prevention of loss	6.34*	23.64	.07
Wilks' $\lambda = .76$, $F_{(3, 86)} = 8.93$, $p < .01$, $\eta^2 = .24$			
<i>Across self-generated domains (2 goals)</i>			
Growth	9.55*	23.79	.10
Maintenance	28.78*	112.74	.25
Prevention of loss	3.05	18.23	.03
Wilks' $\lambda = .71$, $F_{(3, 86)} = 11.79$, $p < .01$, $\eta^2 = .29$			
<i>Across cognitive domain (2 goals)</i>			
Growth	8.17*	20.97	.09
Maintenance	7.55*	29.77	.08
Prevention of loss	7.18*	32.70	.08
Wilks' $\lambda = .83$, $F_{(3, 86)} = 5.70$, $p < .01$, $\eta^2 = .17$			
<i>Across physical domain (2 goals)</i>			
Growth	n.a.	n.a.	n.a.
Maintenance	n.a.	n.a.	n.a.
Prevention of loss	n.a.	n.a.	n.a.
Wilks' $\lambda = .94$, $F_{(3, 85)} = 1.84$, n.s., $\eta^2 = .06$, $1 - \beta = .46$			

Notes. ⁺ $p < .05$; * $p < .01$ (alpha-level adjustment for 4 repeated analyses); n.a. = not applicable

^(a) Refers to composite score across all self-generated goals (6 goals), across self-generated domains (2 goals), across cognitive domain (2 goals), or across physical domain (2 goals), respectively.

^(b) *F*-values with 1, 88 degrees of freedom across all self-generated goals, across self-generated domains, across cognitive domain; *F*-values with 1, 87 degrees of freedom across physical domain, as one younger person did not report any physical functioning goals and was therefore dropped from all respective analyses.

Within-age-group comparisons. To test whether younger adults reported a primary orientation toward growth, whereas older adults primarily oriented their goals toward maintenance and prevention of loss, I conducted within-age-group comparisons on the three components of goal orientation across all self-generated goals and separately across the two goals referring to self-generated domains, the two cognitive and the two physical functioning goals.

(a) *Across all self-generated goals (6 goals).* Repeated-measures ANOVAs conducted separately for younger and older adults showed that the effect of the within-subject factor in the younger age group was significant (Wilks' $\lambda = .47$, $F_{(2, 47)} = 26.88$, $p < .01$, $\eta^2 = .53$). In the older subsample, however, the within-factor did not reach significance (Wilks' $\lambda = .87$, $F_{(2, 39)} = 2.83$, n.s.,

$\eta^2 = .13$, $1 - \beta = .52$).³⁵ For younger adults, paired-samples t-tests then tested within-group mean differences in each of the respective pairs of goal orientation toward growth, maintenance, and prevention of loss. As Table 9 shows, younger adults reported a stronger goal orientation toward growth than toward maintenance and prevention of loss.³⁶

(b) *Across self-generated domains (2 goals)*. Repeated-measures ANOVAs separately conducted for younger and older adults yielded significance of the within-subject effects in both age groups (Wilks' $\lambda = .48$, $F_{(2, 47)} = 25.79$, $p < .01$, $\eta^2 = .52$ and Wilks' $\lambda = .66$, $F_{(2, 39)} = 9.92$, $p < .01$, $\eta^2 = .34$, respectively).³⁷ Paired-samples t-tests found that younger adults had a primary goal orientation toward growth, whereas older adults focused more on maintenance than on prevention of loss (see Table 9).³⁸

(c) *Across cognitive domain (2 goals)*. Repeated-measures ANOVAs run separately in each of the age groups revealed a significant effect of goal orientation in cognitive functioning goals in the younger (Wilks' $\lambda = .48$, $F_{(2, 47)} = 25.78$, $p < .01$, $\eta^2 = .52$) but not in the older group (Wilks' $\lambda = 1.0$, $F_{(2, 39)} = .06$, n.s., $\eta^2 = .00$, $1 - \beta = .06$). As shown in Table 9, paired-samples t-tests found that younger adults primarily oriented their cognitive functioning goals toward growth.³⁹

(d) *Across physical domain (2 goals)*. Age-separate repeated-measures ANOVAs indicated that neither younger (Wilks' $\lambda = .94$, $F_{(2, 46)} = 1.58$, n.s., $\eta^2 = .06$, $1 - \beta = .32$) nor older adults (Wilks' $\lambda = .97$, $F_{(2, 39)} = .70$, n.s., $\eta^2 = .03$, $1 - \beta = .16$) differed in their goal orientation.⁴⁰ Thus, unexpectedly, neither younger nor older adults showed a primary goal orientation in their physical functioning goals.

Summarizing the data suggests that the expected age-associated differences in personal goal orientation existed with the exception of the physical functioning domain. Younger adults reported a primary goal orientation toward growth, whereas goal orientation toward maintenance and prevention of loss tended to be more salient in late adulthood. The following section aimed

³⁵ The Mauchly test indicated violation of the sphericity assumption in the older sample ($p < .05$). The Greenhouse-Geisser correction indicated that departure from sphericity was tolerable ($\epsilon = .77$) and supported the non-significant finding ($F_{(1.54, 61.76)} = 1.33$, n.s.).

³⁶ Reanalyzing the data with the Wilcoxon's Signed-Ranks test for two related samples did not alter the results for younger adults ($Z_{\text{Growth/Maintenance}} = -5.02$, $p < .016$; $Z_{\text{Growth/Prevention of loss}} = -5.22$, $p < .016$; $Z_{\text{Maintenance-Prevention of loss}} = -.84$, n.s.).

³⁷ The Greenhouse-Geisser correction for departures from sphericity in the older sub-sample was tolerable ($\epsilon = .73$) and did not alter the results ($F_{(1.47, 58.73)} = 4.86$, $p < .01$).

³⁸ Reanalyzing the data with the Wilcoxon's Signed-Ranks test for two related samples did not alter the results for younger ($Z_{\text{Growth/Maintenance}} = -4.84$, $p < .016$; $Z_{\text{Growth/Prevention of loss}} = -4.89$, $p < .016$; $Z_{\text{Maintenance/Prevention of loss}} = -.11$, n.s.) and older adults ($Z_{\text{Growth/Maintenance}} = -1.08$, n.s.; $Z_{\text{Growth/Prevention of loss}} = -1.85$, n.s.; $Z_{\text{Maintenance/Prevention of loss}} = -3.73$, $p < .016$).

³⁹ Reanalyzing the data with the Wilcoxon's Signed-Ranks test for two related samples did not alter the results for younger adults ($Z_{\text{Growth/Maintenance}} = -5.09$, $p < .016$; $Z_{\text{Growth/Prevention of loss}} = -5.02$, $p < .016$; $Z_{\text{Maintenance/Prevention of loss}} = -.58$, n.s.).

⁴⁰ The Greenhouse-Geisser correction for departures from sphericity in the younger sub-sample was acceptable ($\epsilon = .76$) and yielded the same non-significant results ($F_{(1.52, 71.33)} = 2.10$, n.s.).

at testing the stability of these age-group differences when controlling for education, sex, and various person characteristics as rival predictors.

Table 9. *Study 1: Within-Age-Group Differences in Personal Goal Orientation of Self-Generated Goals (T1): Paired-Sample t-Test Follow-Up Analyses*

Goal orientation ^(a)	Growth	Maintenance	Prevention of loss
<i>Across all self-generated goals (6 goals)</i>			
Growth		$t_{(48)} = 6.78^*$	$t_{(48)} = 6.69^*$
Maintenance	n.a.		$t_{(48)} = .43$
Prevention of loss	n.a.	n.a.	
<i>Across self-generated domains (2 goals)</i>			
Growth		$t_{(48)} = 6.78^*$	$t_{(48)} = 6.68^*$
Maintenance	$t_{(40)} = -1.15$		$t_{(48)} = -.16$
Prevention of loss	$t_{(40)} = 1.58$	$t_{(40)} = 4.25^*$	
<i>Across cognitive domain (2 goals)</i>			
Growth		$t_{(48)} = 6.69^*$	$t_{(48)} = 6.26^*$
Maintenance	n.a.		$t_{(48)} = .53$
Prevention of loss	n.a.	n.a.	

Notes. * $p < .016$ (alpha-level adjustment for 3 repeated analyses); n.a. = not applicable. Results for younger adults are printed above the diagonal and results for older adults below the diagonal.

^(a) Refers to composite score across all self-generated goals (6 goals), across self-generated domains (2 goals), and across cognitive domain (2 goals), respectively.

Control Analyses: Education, Sex, and Person Variables. I selected educational level, sex, and several person characteristics as control variables because one can assume that they serve as alternative predictors of differences in personal goal orientation, independently of chronological age. One can argue that the higher a person's educational status, the stronger his or her growth goal orientation may be. Moreover, based on research in the context of risk taking (Byrnes, Miller, & Schafer, 1999), it seems plausible that men in general could be more growth-oriented than women. Finally, individuals who score high in neuroticism, for instance, may also have the tendency to report a stronger goal orientation toward prevention of loss in the sense of a focus on negative outcomes.

Goal orientation toward growth (primary and lower secondary: $M = 6.46$, $SE = .19$; higher secondary: $M = 6.11$, $SE = .22$), maintenance (primary and lower secondary: $M = 5.57$, $SE = .26$; higher secondary: $M = 5.36$, $SE = .24$), and prevention of loss (primary and lower secondary: $M = 5.57$, $SE = .27$; higher secondary: $M = 4.82$, $SE = .30$) was not different for participants with different educational status and participants with higher secondary education (Wilks' $\lambda = .94$, $F_{(3)}$,

$s_4) = 1.84$, n.s., $\eta^2 = .06$, $1 - \beta = .46$).⁴¹ Men and women did not differ in their goal orientation toward growth (men: $M = 6.21$, $SE = .23$; women: $M = 6.30$, $SE = .20$), maintenance (men: $M = 5.48$, $SE = .24$; women: $M = 5.42$, $SE = .26$), and prevention of loss (men: $M = 5.16$, $SE = .30$; women: $M = 5.11$, $SE = .30$; Wilks' $\lambda = 1.00$, $F_{(3, 84)} = .03$, n.s., $\eta^2 = .00$, $1 - \beta = .06$).⁴² Table 10 presents the Pearson correlations between the three components of goal orientation across all self-generated goals and several person variables. None of these correlations reached significance after adjusting the alpha-level to the multiple testing criteria. Several associations were significantly different ($p < .05$) in both age groups as tested using Fisher's Z-transformation and significance test for two independent correlations. In these cases, Table 10 shows the bivariate correlations separately for younger and older adults.

Table 10. *Study 1: Bivariate Associations Between Personal Goal Orientation (T1; Across All Self-Generated Goals) and Several Person Control Variables*

Construct	Growth <i>r</i>	Maintenance <i>r</i>	Prevention of loss <i>r</i>
<i>Person variables</i>			
Social desirability	-.02	.24 ⁺	.03
Personality traits			
Neuroticism	.26 ⁺	-.13 ^(a)	-.02 ^(b)
Extraversion	.16	.05	-.02
Openness	-.12	-.13	-.12
Agreeableness	-.13	.07	.12 ^(c)
Conscientiousness	-.12	.16 ^(d)	-.03 ^(e)
Generalized outcome expectancies			
Optimism	-.10 ^(f)	.18 ^(g)	.14
Pessimism	.14	-.02	.12 ^(h)
Generalized self-efficacy	.01	.16	.01
Agency beliefs	-.02	.05 ⁽ⁱ⁾	-.12

Notes. ⁺ $p < .05$; * $p < .004$ (alpha-level adjustment for 12 repeated analyses). Reanalyzing the data using Spearman's rho (rank correlations) yielded the same results.

^(a) Age-group difference: $r_{\text{younger}} = .23$; $r_{\text{older}} = -.17$

^(b) Age-group difference: $r_{\text{younger}} = .31^+$; $r_{\text{older}} = -.17$

^(c) Age-group difference: $r_{\text{younger}} = -.17$; $r_{\text{older}} = .27$

^(d) Age-group difference: $r_{\text{younger}} = -.26$; $r_{\text{older}} = .28$

^(e) Age-group difference: $r_{\text{younger}} = -.40^+$; $r_{\text{older}} = .13$

^(f) Age-group difference: $r_{\text{younger}} = .19$; $r_{\text{older}} = -.18$

^(g) Age-group difference: $r_{\text{younger}} = -.18$; $r_{\text{older}} = .35^+$

^(h) Age-group difference: $r_{\text{younger}} = .35^+$; $r_{\text{older}} = -.00$

⁽ⁱ⁾ Age-group difference: $r_{\text{younger}} = -.22$; $r_{\text{older}} = .20$

⁴¹ The educational level x age group interaction did also not reach significance (Wilks' $\lambda = .96$, $F_{(3, 84)} = 1.08$, n.s., $\eta^2 = .04$, $1 - \beta = .28$).

⁴² The sex x age group interaction did also not reach significance (Wilks' $\lambda = .98$, $F_{(3, 84)} = .69$, n.s., $\eta^2 = .56$, $1 - \beta = .20$).

Hierarchical multiple regression analyses investigated how well chronological age predicted goal orientation after controlling for alternative predictors.⁴³ As potential rival predictors I considered both sociodemographic and all person variables that either showed correlations with one of the three facets of goal orientation at the level of $p < .05$, age-group differences in these correlations, or age-group differences in the specific person characteristic (see Table A9 in Appendix A). In the first step, I entered both sociodemographic and all relevant person predictors into the models simultaneously. In the second step, chronological age was added to the predictions.⁴⁴ Table 11 presents the multiple correlations, percentage of variance explained (R^2), and change in percentage of variance explained after entering chronological age into the models (ΔR^2). Chronological age still significantly contributed to the prediction of all three dimensions of goal orientation. For growth goal orientation an additional 4%, for maintenance goal orientation an additional 13%, and for prevention of loss goal orientation an additional 7% of the variance were explained. These findings support the view that the age-related differences in goal orientation were not simply due to differences in educational level, sex, or person characteristics.

Table 11. *Study 1: Hierarchical Multiple Regression of Alternative Predictors (Sociodemographic and Person Control Variables) and Chronological Age on Personal Goal Orientation (T1; Across All Self-Generated Goals)*

	Growth			Maintenance			Prevention of Loss		
	R	R ²	ΔR^2	R	R ²	ΔR^2	R	R ²	ΔR^2
<u>Step 1</u>									
Alternative predictors	.32	.11		.29	.08		.34	.12	
<u>Step 2</u>									
Chronological age	.38	.15	.04*	.46*	.21	.13*	.43*	.19	.07*

Note. * $p < .05$

Age-Group Differences in Personal Goal Orientation of Goals in Various Life Domains

The previous section showed that, with the exception of physical functioning goals, younger and older adults differed in their goal orientation of self-generated goals. The present research assumed that there are life contexts such as leisure in which goal orientation of younger and older adults did not differ. To test this assumption, I again used the two-step analysis procedure described above. A 2 (age group: younger vs. older) x 3 (goal orientation: growth vs. maintenance vs. prevention of loss) x 13 (goal domain: life in general vs. partnership vs. physical functioning

⁴³ The assumption of homogeneity of regression was violated as several of the control variables showed age-group differences in their bivariate correlations with goal orientation. To control for potential alternative predictors of the observed age-related differences in personal goal orientation, hierarchical regression analyses were conducted instead of multivariate analysis of covariance (MANCOVA).

⁴⁴ The minor deviations from the assumption of a linear relationship between the variables were at a tolerable level (cf. Berry, 1993; Pedhazur, 1982).

vs. cognitive functioning vs. family vs. health and well-being vs. personality and self vs. friends and acquaintances vs. leisure vs. finances and personal belongings vs. education, work, and work-related activities vs. living situation vs. politics and world issues) repeated-measures ANOVA with goal orientation and goal domain as the two within-subject factors yielded a significant main effect for goal domain (Wilks' $\lambda = .40$, $F_{(12, 77)} = 9.83$, $p < .05$, $\eta^2 = .61$). The goal orientation x age group (Wilks' $\lambda = .63$, $F_{(2, 87)} = 25.13$, $p < .05$, $\eta^2 = .37$), the goal domain x age group (Wilks' $\lambda = .77$, $F_{(12, 77)} = 1.90$, $p < .05$, $\eta^2 = .23$), and the goal domain x goal orientation interaction (Wilks' $\lambda = .24$, $F_{(24, 65)} = 8.50$, $p < .05$, $\eta^2 = .76$) reached significance. There was a significant three-way interaction of goal orientation x goal domain x age group (Wilks' $\lambda = .49$, $F_{(24, 65)} = 2.83$, $p < .05$, $\eta^2 = .51$). All other effects were not significant.^{45, 46} Separately for each of the thirteen domains, 2 (age group) x 3 (goal orientation) MANOVAs followed by univariate ANOVAs were conducted to specifically explore the *between-age-group differences*. Table 12 reports the respective findings.^{47, 48}

Table 12. *Study 1: Between-Age-Group Differences in Personal Goal Orientation of Goals in Various Life Domains (T1): Multi- and Univariate Follow-Up Analyses*

Goal orientation	Younger adults		Older adults		$F^{(a)}$	MSE	η^2
	M	SE	M	SE			
<i>Life in general</i>							
Growth	7.18	.13	6.33	.30	7.60 ⁺	16.09	.08
Maintenance	5.20	.30	6.23	.33	5.33 ⁺	23.68	.06
Prevention of loss	4.86	.32	5.90	.39	4.30 ⁺	24.21	.05
Wilks' $\lambda = .84$, $F_{(3, 86)} = 5.51$, $p < .004$, $\eta^2 = .16^{(b)}$							
<i>Cognitive functioning</i>							
Growth	6.69	.17	6.22	.29	2.15	5.02	.02
Maintenance	5.67	.25	6.56	.29	5.43 ⁺	17.58	.06
Prevention of loss	4.69	.32	6.90	.26	27.22*	108.88	.24
Wilks' $\lambda = .75$, $F_{(3, 86)} = 9.39$, $p < .004$, $\eta^2 = .25^{(c)}$							

(Table continues)

⁴⁵ The Box's M test of homogeneity of variance-covariance matrices was significant ($F_{(780, 21878.5)} = 1.35$, $p < .05$).

⁴⁶ The Mauchly test indicated violation of the sphericity assumption for goal orientation ($p < .05$), goal domain ($p < .05$), and goal orientation x goal domain ($p < .05$). The Greenhouse-Geisser correction indicated that departures from sphericity were tolerable ($\epsilon = .92$; $\epsilon = .73$; $\epsilon = .60$, respectively) and did not alter the results ($F_{(1.85, 162.43)} = 1.13$, n.s.; $F_{(8.72, 767.06)} = 2.40$, $p < .05$; $F_{(14.43, 1270.11)} = 11.14$, $p < .05$, respectively).

⁴⁷ Levene's test ($p < .05$) indicated departures from the assumption of equality of error variances in the two age groups in several cases: growth goal orientation relating to the domains of life in general, cognitive functioning, physical functioning, partnership, education, work, and work-related activities, and finances and personal belongings; maintenance goal orientation in the domains of health and well-being; prevention of loss in the domains of cognitive functioning, health and well-being, and finances and personal belongings.

⁴⁸ Reanalyzing the data with the Mann-Whitney U test for two independent samples showed comparable results and supported the findings of age-group differences in maintenance goal orientation in the life domain of cognitive functioning ($U = 648.5$, $p < .004$), physical functioning ($U = 626.5$, $p < .004$), and family ($U = 644$, $p < .004$).

Table 12 (*continued*)

Goal orientation	Younger adults		Older adults		$F^{(a)}$	MSE	η^2
	M	SE	M	SE			
<i>Physical functioning</i>							
Growth	6.43	.23	5.59	.36	4.08 ⁺	15.87	.04
Maintenance	5.43	.28	6.56	.29	7.82 ⁺	28.63	.08
Prevention of loss	4.51	.30	6.15	.38	11.70*	59.76	.12
Wilks' $\lambda = .81, F_{(3, 86)} = 6.78, p < .004, \eta^2 = .19$							
<i>Partnership</i>							
Growth	6.20	.27	3.72	.39	28.77*	137.95	.25
Maintenance	4.51	.39	5.25	.44	1.61	12.22	.02
Prevention of loss	4.59	.40	5.10	.45	.70	5.66	.01
Wilks' $\lambda = .72, F_{(3, 86)} = 11.12, p < .004, \eta^2 = .28$							
<i>Family</i>							
Growth	5.18	.33	3.37	.42	11.91*	73.76	.22
Maintenance	5.12	.36	6.46	.36	6.85 ⁺	40.14	.07
Prevention of loss	4.71	.38	6.21	.39	7.31 ⁺	49.72	.08
Wilks' $\lambda = .78, F_{(3, 86)} = 8.31, p < .004, \eta^2 = .23$							
<i>Friends and acquaintances</i>							
Growth	5.27	.26	4.58	.34	n.a.	n.a.	n.a.
Maintenance	6.51	.24	6.52	.27	n.a.	n.a.	n.a.
Prevention of loss	5.61	.34	6.24	.36	n.a.	n.a.	n.a.
Wilks' $\lambda = .94, F_{(3, 86)} = 1.82, n.s., \eta^2 = .06, 1 - \beta = .46^{(d)}$							
<i>Health and well-being</i>							
Growth	5.98	.22	5.90	.33	.04	.13	.00
Maintenance	5.53	.26	7.10	.16	23.66*	54.81	.21
Prevention of loss	5.02	.34	6.85	.26	17.19*	75.02	.16
Wilks' $\lambda = .74, F_{(3, 86)} = 9.89, p < .004, \eta^2 = .26^{(e)}$							
<i>Personality and self</i>							
Growth	5.76	.28	5.27	.35	1.20	5.29	.01
Maintenance	5.61	.23	6.68	.20	11.95*	25.59	.12
Prevention of loss	4.84	.32	6.32	.32	10.83*	48.92	.11
Wilks' $\lambda = .82, F_{(3, 86)} = 6.17, p < .004, \eta^2 = .18$							
<i>Leisure</i>							
Growth	5.67	.28	5.48	.35	n.a.	n.a.	n.a.
Maintenance	5.55	.28	6.25	.31	n.a.	n.a.	n.a.
Prevention of loss	4.73	.35	5.84	.36	n.a.	n.a.	n.a.
Wilks' $\lambda = .94, F_{(3, 86)} = 1.75, n.s., \eta^2 = .06, 1 - \beta = .44$							

(Table continues)

Table 12 (*continued*)

Goal orientation	Younger adults		Older adults		$F^{(a)}$	MSE	η^2
	M	SE	M	SE			
<i>Education, work, and work-related activities</i>							
Growth	7.31	.12	5.20	.35	36.35*	99.48	.29
Maintenance	4.65	.35	5.90	.37	5.87 ⁺	34.84	.06
Prevention of loss	4.93	.36	5.54	.41	1.20	8.10	.01
Wilks' $\lambda = .63$, $F_{(3, 86)} = 16.65$, $p < .004$, $\eta^2 = .37^{(f)}$							
<i>Finances and personal belongings</i>							
Growth	6.68	.22	4.46	.42	24.27*	111.05	.22
Maintenance	4.49	.34	6.22	.32	13.14*	66.79	.13
Prevention of loss	5.55	.36	6.73	.30	6.08 ⁺	31.12	.02
Wilks' $\lambda = .69$, $F_{(3, 86)} = 12.61$, $p < .004$, $\eta^2 = .31^{(g)}$							
<i>Living situation</i>							
Growth	5.18	.35	2.34	.30	36.86*	180.32	.30
Maintenance	4.45	.30	6.56	.33	22.81*	99.57	.21
Prevention of loss	4.35	.37	6.05	.40	9.59*	64.65	.10
Wilks' $\lambda = .67$, $F_{(3, 86)} = 14.29$, $p < .004$, $\eta^2 = .33$							
<i>Politics and world issues</i>							
Growth	5.33	.30	5.61	.37	n.a.	n.a.	n.a.
Maintenance	4.47	.33	4.43	.38	n.a.	n.a.	n.a.
Prevention of loss	4.14	.36	5.46	.43	n.a.	n.a.	n.a.
Wilks' $\lambda = .92$, $F_{(3, 86)} = 2.51$, n.s., $\eta^2 = .08$, $1 - \beta = .60$							

Notes. ⁺ $p < .05$; * $p < .004$ (alpha-level adjustment for 13 repeated analyses); n.a. = not applicable

^(a) F -values with 1, 88 degrees of freedom

^(b) Box's M test of homogeneity of variance–covariance matrices ($F_{(6, 51484)} = 4.76$, $p < .05$)

^(c) Box's M test of homogeneity of variance–covariance matrices ($F_{(6, 51484)} = 2.97$, $p < .05$)

^(d) Box's M test of homogeneity of variance–covariance matrices ($F_{(6, 51484)} = 2.44$, $p < .05$)

^(e) Box's M test of homogeneity of variance–covariance matrices ($F_{(6, 51484)} = 3.84$, $p < .05$)

^(f) Box's M test of homogeneity of variance–covariance matrices ($F_{(6, 51484)} = 8.03$, $p < .05$)

^(g) Box's M test of homogeneity of variance–covariance matrices ($F_{(6, 51484)} = 2.93$, $p < .05$)

No age-related differences in goal orientation emerged for the domains of friends and acquaintances, leisure, and politics and world issues. To understand this result one could argue that these specific domains are not necessarily characterized by negative resource changes over the lifespan. Younger and older adults might rather experience equal amounts of gains and losses in these specific life contexts. In all other domains the age groups differed on at least one of the three dimensions of personal goal orientation. Results remained stable when controlling for educational level, sex, and various person variables. The results demonstrate that age-related differences in self-reported goal orientation existed in most but not all domains.

Age-Differential Associations Between Personal Goal Orientation and General Subjective Well-Being and Goal Satisfaction

The following section tested the assumption that younger and older adults differ in their associations between goal orientation and general subjective well-being as well as goal-specific satisfaction (i.e., satisfaction with goal attainment and satisfaction with goal progress). Table 13 depicts the bivariate Pearson and multiple correlations between each of the three aspects of goal orientation across all six self-generated goals measured at T1 and general subjective well-being as well as the two indicators of goal satisfaction assessed at T2. After Fisher's Z-transformation, the bivariate associations were tested for age-group differences ($p < .05$).⁴⁹

Table 13. *Study 1: Associations Between Personal Goal Orientation (T1; Across All Self-Generated Goals) and General Subjective Well-Being (T2) and Goal Satisfaction (T2): Bivariate Pearson Correlations and Multiple Correlations*

Facet of well-being	Growth <i>r</i>	Maintenance <i>r</i>	Prevention of loss <i>r</i>	Multiple R
<i>General subjective well-being</i> ^(a)				
Total sample	-.16	.20	-.08	.34*
Younger adults	.04	-.19	-.39*	.41*
Older adults	-.16	.31*	.01	.39*
<i>Goal satisfaction</i>				
Satisfaction with goal attainment				
Total sample	.27*	.28*	.16	.41*
Younger adults	.30*	.28	.26	.40*
Older adults	.35*	.15	-.02	.41*
Satisfaction with goal progress				
Total sample	-.16	.36*	.02	.46*
Younger adults	-.00	.23	-.03	.31
Older adults	-.14	.30	-.10	.46*

Notes. * $p \leq .05$. Reanalyzing the data using Spearman's rho (rank correlations) yielded the same results.

^(a) Age-group differences in goal orientation toward maintenance ($\chi = -2.34, p < .05$) and prevention of loss ($\chi = -1.92, p < .05$).

Age-group differences only emerged with respect to general subjective well-being but not in satisfaction with goal attainment or goal progress. Specifically, the age groups differed in their associations between general subjective well-being and goal orientation toward maintenance ($\chi = -2.34, p < .05$) and toward prevention of loss ($\chi = -1.92, p < .05$). Younger adults' goal orientation toward prevention of loss was negatively related to subjective well-being two weeks later. For older adults, in contrast, this negative association did not exist. In fact, older adults who

⁴⁹ Additionally, I tested whether goal orientation predicted *change* in general subjective well-being and in goal satisfaction over the two-week study interval. Three separate two-step hierarchical multiple regression analyses tested whether goal orientation measured at T1 could predict general subjective well-being at T2 as well as the two indicators of goal-specific satisfaction while controlling for level of well-being at T1. In the first step, I entered the initial (T1) level of the respective facet of well-being into the model. In the second step, I added the three dimensions of goal orientation (T1) to the prediction. Goal orientation did not predict change over time in subjective well-being in any of these models ($p < .05$): (1) general subjective well-being: $\Delta R^2 = .005$, (2) satisfaction with goal attainment: $\Delta R^2 = .03$, and (3) satisfaction with goal progress $\Delta R^2 = .02$.

reported a stronger focus on maintenance reported higher well-being over the two-week interval. Unexpectedly, however, goal orientation toward growth was not age-differentially related to general subjective well-being. Table A15 in Appendix A shows detailed results of the associations and the respective age-group differences between goal orientation at T1 and each of the five facets of general subjective well-being at T2.

Study 1: Summary and Short Discussion of the Findings

Study 1 aimed at describing the concept of personal goal orientation. Interrelations between goal orientation toward growth, maintenance, and prevention of loss were investigated. Next, age-related differences in goal orientation of self-reported goals relating to self-generated domains and cognitive and physical functioning were tested. The study then explored life domains in which age-group differences in goal orientation did not exist. Finally, I examined associations between goal orientation and indicators of subjective well-being as well as goal-specific satisfaction for age-related differences.

Most research on self-reported motivational orientation employed assessment strategies that operationalized goal orientation as a uni-dimensional, bipolar construct. Goals were externally categorized as either approach- or avoidance-oriented (e.g., Elliot & Church, 1997; J. Heckhausen, 1997; Ogilvie et al., 2001). Arguing from a developmental standpoint (P. B. Baltes, 1997; P. B. Baltes et al., 1998), Study 1 conceptualized goal orientation as comprising three components, namely growth, maintenance, and prevention of loss. These represent the three dimensions of developmental regulation. Different from most studies reported in the literature, I assumed that a person could simultaneously focus on growth, maintenance, and prevention of loss, however, to varying degrees. As an alternative to external coding procedures, I used the respondents' subjective ratings to assess goal orientation. This procedure is less dependent on the raters' interpretation of the short goal-related statements provided by respondents. In addition, it gives an insight about the person's own evaluation of his or her goal orientation.

Correlational and factor-analytic findings of Study 1 demonstrated that goal orientation toward growth, maintenance, and prevention of loss were differentially interrelated and did not constitute three independent dimensions. As expected, growth goal orientation represented a construct largely independent of maintenance and prevention of loss. Maintenance and prevention of loss, however, were positively correlated and thus measure some overlapping aspects. One explanation for this unexpected finding refers to the specific definition of personal goal orientation in the present study. Drawing upon lifespan theory, the present operationalization distinguished between *change* (i.e., growth and prevention of loss) and *no change* (i.e., maintenance). It furthermore differentiated between focusing on *positive* (i.e., growth) or

negative outcomes (i.e., prevention of loss). Maintenance goal orientation, however, can imply both, a positive and a negative outcome focus. The present definition of maintenance goal orientation did not explicitly differentiate between maintaining functions in order to keep a highly satisfactory positive level vs. a level that is only acceptable and maintained as any decrease would be worse. In this latter sense, it is driven by the fear of further losses and thus seems to be closely linked to the dimension of prevention of loss. Examples would be to maintain the amount of physical activity per week because one is highly satisfied with one's physical fitness level, as compared to maintaining the amount of physical training per week because doing less would be highly unsatisfactory and would bring about declines in one's fitness level. In both cases the goal is to maintain the status quo. In the first example, however, the outcome focus is positive, whereas in the second case it is negative (for this differentiation see also Elliot & McGregor, 2001; Ford, 1992). Box 2 graphically represents this 2 x 2 conceptualization of personal goal orientation.

Box 2. 2 x 2 *Conceptualization of Personal Goal Orientation*

	Positive outcome focus	Negative outcome focus
Change	Growth	Prevention of loss
No change	Maintenance	Maintenance

The interrelatedness of maintenance and prevention of loss suggests that participants might have understood maintenance goal orientation as referring to no change in order to prevent negative outcomes and as implying the anticipation of loss. Explicitly differentiating between positive and negative outcome orientations when introducing the concept of maintenance goal orientation to respondents would be desirable for future research. Studies 2, 3a, and 3b of this dissertation, however, took an alternative, more parsimonious route: In these studies the dimensions of maintenance and prevention of loss were collapsed into one component. The studies differentiated *growth* vs. *maintenance and prevention of loss* as the two independent aspects of personal goal orientation. As elaborated in Study 2, growth goal orientation is then oriented toward positive, approach aspects, whereas maintenance–prevention of loss focuses on the avoidance of negative outcomes.

The test–retest reliability of goal orientation over the two-week time interval was consistently high for both age groups across all self-generated goals, the two goals relating to self-generated domains, cognitive and physical functioning, and across goals referring to the 13 listed life domains. This high temporal stability suggests that the concept was reliably measured in the present context, was stable over, at least, a short period of time, and thus comprised chronically

accessible aspects (cf. Higgins & Silberman, 1998). To what degree goal orientation is malleable by momentary, situation- or task-specific influences was investigated in Studies 3a and 3b.

Goal domains most frequently generated by younger and older adults in Study 1 reflected the age-related differences in salience of life contexts typically found in the literature (e.g., Freund, 1995; J. Heckhausen, 1997; Nurmi, 1992; Staudinger, 1996; Staudinger & Pasupathi, 2000; Wiese, 2000). Younger adults most frequently listed goals referring to the domain of education, work, and work-related activities, whereas older adults most often mentioned goals relating to leisure and health and well-being.

Study 1 demonstrated age-group differences in self-reported goal orientation of self-generated goals and of goals in various life domains. As expected, younger adults focused more on growth than older adults. This was true with respect to goals relating to self-generated domains as well as cognitive functioning. In addition, the primary goal orientation in young adulthood was toward growth. In late adulthood, the focus on maintaining functional levels and loss-prevention increased. Older compared to younger adults showed a stronger orientation toward maintenance and prevention of loss across all self-generated goals and with respect to their cognitive goals. In their goals referring to self-generated domains they reported a stronger maintenance goal orientation than younger adults. Interestingly, older adults did not report a primary orientation, but focused equally on growth, maintenance, and prevention of loss. This finding speaks to the assumption that older adults (maybe implicitly) believe that change toward improvement, in addition to decline, is possible until late in life. In this sense, they seem to have incremental rather than entity theories of development and goal achievement (cf. Dweck & Leggett, 1988).

One could assume that the increase in responding in socially desirable ways shown for older adults in the present study (cf. Gove & Geerken, 1977) explains why older adults reported a strong goal orientation toward growth, even though they may experience more and more losses and resource limitations. The results, however, remained stable after controlling for individual differences in educational level, sex, and several personality characteristics including social desirability.

Unexpectedly, younger and older participants did not differ in their goal orientation of physical functioning goals. This goal context, similar to the domain of cognitive functioning, was hypothesized to be prototypical with respect to increasingly negative changes across the lifespan, at the same time offering potentials for gains until old age (cf. P. B. Baltes & Smith, 2003). Peck (1959) proposed earlier and stronger decrease in the physical opposed to the cognitive domain. This should lead to even more pronounced age-related differences for the physical than for the cognitive domain as a reaction to counteract the impending losses. One reason for this unexpected

finding that the age groups did not differ in their goal orientation in the physical domain refers to the fact that older adults in Study 1 were relatively healthy and physically fit. They might not have experienced many losses with respect to their physical state yet and therefore their focus on maintenance and loss-prevention is not yet primary in the physical domain. One purpose of Study 2 was to further explore this unexpected result. Employing a more parsimonious conceptualization of goal orientation comprising only growth and maintenance–prevention of loss, Study 2 aimed at replicating the general pattern of result on age-group differences in goal orientation of cognitive and physical functioning goals.

In addition to assessing goal orientation of self-generated goals, participants in Study 1 rated their goal orientation of goals referring to a list of various central life domains such as family, work, or health. This strategy allowed the confirmation of the findings on age-group differences in goal orientation across different assessment methods. Furthermore, it enabled the exploration of life domains in which age-group differences would not exist. Comparable results were found when using this alternative method. Expected differences in personal goal orientation of younger and older adults emerged in the various domains of cognitive and physical functioning, partnership, family, health and well-being, personality and self, education, finances and personal belongings as well as with respect to their living situation. There were some minor unexpected divergences between the two methods when looking at the dimensions of growth, maintenance, and prevention of loss separately. These differences across methods, however, might have been due, in part, to the conservative alpha-level adjustment in multiple-testing procedures adopted in this study as the tendencies of the results were converging.

With respect to the domains of friends and acquaintances, leisure, and politics and world issues the two age groups did not report different orientations toward growth, maintenance, and prevention of loss. The assumption that these three domains are not necessarily characterized by negative age-related resource changes can explain this finding. Even in early life, individuals may experience losses in the domain of friends and acquaintances (e.g., break-up of a friendship, lack of time to meet with friends). At the same time, the domain of friends and acquaintances as well as the domain of leisure activities offer potentials for growth until late in life (e.g., joining a senior club and making new friends). Finally, younger and older adults may not differ in their feeling of control over world and political issues. This could have led to their equal focus on growth, maintenance, and prevention of loss in these domains.

Study 1 revealed age-group differences in the associations between personal goal orientation and well-being. Specifically, younger and older adults differed in the relations between goal orientation toward maintenance and prevention of loss and general subjective well-being. A stronger orientation toward prevention of loss was negatively associated with well-being in

younger adults. This negative association, however, was not found in older adults. Late adulthood was rather characterized by a positive relation between maintenance goal orientation and general subjective well-being. Furthermore, there were positive associations between goal orientation toward growth and maintenance and satisfaction with goal attainment as well as between maintenance goal orientation and satisfaction with goal progress. Unexpectedly, however, no age-differences emerged in these relations. This can be interpreted in the sense that the differential associations between goal orientation and general subjective well-being were not explained by the relations between goal orientation and goal-specific satisfaction. Study 2 aimed at further exploring these relations between goal orientation and indicators of goal satisfaction.

Table 14. *Study 1: Overview of Specific Research Hypotheses and Main Findings*

Hypotheses	Supported by results?
1. <i>Description of the concept of personal goal orientation</i>	
1.1 Growth, maintenance and prevention of loss are independent components of goal orientation.	Partly
2. <i>Investigation of age-related differences in personal goal orientation</i>	
2.1 There are age-related differences in the goal orientation of self-generated goals and goals across various life domains.	Yes
2.1.1 Younger adults report a primary goal orientation toward growth.	Yes
2.1.2 Older adults report a primary goal orientation toward maintenance and prevention of loss.	Partly
2.2 Age-related differences in goal orientation remain stable after controlling for education, sex, and several person variables as rival predictors.	Yes
2.3 Age-related differences in goal orientation remain stable over the two-week time interval as they comprise dispositional conditions.	Yes
2.4 There are life domains in which age-related differences in goal orientation do not exist (e.g., friends and acquaintances, leisure).	Yes
3. <i>Investigation of associations between personal goal orientation and subjective well-being</i>	
3.1 The associations between goal orientation and general subjective well-being and goal-specific satisfaction are age-differential.	Yes
3.1.1 In younger adults, growth goal orientation is positively associated with general subjective well-being and goal satisfaction, whereas goal orientation toward maintenance and prevention of loss is negatively associated with indicators of subjective well-being.	Partly
3.1.2 In older adults, growth goal orientation is negatively associated with general subjective well-being and goal satisfaction, whereas goal orientation toward maintenance and prevention of loss is positively associated with indicators of subjective well-being.	Partly

The age-differential associations between goal orientation toward growth, maintenance, and prevention of loss and subjective well-being underscore the importance of looking at all three components separately to fully understand their role as processes of adaptive developmental regulation. For reasons of parsimony, however, the following studies of the

dissertation referred to the two-dimensional conceptualization of goal orientation. Table 14 summarizes the main results of Study 1.

Study 2: Self-Reported Personal Goal Orientation II

Study 2 had two interrelated objectives. One was to explore the use of the two-dimensional, more parsimonious conceptualization of personal goal orientation. The second was the replication of the general pattern of findings of age-related differences in goal orientation in self-reported goals. To present this study, I first report the specific research hypotheses and then outline methods and results. The section concludes with a summary and a short discussion of the central findings and resulting research questions to be approached in Studies 3a and 3b.

Study 2: Specific Research Hypotheses

On theoretical grounds as well as in reference to the results of consistently positive correlations between maintenance and prevention of loss goal orientation supplemented by factor-analytic findings in Study 1, Study 2 collapsed these two dimensions into one construct. The resulting conceptualization comprised growth and maintenance–prevention of loss as the two components of personal goal orientation. In order to replicate the general pattern of findings on age-group differences in goal orientation, Study 2 focused exclusively on the two specific contexts of cognitive and physical functioning for several reasons: (1) for reasons of parsimony, (2) to be consistent with Studies 3a and 3b, which required a contextualized investigation of behavioral preference for goal orientation, and (3) to allow further elaboration of the finding of no age-related differences in goal orientation in the physical domain obtained in Study 1. Table 15 gives an overview of the major aims and specific research hypotheses of Study 2.

Table 15. *Study 2: Overview of Major Aims and Specific Research Hypotheses*

Hypotheses	
1.	<i>Replication of age-related differences in personal goal orientation</i>
1.1	The pattern of findings on age-related differences in goal orientation of self-generated goals can be replicated using a two-dimensional conceptualization of goal orientation.
1.1.1	Younger adults report a primary goal orientation toward growth.
1.1.2	Older adults report a primary goal orientation toward maintenance–prevention of loss.
1.1.3	Age-related differences in goal orientation remain after controlling for education, sex, and several person variables as rival predictors.

Study 2: Methods

Procedure

Within days after recruitment, participants came to the Max Planck Institute for data collection. Study 2 comprised one measurement time point. Similar to testing procedures in Study 1, sessions were conducted in groups varying from 2–18 participants with younger and older adults attending separate sessions. The sessions were conducted in a standardized manner by one of five trained research assistants. At the beginning of the session, all volunteers were informed about the testing procedure before signing a consent form. They were then familiarized with format and handling of the questionnaires and completed several sociodemographic questions followed by two additional questionnaires with detailed written instruction. Finally, participants worked on two performance-based cognitive tasks (i.e., Spot-a-Word and Digit-Symbol Substitution). The research assistant conducting the session was available the entire time for questions and explanations. The sessions typically took between 60 and 90 minutes. At the end of the session, participants were debriefed and reimbursed with 15 Euros (approximately \$ 12) for participation in the study.

Participants

Recruitment

A professional recruitment firm recruited 100 younger and older adults at random for participation in this self-report study. Recruitment criteria were that the person was either between 18 and 25 (younger adults) or between 64 and 86 years of age (older adults) and was able to come to the Max Planck Institute once for data collection. Recruitment took place in November 2002.

Sociodemographic Characteristics

The sample consisted of $n = 48$ younger ($M = 20.8$ years, $SD = 2.0$) and $n = 52$ older adults ($M = 72.1$ years, $SD = 6.0$). As the sample was stratified by sex and educational level, there were no significant differences in the number of men and women in both age groups ($\chi^2_{(1, N = 100)} = .17$, n.s.) and younger and older adults did not differ in their overall educational level when comparing primary and lower secondary with higher secondary education ($\chi^2_{(1, N = 100)} = 1.14$, n.s.). Table 16 gives an overview of the sociodemographic characteristics of younger and older respondents in Study 2.

Table 16. *Study 2: Sociodemographic Characteristics of Younger and Older Adults*

		Younger adults ($n = 48$)		Older adults ($n = 52$)	
Age (in years)	Range	18.12–25.09		64.41–86.02	
	<i>M</i>	20.84		72.06	
	<i>SD</i>	2.02		5.97	
Sex	Male	26	(54.2%)	26	(50.0%)
	Female	22	(45.8%)	26	(50.0%)
Marital status	Unmarried	48	(100.0%)	5	(9.6%)
	Married	0	(0.0%)	29	(55.8%)
	Divorced	0	(0.0%)	5	(9.6%)
	Widowed	0	(0.0%)	25	(25.0%)
Children	Yes	0	(0.0%)	44	(84.6%)
	No	48	(100.0%)	8	(15.4%)
Education ^(a)	Primary	2	(4.2%)	10	(19.2%)
	Lower secondary	16	(33.3%)	15	(28.8%)
	Higher secondary	30	(62.5%)	27	(51.9%)
Current occupation ^(b)	Employed ^(c)	11	(22.9%)	6	(11.5%)
	Apprentice	1	(2.1%)	0	(0.0%)
	High school student	16	(33.3%)	0	(0.0%)
	University student	16	(33.3%)	0	(0.0%)
	Homemaker	0	(0.0%)	4	(7.7%)
	Unemployed	0	(0.0%)	3	(7.3%)
	Retired	0	(0.0%)	48	(92.3%)
	Other	2	(4.2%)	0	(0.0%)

Notes.

^(a) Primary = Grund-/Volks-/Hauptschule (8–9 years); Lower secondary = Mittlere Reife/Realschule (10 years); Higher secondary = (Fach-)Abitur/Fach-/Hochschulstudium (more than 13 years)

^(b) The percentages do not add up to 100, since a person can belong to multiple categories.

^(c) One older man did not indicate his current employment status.

Cognitive and Physical Functioning

Study 2 used the same measures as Study 1 to assess participants' cognitive and physical functioning. An exception was that Study 2, for reasons of time, did not measure objective physical functioning. For a detailed description of the instruments see Table A10 in Appendix A. Internal consistency for *subjective health* was good (Cronbach's $\alpha = .86$). Table 17 gives an overview of the cognitive and physical functioning measures of younger and older adults in Study 2. With respect to cognitive and physical functioning, the present sample did not differ from the younger (Wilks' $\lambda = .96$, $F_{(4, 92)} = .56$, n.s., $\eta^2 = .04$, $1 - \beta = .31$) and older adults (Wilks' $\lambda = .94$, $F_{(4, 86)} = .56$, n.s., $\eta^2 = .07$, $1 - \beta = .44$) recruited for Study 1. Additional descriptive information on cognitive and physical functioning is presented in Table B4 in Appendix B.

Table 17. *Study 2: Cognitive and Physical Functioning of Younger and Older Adults: Means, Standard Deviations, Ranges, and Tests of Significant Age-Group Differences*

	Younger adults ($n = 48$)			Older adults ($n = 52$)			t
	M	SD	Range	M	SD	Range	
<i>Cognitive functioning</i>							
Knowledge ^{(a)(b)}	21.30	4.39	11–28	28.67	2.92	20–34	-9.96*
Perceptual-motor speed ^(c)	57.02	9.88	37–76	38.90	8.11	25–57	9.95*
Subjective cognitive functioning	6.00	1.07	4–8	5.87	1.09	3–8	.62
<i>Physical functioning</i>							
Subjective health ^{(d)(e)}	6.22	.93	3.7–7.7	5.93	1.21	3.4–7.8	1.34

Notes. * $p < .01$ (alpha-level adjustment for 4 repeated analyses); see Table A10 for further information on the instruments to measure cognitive and physical functioning.

^(a) Levene's test ($p < .05$) indicated departures from equality of variances in the two age groups.

^(b) Mann-Whitney U test: $U = 178.5$, $p < .01$

^(c) For reasons of time, two older adults did not respond to this test. Respective analyses therefore based on a reduced sample size ($n_{\text{older}} = 50$).

^(d) Levene's test ($p < .05$) indicated departures from equality of error variances in the two age groups.

^(e) Mann-Whitney U test: $U = 1100$, n.s.

Measures

In order to investigate the specific research hypotheses proposed in Study 2, information on several central, correlate, and control measures was assessed. The following section first describes the measurement of central variables, that is (1) the generation of personal goals and (2) personal goal orientation of self-generated goals. Then, the measurement of the correlate variables (i.e., several concepts of self-regulation, goal resources, and additional goal characteristics including goal-specific satisfaction) is outlined. I end the section by presenting the person control measures. If not otherwise indicated, participants used eight-point scales (ranging from 1 to 8) to evaluate their responses. Table 18 presents the overview, specific instructions, and psychometrical information on the central instruments used in this cross-sectional questionnaire study.

Generation of Personal Goals

Participants were asked to generate their four most important personal goals (see Appendix B, Box B1). The procedure was identical to the one used in Study 1 with the exception that respondents were instructed to list only two goals relating to the cognitive and two goals referring to the physical domain. The order of goal domains was counterbalanced. Screening goal contents of personal goals generated by participants suggested that they were similar to the ones listed in Study 1.

Personal Goal Orientation in Self-Generated Goals

Study 2 conceptualized goal orientation as comprising only two components: (1) *growth* and (2) *maintenance–prevention of loss*. The questionnaire described growth goal orientation as being directed toward improving functions or trying to achieve something new. Goal orientation toward maintenance–prevention of loss was characterized by a focus on maintenance of functioning and prevention of negative outcomes and losses. Participants evaluated each of their four self-generated goals separately with respect to growth and maintenance–prevention of loss. The order of dimension evaluation was counterbalanced across participants.

Table 18. *Study 2: Instruments Assessing the Central Variables: Overview and Psychometrical Information*

Construct	Description of measurement instrument
<i>Generation of personal goals</i>	
Self-generated personal goals	
<i>Author:</i>	Modified after B. R. Little (1983)
<i>Task:</i>	List of four personal goals: cognitive functioning (2 goals), physical functioning (2 goals)
<i>Personal goal orientation in self-generated personal goals</i>	
Growth	
<i>Author:</i>	Newly developed
<i>Item:</i>	Single item: “ <i>With this goal, I would like to improve something or achieve something new.</i> ” [German wording: <i>Ich möchte mit diesem Ziel etwas verbessern oder Neues erreichen.</i>]
<i>Response format:</i>	1 “ <i>does not apply at all</i> ” to 8 “ <i>applies very well</i> ”
<i>Score aggregation:</i>	Mean scores across all self-generated goals (4 goals), across cognitive domain (2 goals), across physical domain (2 goals)
<i>Internal consistency:</i>	All self-generated goals: $\alpha = .60$; cognitive domain: $\alpha = .46$; physical domain: $\alpha = .31$
Maintenance–Prevention of loss	
<i>Author:</i>	Newly developed
<i>Item:</i>	Single item: “ <i>With this goal, I would like to maintain something or prevent a loss.</i> ” [German wording: <i>Ich möchte mit diesem Ziel etwas aufrechterhalten oder einen Verlust vermeiden.</i>]
<i>Response format:</i>	1 “ <i>does not apply at all</i> ” to 8 “ <i>applies very well</i> ”
<i>Score aggregation:</i>	Mean scores across all self-generated goals (4 goals), across cognitive domain (2 goals), across physical domain (2 goals)
<i>Internal consistency:</i>	All self-generated goals: $\alpha = .69$; cognitive domain: $\alpha = .48$; physical domain: $\alpha = .47$

In totaling the ratings of the respective dimensions, I computed separate mean scores as indicators of growth and maintenance–prevention of loss goal orientation. For each component, a general indicator of goal orientation across all four goals was computed. In addition, domain-specific indicators for the two goals relating to cognitive functioning and the two goals relating to physical functioning were computed. Tables B1–B3 in Appendix B provide descriptive information on goal orientation toward growth and maintenance–prevention of loss of self-

generated goals in the total sample and in younger and older adults. Table 18 indicates acceptable internal consistencies for growth and maintenance–prevention of loss across all goal domains ($.60 \leq \alpha \leq .69$), but low internal consistencies in the cognitive and physical domain ($.31 \leq \alpha \leq .48$).

Correlate and Control Variables

Equivalent to Study 1, participants completed a set of questionnaires on various correlate and person control variables. Tables B4 and B5 in Appendix B give detailed descriptive information on the variables in the total sample and the age-group sub-samples.

Concepts of Self-Regulation, Goal Resources, and Additional Goal Characteristics. Study 2 assessed information on (1) the life-management strategies of elective selection, loss-based selection, optimization, and compensation, (2) proactive and preventive coping styles, and (3) the motive to approach success and to avoid failure. Table B6 in Appendix B summarizes these measures. Internal consistencies were good with the exception of the life-management strategies, which had low internal consistencies ($.25 \leq \alpha \leq .91$).

Information on goal resources was measured: (1) two indicators of objective cognitive functioning (knowledge and perceptual-motor speed), (2) subjective cognitive functioning, (3) subjective health, (4) expectation of goal-specific resource demands, and (5) subjective availability of goal-specific resources. Table B6 in Appendix B summarizes these instruments. Cronbach's α was satisfactory for subjective health but low for expectation of goal-specific resource demands and subjective availability of goal-specific resources ($.56 \leq \alpha \leq .86$).

For each of their four self-generated goals participants indicated the degree of (1) satisfaction with goal attainment, (2) satisfaction with goal progress, (3) recent approach to goal attainment (goal progress), (4) state satisfaction before goal setting, (5) goal-related future orientation, (6) goal engagement, (7) concreteness of goal attainment, (8) control over goal attainment, and finally (9) clear goal outcome criteria. Table B6 in Appendix B gives an overview of these variables. With the exception of goal progress, internal consistencies were satisfactory ($.40 \leq \alpha \leq .80$).

Person Control Variables. Study 2 measured two person control constructs: (a) the tendency to respond in socially desirable ways and (b) the five personality traits of neuroticism, extraversion, openness to new experiences, agreeableness, and conscientiousness. Table B7 in Appendix B presents these scales. With the exceptions of extraversion, openness to new experiences, and agreeableness displaying low internal consistencies, Cronbach's α was good ($.39 \leq \alpha \leq .74$).

Study 2: Results

The main research aims of Study 2 structure the presentation of the results. First, the interrelations of goal orientation toward growth and maintenance–prevention of loss are presented. Then I report the replication of the general pattern of results on age-related differences in goal orientation.

Description of Goal Orientation Toward Growth and Maintenance–Prevention of Loss

Interrelatedness of Goal Orientation Toward Growth and Maintenance–Prevention of Loss

Goal orientation toward growth and maintenance–prevention of loss were not significantly correlated across all self-generated personal goals ($r = .11$, n.s.), across the two cognitive goals ($r = .18$, n.s.), and across the two physical functioning goals ($r = -.10$, n.s.).⁵⁰ After Fisher's Z -transformation, all bivariate correlations were tested for age-group differences at the level of $p < .05$. There were age-group differences in the correlations between goal orientation toward growth and maintenance–prevention of loss across all self-generated goals ($r_{\text{younger}} = .09$, $r_{\text{older}} = .45$; $z = -1.91$, $p < .05$) and across goals relating to physical functioning ($r_{\text{younger}} = -.34$, $r_{\text{older}} = .39$; $z = -3.71$, $p < .05$).

Information on the relations of goal orientation toward growth and maintenance–prevention of loss with concepts of self-regulation, goal resources, and additional goal characteristics is presented in Table B8 in Appendix B. The correlational picture shows that conceptualizing personal goal orientation as a two-dimensional instead of a three-dimensional construct lead to associations with correlate variables that were comparable to those of Study 1. Moreover, neither the motive to approach success nor the motive to avoid failure, two variables not measured in the context of Study 1, was differentially related to goal orientation toward growth and maintenance–prevention of loss. One might have argued that younger adults are generally more ambitious and achievement motivated than older adults, which would then influence their goal orientation. The present data, however, did not show age-group differences in achievement motivation.

Further exploring the relations between satisfaction with goal-specific satisfaction and goal orientation revealed that the associations detected in Study 2 were similar to the ones obtained in Study 1. Satisfaction with goal attainment was positively related to both dimensions of goal orientation. Other than Study 1, however, this positive relation with maintenance–prevention of loss was only existent in older adults. This finding suggests that older as opposed to younger

⁵⁰ Computing Spearman's rho (rank correlations) across all self-generated goals (rho = .17, n.s.), across cognitive goals (rho = .21, n.s.), and across physical goals (rho = -.01, n.s.) yielded the same results.

adults report higher satisfaction with attaining their goal the stronger their maintenance goal orientation. Finally, as in Study 1, the association between satisfaction with goal progress and maintenance goal orientation was positive.

Personal Goal Orientation in Younger and Older Adults

Replication of Age-Group Differences in Personal Goal Orientation of Self-Generated Goals

As in Study 1, a two-stage procedure was used to investigate age-group differences in goal orientation. A 2 (age group: younger vs. older) x 2 (goal orientation: growth vs. maintenance–prevention of loss) x 2 (goal domain: cognitive vs. physical) repeated-measures ANOVA with goal orientation and goal domain as the two within-subject factors indicated significant main effects for age group ($F_{(1, 98)} = 15.48, MSE = 65.01, p < .05, \eta^2 = .14$) and goal orientation (Wilks' $\lambda = .89, F_{(1, 98)} = 12.66, p < .05, \eta^2 = .11$). The goal orientation x age group (Wilks' $\lambda = .63, F_{(1, 98)} = 57.06, p < .05, \eta^2 = .37$) and the goal domain x goal orientation interaction (Wilks' $\lambda = .95, F_{(1, 98)} = 5.16, p < .05, \eta^2 = .05$) proved significant. All other effects were not.⁵¹ The non-significant goal orientation x age group x goal domain interaction indicated that the age-group differences in goal orientation did not differ for the domains of cognitive and physical functioning. Therefore, I did not run separate follow-up analyses for these two domains.

Between-age-group comparisons. To understand the goal orientation x age group interaction, univariate ANOVAs on age-group differences in growth and maintenance–prevention of loss goal orientation were conducted across all self-reported goals. Figure 9 and Table 19 show the results.⁵²

Within-age-group comparisons. As expected, within-age-group comparisons in the two dimensions of goal orientation across all self-generated goals showed that younger adults reported a primary goal orientation toward growth ($t_{(47)} = 6.50, p < .025$), whereas late adulthood was characterized by a primary goal orientation toward maintenance–prevention of loss ($t_{(51)} = -3.36, p < .025$). Thus, using the parsimonious two-component conceptualization of goal orientation in Study 2 replicated the general pattern of results on age-related differences in personal goal orientation of self-reported goals manifested in Study 1. The findings were actually more pronounced in Study 2 than Study 1 with regard to the fact that older adults revealed the expected primary goal orientation toward maintenance–prevention of loss.⁵³

⁵¹ The Box's M test of homogeneity of variance–covariance matrices was significant ($F_{(10, 45232)} = 3.84, p < .05$).

⁵² Reanalyzing the data with the Mann-Whitney U test for two independent samples provided the same results: $U_{\text{Growth}} = 1045.5, n.s.$; $U_{\text{Maintenance–Prevention of loss}} = 377, p < .05$.

⁵³ Reanalyzing the data with the Wilcoxon's Signed-Ranks test for two related samples did not alter the results for younger ($Z_{\text{Growth/Maintenance–Prevention of loss}} = -5.01, p < .025$) and older adults ($Z_{\text{Growth/Maintenance–Prevention of loss}} = -3.25, p < .025$).

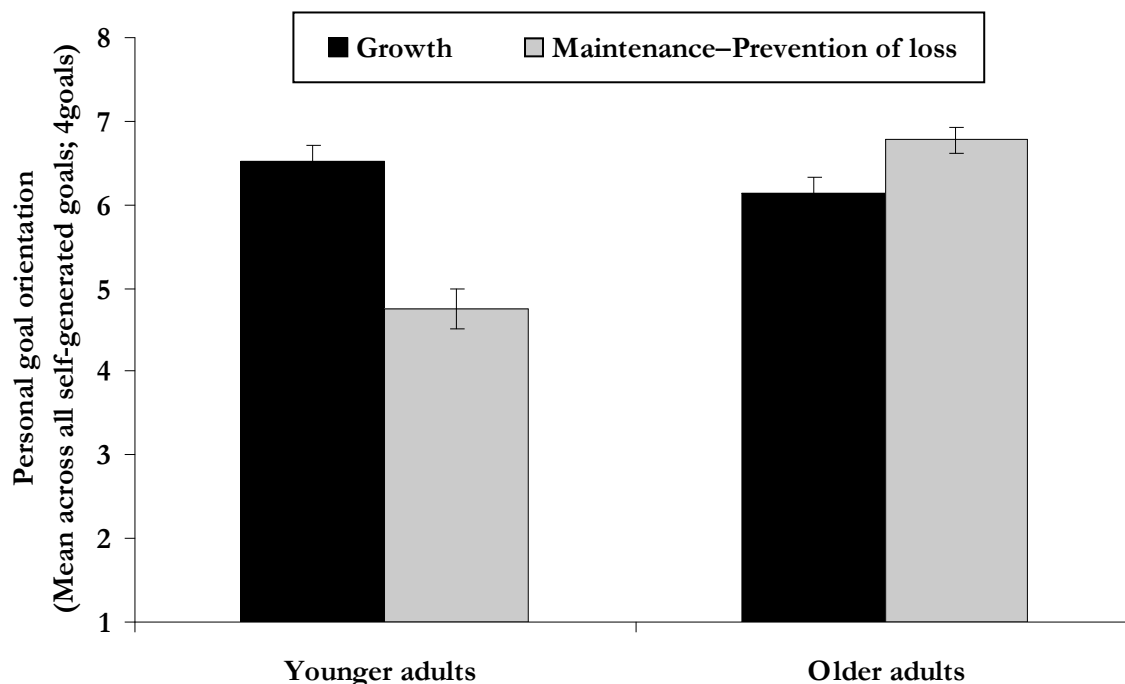


Figure 9. Study 2: Between-age-group differences in personal goal orientation across all self-generated goals (4 goals)

Table 19. Study 2: Between-Age-Group Differences in Personal Goal Orientation Across All Self-Generated Goals: Univariate Follow-Up Analyses

Goal orientation	$F^{(a)}$	MSE	η^2
<i>Across all self-generated goals (4 goals)</i>			
Growth	2.35	3.86	.02
Maintenance-Prevention of loss	52.17*	101.84	.35

Notes. * $p < .025$ (alpha-level adjustment for 2 repeated analyses)

^(a) F -values with 1, 98 degrees of freedom

Control Analyses: Education, Sex, and Person Variables. To test the stability of the age-group differences in goal orientation, I statistically controlled for level of education, sex, and several person variables as rival predictors for reasons outlined earlier. Goal orientation toward growth (primary and lower secondary: $M = 6.28$, $SE = .20$; higher secondary: $M = 6.36$, $SE = .17$) and maintenance-prevention of loss (primary and lower secondary: $M = 6.01$, $SE = .26$; higher secondary: $M = 5.63$, $SE = .23$) were not different for participants with different educational status (Wilks' $\lambda = 1.00$, $F_{(2, 95)} = .25$, n.s., $\eta^2 = .01$, $1 - \beta = .09$).⁵⁴ Different from Study 1, men and women differed in their goal orientation (Wilks' $\lambda = .88$, $F_{(2, 95)} = 6.27$, $p < .006$, $\eta^2 = .12$). Men ($M = 5.92$, $SE = .18$) reported lower scores on growth than women ($M = 6.76$, $SE = .16$; $F_{(1, 96)} = 12.60$, $MSE = 18.64$, $p < .006$, $\eta^2 = .12$), whereas men and women did not differ with respect to

⁵⁴ The educational level x age group interaction did also not reach significance (Wilks' $\lambda = .99$, $F_{(2, 95)} = .62$, n.s., $\eta^2 = .01$, $1 - \beta = .15$).

their orientation toward maintenance–prevention of loss (men: $M = 5.65$, $SE = .21$; women: $M = 5.95$, $SE = .28$; $F_{(1, 96)} = .48$, $MSE = .91$, n.s., $\eta^2 = .01$, $1 - \beta = .11$).⁵⁵ Table 20 provides information on the Pearson correlations between goal orientation toward growth and maintenance–prevention of loss and the person control variables. With the exception of a negative correlation between openness to new experiences and growth goal orientation, none of these correlations reached significance. None of the association was significantly different ($p < .05$) for younger and older adults as tested using Fisher’s Z-transformation and significance test for correlations in two independent samples (see Table 20).

Table 20. *Study 2: Bivariate Associations Between Personal Goal Orientation Across All Self-Generated Goals and Several Person Control Variables*

Construct	Growth <i>r</i>	Maintenance–Prevention of loss <i>r</i>
<i>Person variables</i>		
Social desirability	-.15	.18
<i>Personality traits</i>		
Neuroticism	.02	-.19
Extraversion	.27 ⁺	.01
Openness	.13	-.40*
Agreeableness	.03	.11
Conscientiousness	-.07	.14

Notes. ⁺ $p < .05$; * $p < .006$ (alpha-level adjustment for 8 repeated analyses). Reanalyzing the data using Spearman’s rho (rank correlations) yielded the same results.

Like in Study 1, hierarchical multiple regression analyses tested how well chronological age predicted goal orientation after entering the rival predictors.⁵⁶ I considered both sociodemographic and all person variables that either showed correlations with one of the two dimensions of goal orientation at the level of $p < .05$, significant age-group differences in these correlations, or significant age-group differences in the specific person characteristic (see Table B5 in Appendix B) as potential alternative predictors. First, both sociodemographic and the respective person predictors were simultaneously entered into the models. Second, chronological age was added to the predictions.⁵⁷ Table 21 reports the multiple correlations, percentage of variance explained (R^2), and change in percentage of variance explained after entering chronological age into the model (ΔR^2).

⁵⁵ The sex \times age group interaction did not reach significance (Wilks’ $\lambda = .94$, $F_{(2, 95)} = 3.23$, $p < .006$, $\eta^2 = .60$).

⁵⁶ The assumption of homogeneity of regression was violated, as sex showed a significant age-group difference in its bivariate correlation with growth goal orientation. To control for potential alternative predictors of the observed age-related differences in goal orientation, hierarchical regression analyses were conducted instead of MANCOVA.

⁵⁷ The minor deviations from the assumption of a linear relationship between the variables were at a tolerable level (cf. Berry, 1993; Pedhazur, 1982).

After statistical control for rival predictors, chronological age still significantly contributed to the prediction of maintenance–prevention of loss but not growth goal orientation. This finding suggests that sociodemographic and person characteristics play a role in explaining individual differences in growth goal orientation. As this finding, however, diverges from results obtained in Study 1, I regard it as preliminary and as needing further exploration. For goal orientation toward maintenance–prevention of loss an additional 22% of the variance were explained.

Table 21. *Study 2: Hierarchical Multiple Regression of Alternative Predictors (Sociodemographic and Person Control Variables) and Chronological Age on Personal Goal Orientation Across All Self-Generated Goals*

	Growth			Maintenance–Prevention of loss		
	R	R ²	ΔR ²	R	R ²	ΔR ²
<u>Step 1</u>						
Alternative predictors	.44	.19		.45*	.20	
<u>Step 2</u>						
Chronological age	.44	.19	.00	.65*	.42	.22*

Note. * $p < .05$

Study 2: Summary and Short Discussion of the Findings

One major purpose of Study 2 was to explore the use of the parsimonious two-dimensional conceptualization of goal orientation comprising growth and maintenance–prevention of loss. The second, interrelated objective was to replicate the general pattern of findings of age-related differences in goal orientation in self-reported goals found in Study 1 using this two-dimensional concept. Furthermore, Study 2 aimed at further exploring the two unexpected results obtained in Study 1, namely that the age groups did not differ in the goal orientation of their physical functioning goals and that there were no relations between goal orientation and goal-specific satisfaction.

Similar to Study 1, correlational findings of Study 2 showed that growth and maintenance–prevention of loss were not significantly interrelated in the total sample. They represent two independent constructs. Different from Study 1, however, there were age-group differences in the correlations between goal orientation toward growth and maintenance–prevention of loss across all self-generated goals and across physical functioning goals. Specifically, for older adults the dimensions of growth and maintenance–prevention of loss were positively related across all self-generated goals and with respect to physical functioning. For younger adults goal orientation toward growth and maintenance–prevention of loss of physical goals were negatively related to each other. This divergence between Study 1 and Study 2 might have been influenced by the two-dimensional conceptualization of goal orientation in Study 2 as it might have influenced some

respondents to view these two dimensions as two poles along one dimension. Clearly, further research is needed on this.

Study 2 partly replicated the associations between goal orientation and the two indicators of goal satisfaction. As in Study 1, participants reported more satisfaction with goal attainment the stronger their goal orientation toward maintenance–prevention of loss as well as growth. They also indicated more satisfaction with goal progress the more they focused on maintenance–prevention of loss. Expected age-group differences emerged in the relation between goal orientation toward maintenance–prevention of loss and satisfaction with goal attainment. The stronger their goal orientation toward maintenance–prevention of loss the more satisfied older adults tended to be with attaining their goal. In younger adults, this relation did not reach significance. This result supplemented the idea that it becomes beneficial in old age to focus on maintaining one’s functional level (P. B. Baltes, 1997; Brandtstädter & Rothermund, 1994). This might be the case as older adults have already acquired skills and resources throughout their lives as well as they are increasingly confronted with losses. It might be more realistic for their goal achievement and more favorable for their goal satisfaction to orient their goals toward conserving resources instead of striving for resource gains.

Finally, Study 2 confirmed the general pattern of results on age-related differences in goal orientation using the two-component conceptualization of personal goal orientation. Younger and older adults equally frequently reported a focus on growth. As expected, older adults reported a stronger focus on maintaining their status quo and preventing losses than did younger adults. Moreover, both age groups had a primary goal orientation: Younger adults primarily oriented their goals toward growth, while older adults reported a primary orientation toward maintenance and loss-prevention. Thus, the age-related differences in goal orientation were even more pronounced in Study 2 than in Study 1. Divergent from Study 1, Study 2 demonstrated the expected age-related differences in goal orientation for the domain of physical functioning.

Taken together, the results of Study 2 demonstrated that using the more parsimonious, two-dimensional approach to personal goal orientation allowed replication of the observed age-associated differences in goal orientation obtained when defining goal orientation as a three-component concept. Table 22 summarizes the main findings of Study 2.

Table 22. *Study 2: Overview of Specific Research Hypotheses and Main Findings*

Hypotheses	Supported by results?
1. <i>Replication of age-related differences in personal goal orientation</i>	
1.1 The pattern of findings on age-related differences in goal orientation of self-generated goals can be replicated using a two-dimensional conceptualization of goal orientation.	Yes
1.1.1 Younger adults report a primary goal orientation toward growth.	Yes
1.1.2 Older adults report a primary goal orientation toward maintenance–prevention of loss.	Yes
1.1.3 Age-related differences in personal goal orientation remain after controlling for education, sex, and several person variables.	Partly

Studies 1 and 2 referred to the self-report level. To some degree individuals are able to generate and evaluate their goals. As outlined earlier, however, exclusively relying on self-report in research on personal goals raises several problems (cf. Wilson, 2002). There are essentially six critical elements of the response process that directly impinge on the reliability of self-report measures: (a) the content validity of the question, (b) the comprehension of the question, (c) the accessibility to the information requested, (d) the retrieval of the response on the basis of the information at hand, (e) the communication of the response, and (f) the motivation to respond (cf. Park & Schwarz, 2000).

It is especially problematic to exclusively use self-report when investigating a population of elderly people. Given potential age-related decline in cognitive resources (e.g., Park, 2000), even early beginning of dementia, self-report data of older adults may be strongly biased. Several aspects can lead to incongruence of the individual's self-report and the actual conditions (Schwarz et al., 1999). Individuals, for example, need to understand and interpret what the reference of the question is and what behavior and reference period they are supposed to relate to. They have to reconstruct and remember the relevant instances of this behavior—which may often be theory-driven—and evaluate whether it is typical for their usual behavior or not. In this sense, a representation of the relevant behavior is necessary. Unfortunately, answers are likely to be based on some fragmented recall of the behavior under study. Furthermore, in order to compute reasonable frequency estimates, inference rules are applied that bear the risk of systematic biases. Respondents have to format their response such as adjusting their ratings to a given scale or to response alternatives provided by the researcher. To what extent the obtained responses in Studies 1 and 2 were affected by these mechanisms remains an open question.

Studies 3a and 3b: Behavioral Preference for Personal Goal Orientation

Studies 3a and 3b had two central purposes: One goal was to confirm the age-group differences in self-reported goal orientation on the behavioral level. Adopting a multi-method approach in the present dissertation, instead of having respondents verbally report on their goals, I observed their goal selection behavior in Studies 3a and 3b. This allowed the overcoming of the shortcomings of exclusively relying on self-report. To provide participants with specific contexts for selecting their goals, Study 3a investigated behavioral preference for goal orientation in the cognitive domain, while Study 3b referred to physical functioning. The second aim was to study the role of expected resource demands of goals as one factor underlying age-related differences in goal orientation. The presentation of the studies is structured in the following way: The specific common research hypotheses of Studies 3a and 3b are outlined, followed by a report of the methods and the findings of each of the studies. A summary and a short discussion of the findings combine the central results of both studies.

Studies 3a and 3b: Specific Research Hypotheses

Table 23 gives a summary of the major aims and specific research hypotheses proposed in the context of Studies 3a and 3b.

Table 23. *Studies 3a and 3b: Overview of Major Aims and Specific Research Hypotheses*

Hypotheses	
1.	<i>Investigation of age-related differences in personal goal orientation</i>
1.1	There are age-related differences in the behavioral preference for goal orientation.
1.1.1	Younger adults primarily select growth goals.
1.1.2	Older adults primarily select maintenance–prevention of loss goals.
2.	<i>Investigation of the role of expected resource demands of goals to explain age-related differences in personal goal orientation</i>
2.1	When growth and maintenance–prevention of loss goals are described as demanding an equal amount of resources ...
2.1.1	... younger adults primarily select growth goals.
2.1.2	... older adults primarily select maintenance–prevention of loss goals.
2.2	When growth goals are described as demanding more resources than maintenance–prevention of loss goals both age groups primarily select maintenance–prevention of loss goals.

Study 3a: Methods

Procedure

In the process of recruiting participants for Study 3a, volunteers were informed on the phone that the experiment was concerned with personal training of cognitive functions. The study comprised one test session. Data collection took place at the Max Planck Institute within days after the participants' recruitment. Participants arrived in small groups of 1 to 3 and were seated in front of computers separated by partition walls. As in Studies 1 and 2, younger and older adults attended separate sessions. One of two trained research assistants conducted the test sessions in a standardized manner.

At the beginning of the session, participants signed a consent form and responded to a short sociodemographic questionnaire. They were then asked to set up their individual cognitive training program by selecting goals presented on the screen. They were informed that as soon as they had selected their training goals, the self-set training session would start. The computer program provided written instructions on the training program in general, the specific tasks to work on, and the choice between the goals to pursue while doing the training program (see Box C1 in Appendix C). Immediately after participants set up their training program, they completed a short questionnaire. This questionnaire contained a manipulation check and single self-report items on subjective cognitive functioning, importance of, satisfaction with, and frequency of engagement in the cognitive domain. After participants were told that they would not actually have to work on the training program, the Spot-a-Word and the Digit-Symbol Substitution were administered. The research assistant conducting the session was available for upcoming questions and explanations the entire time. The sessions typically took between 40 and 60 minutes. At the end of the session, respondents were debriefed and received 10 Euros (approximately \$ 8) for study participation.

Participants

Recruitment

At random, 113 younger and older adults were recruited for participation in this cross-sectional experimental study. Half of the participants were drawn from the participant pool of the Max Planck Institute.⁵⁸ The other half was recruited through posters, handouts, and newspaper ads. Criteria for study participation were that the respondents were either between 18 and 31 years

⁵⁸ Participants had no previous experience with the specific behavioral tasks administered in this study and had never participated in any study investigating *'personal goals'*.

old (younger adults) or older than 60 years (older adults) and were able and willing to come to the Max Planck Institute once for data collection. Recruitment took place from March to September 2002.

Sociodemographic Characteristics

The sample comprised $n = 55$ younger ($M = 21.8$ years, $SD = 2.3$) and $n = 58$ older adults ($M = 70.9$ years, $SD = 5.2$). Men and women were equally represented in the age groups ($\chi^2_{(1, N = 113)} = .71$, n.s.). Younger and older adults differed significantly in their overall educational status when comparing primary and lower with higher secondary education ($\chi^2_{(1, N = 113)} = 5.15$, $p < .05$). Table 24 presents the sociodemographics of younger and older participants in Study 3a.

Table 24. *Study 3a: Sociodemographic Characteristics of Younger and Older Adults*

		Younger adults ($n = 55$)		Older adults ($n = 58$)	
Age (in years)	Range	18.74–28.22		64.14–84.26	
	<i>M</i>	21.76		70.92	
	<i>SD</i>	2.26		5.18	
Sex	Male	29	(52.7%)	26	(44.8%)
	Female	26	(47.3%)	32	(55.2%)
Marital status	Unmarried	55	(100.0%)	4	(6.9%)
	Married	0	(0.0%)	37	(63.8%)
	Divorced	0	(0.0%)	8	(13.8%)
	Widowed	0	(0.0%)	9	(15.5%)
Children	Yes	0	(0.0%)	56	(96.6%)
	No	55	(100.0%)	2	(3.4%)
Education ^(a)	Primary	2	(3.6%)	10	(17.2%)
	Lower secondary	14	(25.5%)	19	(32.8%)
	Higher secondary	39	(70.9%)	29	(50.0%)
Current occupation ^(b)	Employed ^(c)	5	(9.1%)	5	(8.6%)
	Apprentice	6	(10.9%)	0	(0.0%)
	High school student	5	(9.1%)	0	(0.0%)
	University student	30	(54.5%)	0	(0.0%)
	Homemaker	0	(0.0%)	1	(1.7%)
	Unemployed	6	(10.9%)	0	(0.0%)
	Retired	0	(0.0%)	51	(87.9%)
	Other	4	(7.3%)	0	(0.0%)

Notes.

^(a) Primary = Grund-/Volks-/Hauptschule (8–9 years); Lower secondary = Mittlere Reife/Realschule (10 years); Higher secondary = (Fach-)Abitur/Fach-/Hochschulstudium (more than 13 years)

^(b) Percentages do not add up to 100, since a person can belong to multiple categories.

^(c) One younger woman did not indicate her current employment status.

Cognitive Functioning

To assess objective cognitive functioning, Study 3a used the same performance-based tests as Studies 1 and 2 (see Table A10 in Appendix A). Younger adults in Study 3a differed in their cognitive performance from younger adults recruited in the context of Studies 1 and 2 (Wilks' $\lambda = .89$, $F_{(4, 296)} = 4.65$, $p < .025$, $\eta^2 = .06$). Specifically, younger adults in Study 3a obtained slightly higher scores in the Spot-a-Word test than younger adults in both other samples. Older adults did not differ across the studies (Wilks' $\lambda = .94$, $F_{(4, 290)} = 2.36$, n.s., $\eta^2 = .03$, $1 - \beta = .68$). Table 25 presents the cognitive functioning of younger and older participants in Study 3a. Table C5 in Appendix C reports additional descriptive information on cognitive functioning in the total sample and the younger and older sub-sample.

Table 25. *Study 3a: Cognitive Functioning of Younger and Older Adults: Means, Standard Deviations, Ranges, and Tests of Significant Age-Group Differences*

	Younger adults ($n = 55$)			Older adults ($n = 58$)			t
	M	SD	Range	M	SD	Range	
<i>Cognitive functioning</i>							
Knowledge	24.42	3.12	18–30	27.97	2.75	22–32	-6.42*
Perceptual-motor speed	58.55	9.77	32–79	42.78	9.48	22–62	8.71*

Notes. * $p < .025$ (alpha-level adjustment for 2 repeated analyses); see Table A10 for further information on the instruments to measure cognitive functioning.

Measures

The following sections outline the assessment of goal orientation on the behavioral level as the central measure of Study 3a. Then, the measurement of correlate variables (i.e., goal resources and additional goal characteristics) is presented. If not otherwise indicated, self-report responses were given on seven-point scales ranging from 1 to 7. Table 26 presents the overview of behavioral goal orientation measures, specific instructions, and psychometrical information.

Behavioral Preference for Personal Goal Orientation (Computer Task)

Study 3a assessed behavioral preference for goal orientation toward growth vs. maintenance–prevention of loss in the context of a computer program. Participants completed the experiment on an individual basis. The computer program (including instructions) was implemented on an IBM compatible Pentium computer (Macintosh Power PC) using a 1.2.5 PsyScope program (J. D. Cohen, MacWhinney, Flatt, & Provost, 1993). After reading the initial instructions, participants started the preference-choice task. Subsequently one of five cognitive training tasks

was presented on the screen in a randomized order. Specifically, a picture and a headline describing the respective task were shown. To cover some of the main cognitive components the tasks were (a) solving crossword-puzzles (knowledge), (b) matching geometrical figures (geometrical reasoning), (c) word recall (memory), (d) arithmetics (mathematical skills), and (e) word recognition (vocabulary).

Table 26. *Study 3a: Instruments Assessing Central Variables: Overview and Psychometrical Information*

Construct	Description of measurement instrument
Behavioral preference for personal goal orientation	
	<i>Author:</i> Newly developed
	<i>Computer Task:</i> Five choices between goals oriented toward growth or maintenance-prevention of loss: cognitive functioning
	<i>Score aggregation:</i> Mean score of growth goal orientation across five tasks

Participants were informed that each of the tasks could be approached in two different ways. One approach would aim at improving functions (i.e., goal orientation toward growth), whereas the other would aim at maintaining functions and preventing losses (i.e., goal orientation toward maintenance-prevention of loss). In addition to this within-subject factor, Study 3a comprised two experimental conditions (between-subjects factor), as participants were informed about expected resource demands required by the two different approaches to each of the tasks. In the one condition, growth and maintenance-prevention of loss goals were described as being equally resource-demanding (i.e., equal expected resource demands). In the other condition, growth goals were described as requiring more resources than maintenance-prevention of loss goals (i.e., unequal expected resource demands). Younger and older adults were randomly assigned to one of the two conditions. Table 27 summarizes the design of Study 3a.⁵⁹

Table 27. *Study 3a: Design of the Computer Task on Behavioral Preference for Personal Goal Orientation*

Sample	Information on resources	
	Equal expected resource demands	Unequal expected resource demands
Younger adults	$n = 28$	$n = 27$
Older adults	$n = 28$	$n = 30$

Participants were asked to choose between the growth and the maintenance-prevention of loss approach to each of the five cognitive tasks by pressing the left or right key, respectively, on the keyboard. The assignment of goal orientation toward growth or maintenance-prevention of

⁵⁹ A manipulation check was included that asked participants to indicate in what respect the two approaches to the tasks were different from each other. The check results suggested that goal orientation and resource instructions operated as intended.

loss to the left or right key on the keyboard was counterbalanced across participants. For a detailed presentation of the specific instructions see Box C1 in Appendix C.

As an indicator of a person's behavioral preference for growth goal orientation in the cognitive domain, I divided the individual number of growth goals selected by the total number of choices made. The higher the respective score, the stronger a person's orientation toward growth and the weaker the orientation toward maintenance–prevention of loss with respect to cognitive goals. Table C1 in Appendix C provides descriptive information on these variables in the total sample and in younger and older adults. Thus, Study 3a used a forced-choice format to assess behavioral preference for goal orientation. This could suggest that this study operationalized growth vs. maintenance–prevention of loss as two components along one dimension. Averaging across the five cognitive tasks, however, allowed a weighting of goal orientation toward growth and maintenance–prevention of loss that was consistent with the definition and assessment of the concept in Studies 1 and 2.

Item characteristics of behavioral preference for goal orientation for each of the five cognitive tasks are presented in Tables C2 (equal expected resource demands) and C3 (unequal expected resource demands) in Appendix C. The tables indicate the absolute and the relative frequency of endorsement of the possible choice options in the total sample and in the younger and older sub-samples. In addition, they contain distribution characteristics and item discriminability. Correlations between choice options in the specific tasks and the total score across the five respective tasks (item discriminability) ranged between $r = -.29$ and $r = -.88$. This supported the view that findings on the item level reflected findings on the level of the composite score. Table C4 in Appendix C presents item difficulties (i.e., percentage of responses in an affirmative direction indicating a primary orientation toward growth) across the five tasks separately for the two experimental conditions. Item difficulties ranged between 33% and 86%. Thus, results on the mean group level were confirmed in the individual choice patterns.

Correlate Variables

Goal Resources and Additional Goal Characteristics. As information on goal resources, Study 3a measured two indicators of objective (knowledge and perceptual-motor speed) and one single item on subjective cognitive functioning. Moreover, it assessed three additional goal characteristics: (1) satisfaction with, (2) importance of, and (3) frequency of engagement in the cognitive domain. Tables C5 and C6 in Appendix C present detailed descriptive and psychometrical information on these correlate variables.

Study 3a: Results

I begin by reporting age-related differences in goal orientation of preference-choice behavior. Results on the role of expected resource demands of growth and maintenance–prevention of loss goals as a factor underlying the differences in younger and older adults’ goal orientation follow next.

Personal Goal Orientation in Younger and Older Adults and Role of Expected Resource Demands

Age-Group Differences in Behavioral Preference for Personal Goal Orientation and Expected Resource Demands of Goals as Underlying Factor

As in Studies 1 and 2, a two-step procedure by first testing (*univariate*) overall effects and then conducting the respective *between-* and *within-age-group follow-up analyses* was used to investigate age-group differences in goal orientation on the behavioral level and to examine the role of expected resource demands. A 2 (age group: younger vs. older) x 2 (resource information: equal vs. unequal expected resource demands) univariate ANOVA yielded significant main effects for age group ($F_{(1, 109)} = 7.96, MSE = 20.53, p < .05, \eta^2 = .07$) and resource information ($F_{(1, 109)} = 18.87, MSE = 48.67, p < .05, \eta^2 = .15$). The age group x resource information interaction, however, did not reach significance ($F_{(1, 109)} = .06, MSE = .16, n.s., \eta^2 = .00, 1 - \beta = .06$).^{60, 61} Figure 10 graphically summarizes these findings.

Within-age-group comparisons. Age-group separate, one-sample t-tests explored younger and older adults’ primary goal orientation on the behavioral level. Separately for the conditions of equal and unequal expected resource demands, behavioral preference for growth goal orientation was tested against behavioral preference for goal orientation toward maintenance–prevention of loss. Table 28 reports the respective results.^{62, 63}

⁶⁰ Levene’s test ($p < .05$) indicated departures from the assumption of equality of error variances in the two age groups.

⁶¹ Reanalyzing the data with the Mann-Whitney U test for two independent samples confirmed the findings of the two significant main effects: $U_{\text{Age group}} = 1134, p < .05$; $U_{\text{Resource information}} = 915.5, p < .05$.

⁶² Reanalyzing the data with one-sample t-tests testing the means of behavioral growth goal orientation against the test value of 2.5 (chance level) yielded the same results, with the exception of results for younger adults under the condition of unequal expected resource demands: (1) Younger adults, equal expected resource demands: $t_{(27)} = 4.65, p < .025$; (2) younger adults, unequal expected resource demands: $t_{(26)} = -1.42, n.s.$; (3) older adults, equal expected resource demands: $t_{(27)} = .19, n.s.$; and (4) older adults, unequal expected resource demands: $t_{(29)} = -3.70, p < .025$.

⁶³ Reanalyzing the data with the one-sample Kolmogorov-Smirnov test evidenced the same results, also with the exception of results for younger adults under the condition of unequal expected resource demands: (1) Younger adults, equal expected resource demand: $Z = 1.47, p < .025$; (2) younger adults, unequal expected resource demands: $Z = .79, n.s.$; (3) older adults, equal expected resource demands: $Z = 1.02, n.s.$; and (4) older adults, unequal expected resource demands: $Z = 1.53, p < .025$.

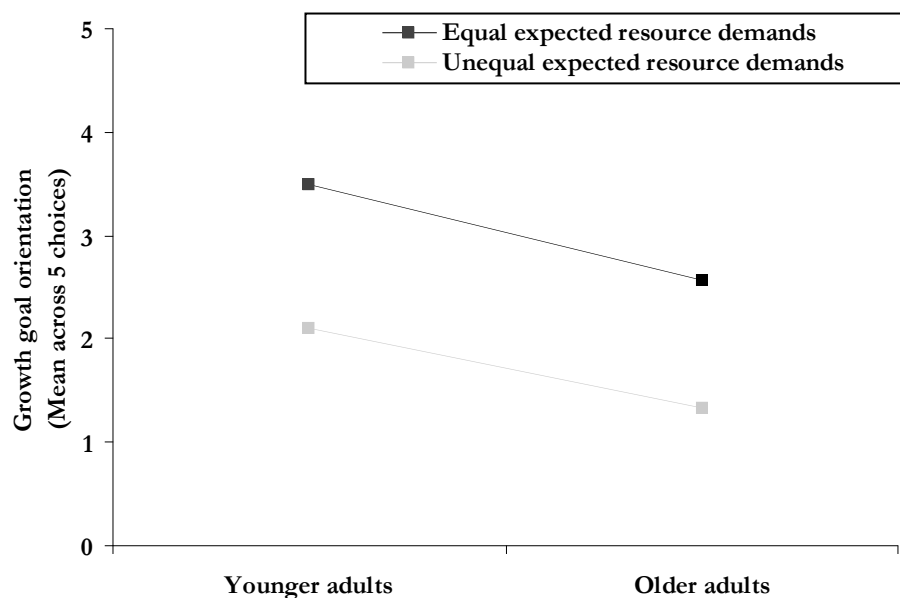


Figure 10. Study 3a: Age-group differences in behavioral preference for personal goal orientation and the role of expected resource demands (cognitive functioning)

Table 28. Study 3a: Within-Age-Group Differences in Behavioral Preference for Personal Goal Orientation: One-Sample *t*-Test Analyses

Information on resources	Growth		Maintenance–Prevention of loss		<i>t</i>	df
	<i>M</i>	<i>SE</i>	<i>M</i>	<i>SE</i>		
<i>Younger adults</i>						
Equal expected resource demands	3.50	.22	1.50	.22	9.30*	27
Unequal expected resource demands	2.11	.27	2.89	.27	-2.84*	26
<i>Older adults</i>						
Equal expected resource demands	2.57	.38	2.43	.38	.37	27
Unequal expected resource demands	1.33	.32	3.67	.32	-7.40*	29

Note. * $p < .025$ (alpha-level adjustment for 2 repeated analyses)

To examine if experimentally manipulating resource information influenced goal orientation in preference-choice behavior within the age groups, two age-separate univariate ANOVAs with one between-subjects variable (resource information) were conducted. The analyses revealed a significant main effect for resource information in the younger ($F_{(1,53)} = 16.03$, $MSE = 26.52$, $p < .025$, $\eta^2 = .23$) and the older sub-sample ($F_{(1,56)} = 6.42$, $MSE = 22.20$, $p < .025$, $\eta^2 = .10$).⁶⁴ Younger and older adults selected growth goals more frequently when growth and maintenance–prevention of loss goals were described as requiring equal amounts of resources

⁶⁴ Reanalyzing the data with the Mann-Whitney *U* test for two independent samples yielded the same results for younger ($U = 179$, $p < .025$) and older adults ($U = 271$, $p < .025$).

than when growth goals were characterized by more resource demands than maintenance–prevention of loss goals (see Figure 10).

In sum, the analyses revealed that there were differences in goal orientation between younger and older adults on the behavioral level with respect to the cognitive domain. Younger compared to older adults selected more growth goals under both experimental conditions, equal and unequal expected resource demands. Unexpectedly, only under the condition of unequal expected resource demands did older adults show a primary behavioral preference for goal orientation toward maintenance–prevention of loss. There was also evidence that experimentally influencing information on expected resource demands by pointing out resource losses when pursuing growth opposed to maintenance–prevention of loss goals, influenced goal selection behavior in both age groups in favor of maintenance–prevention of loss over growth goals.

Associations between growth goal orientation on the behavioral level and goal resources and additional goal characteristics are reported in Table C7 in Appendix C. There was only one significant relation, namely a positive association between behavioral preference for growth goal orientation and perceptual-motor speed. This correlation was in line with results obtained in the context of Studies 1 and 2.

Study 3b: Methods

Procedure

With few exceptions, the testing procedure of Study 3b was identical to the one described for Study 3a. One of these exceptions referred to the information volunteers received on the phone. In Study 3b, they were told that the experiment was concerned with personal training of physical functions. Box C2 in Appendix C presents instructions given on the screen on the physical training program in general, the specific physical tasks to work on, and the choice between goals to pursue while doing the training program. Different from Study 3a, Study 3b asked for self-report information on subjective health, importance of, satisfaction with, and frequency of engagement in the physical domain.

Participants

Recruitment

101 younger and older adults were randomly sampled for participation in Study 3b. Recruitment criteria, procedure, and time were identical to Study 3a.

Sociodemographic Characteristics

The effective sample of Study 3b consisted of $n = 52$ younger ($M = 24.2$ years, $SD = 2.9$) and $n = 49$ older adults ($M = 69.4$ years, $SD = 5.6$). Men and women were equally represented in both age groups ($\chi^2_{(1, N = 101)} = .00$, n.s.). Younger and older respondents differed in their overall educational status when comparing primary and lower with higher secondary education ($\chi^2_{(1, N = 100)} = 30.29$, $p < .05$). Table 29 gives an overview of the sociodemographic characteristics of the younger and older participants in Study 3b.

Table 29. *Study 3b: Sociodemographic Characteristics of Younger and Older Adults*

		Younger adults ($n = 52$)	Older adults ($n = 49$)
Age (in years)	Range	18.93–30.96	60.01–86.05
	M	24.18	69.37
	SD	2.93	5.62
Sex	Male	23 (44.2%)	22 (44.9%)
	Female	29 (55.8%)	27 (55.1%)
Marital status	Unmarried	52 (100%)	5 (10.2%)
	Married	0 (0.0%)	30 (61.2%)
	Divorced	0 (0.0%)	10 (20.4%)
	Widowed	0 (0.0%)	4 (8.2%)
Children	Yes	1 (1.9%)	42 (85.7%)
	No	51 (98.1%)	7 (14.3%)
Education ^{(a)(b)}	Primary	0 (0.0%)	12 (24.4%)
	Lower secondary	3 (5.8%)	15 (30.6%)
	Higher secondary	49 (94.2%)	21 (42.9%)
Current occupation ^(c)	Employed	4 (7.7%)	1 (2.0%)
	Apprentice	0 (0.0%)	0 (0.0%)
	High school student	8 (15.4%)	0 (0.0%)
	University student	40 (76.9%)	1 (2.0%)
	Homemaker	0 (0.0%)	9 (18.4%)
	Unemployed	2 (3.8%)	0 (0.0%)
	Retired	0 (0.0%)	42 (85.7%)
	Other	0 (0.0%)	1 (2.0%)

Notes.

^(a) Primary = Grund-/Volks-/Hauptschule (8–9 years); Lower secondary = Mittlere Reife/Realschule (10 years); Higher secondary = (Fach-)Abitur/Fach-/Hochschulstudium (more than 13 years)

^(b) One older woman did not specify her educational status.

^(c) Percentages do not add up to 100, since a person can belong to multiple categories.

Cognitive Functioning

The same performance-based tests were administered as in Study 3a (see Table A10 in Appendix A). With respect to cognitive functioning, younger adults in the present sample differed from younger adults recruited in the other three studies (Wilks' $\lambda = .85$, $F_{(6, 398)} = 5.72$, $p < .025$, $\eta^2 =$

.08). Specifically, younger adults in Study 3b scored slightly higher in the Spot-a-Word test than younger adults in Studies 1 and 2. Older adults did not differ across these samples (Wilks' $\lambda = .94$, $F_{(6, 386)} = 2.01$, n.s., $\eta^2 = .03$, $1 - \beta = .73$). Cognitive functioning of younger and older adults in Study 3b is presented in Table 30. Table C12 in Appendix C provides additional descriptive information on cognitive and physical functioning in the total sample and in the younger and older sub-samples.

Table 30. *Study 3b: Cognitive Functioning of Younger and Older Adults: Means, Standard Deviations, Ranges, and Tests of Significant Age-Group Differences*

	Younger adults ($n = 52$)			Older adults ($n = 49$)			t
	M	SD	Range	M	SD	Range	
<i>Cognitive functioning</i>							
Knowledge	24.29	3.33	18–30	27.92	2.76	22–32	-5.94*
Perceptual-motor speed	62.23	9.28	32–79	43.24	7.87	29–62	11.06*

Notes. * $p < .025$ (alpha-level adjustment for 2 repeated analyses); see Table A10 for further information on the instruments to measure cognitive functioning.

Measures

Next, I outline the measurement of goal orientation on the behavioral level as the central variable in Study 3b. The additional self-report measures on goal resources and additional goal characteristics were equivalent to the ones used in Study 3a.

Behavioral Preference for Personal Goal Orientation (Computer Task)

The computer program to assess behavioral preference for goal orientation toward growth vs. maintenance–prevention of loss was equivalent to the one used in Study 3a and identically administered. The only difference was that it referred to the domain of physical functioning. The respective five physical training tasks covered five central physical functions: (a) lifting free weights (muscle strength), (b) walking or jogging on a treadmill (endurance), (c) working out on a rowing machine (speed), (d) bicycling (lung function), and (e) walking or jogging under heart rate control (cardiovascular function). Younger and older adults were again randomly assigned to one of the two experimental conditions (i.e., resource information on equal vs. unequal expected resource demands of goals; see Box C2 in Appendix C).⁶⁵ The numbers of participants in each condition are presented in Table 31.

⁶⁵ Again a manipulation check was included. It showed that goal orientation and resource instructions operated as intended.

Table 31. *Study 3b: Design of the Computer Task on Behavioral Preference for Personal Goal Orientation*

Sample	Information on resources	
	Equal expected resource demands	Unequal expected resource demands
Younger adults	$n = 28$	$n = 24$
Older adults	$n = 24$	$n = 25$

I calculated the indicator of a person's behavioral preference for growth goal orientation by dividing the individual number of growth goals selected by the total number of choices made. The higher a person's respective score the stronger the goal orientation toward growth and the weaker the orientation toward maintenance–prevention of loss in the physical domain. Table C8 in Appendix C reports descriptive information on goal orientation in preference-choice behavior for physical functioning for the total sample and in the age-group sub-samples.

The item characteristics of behavioral preference for goal orientation for each of the five physical tasks are summarized in Tables C9 (equal expected resource demands) and C10 (unequal expected resource demands) in Appendix C. The item discriminability of the five tasks ranged between $r = -.26$ and $r = -.75$, indicating that the findings on the item level reflected the findings on the level of the composite score. The item difficulties ranged between 8% and 79%. This suggested that findings on the mean group level were confirmed in the individual choice patterns (see Table C11 in Appendix C).

Correlate Variables

Goal Resources and Additional Goal Characteristics. Measurement of goal resources and additional goal characteristics in Study 3b diverged from the measurement in the context of Study 3a in that respondents evaluated subjective functioning, satisfaction, importance, and frequency of engagement with respect to the physical domain. Table C12 in Appendix C presents detailed descriptive information on these correlate variables (for psychometrical information, compare Table C6 in Appendix C).

Study 3b: Results

Personal Goal Orientation in Younger and Older Adults and Role of Expected Resource Demands

Age-Group Differences in Behavioral Preference for Personal Goal Orientation and Expected Resource Demands of Goals as Underlying Factor

As in all other studies, the two-step procedure was used to test age-group differences in behavioral preference for goal orientation and the role of expected resource demands in the physical functioning domain. A 2 (age group: younger vs. older) x 2 (resource information: equal vs. unequal expected resource demands) univariate ANOVA yielded significant main effects for age group ($F_{(1, 97)} = 39.39$, $MSE = 59.03$, $p < .05$, $\eta^2 = .29$) and resource information ($F_{(1, 97)} = 29.41$, $MSE = 44.07$, $p < .05$, $\eta^2 = .23$). In addition, other than in Study 3a, the age group x resource information interaction reached significance ($F_{(1, 97)} = 8.51$, $MSE = 12.75$, $p < .05$, $\eta^2 = .08$).⁶⁶ Figure 11 gives a graphical summary of these results.

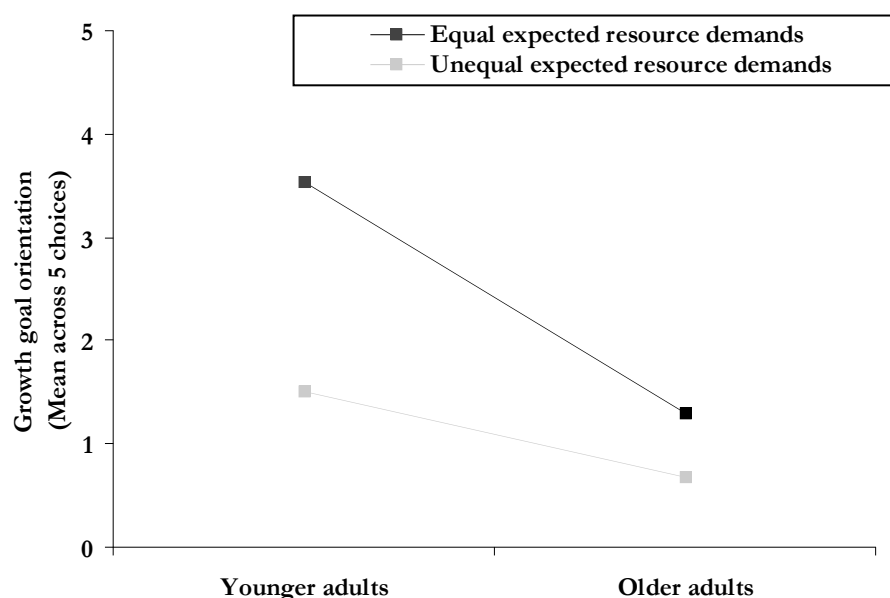


Figure 11. Study 3b: Age-group differences in behavioral preference for personal goal orientation and the role of expected resource demands (physical functioning)

Within-age-group comparisons. Age-group separate, one-sample t-tests explored younger and older adults' primary behavioral goal orientation by testing separately for equal and unequal expected resource demands if behavioral preference for growth goal orientation differed from

⁶⁶ Reanalyzing the data with the Mann-Whitney U test for two independent samples confirmed the findings of the two significant main effects: $U_{\text{Age group}} = 565.5$, $p < .05$; $U_{\text{Resource information}} = 685$, $p < .05$.

behavioral preference for goal orientation toward maintenance–prevention of loss. Table 32 summarizes the findings.^{67, 68}

Finally, I run two age-group separate univariate ANOVAs with resource information as between-subjects variable to investigate the influence of experimentally manipulating resource information on behavioral preference for goal orientation within the age groups. There was a significant main effect for resource information in the younger ($F_{(1, 50)} = 31.52, MSE = 53.56, p < .025, \eta^2 = .39$) but not in the older sub-sample ($F_{(1, 47)} = 3.57, MSE = 4.58, n.s., \eta^2 = .07, 1 - \beta = .46$).⁶⁹ Younger adults selected growth goals more frequently when growth and maintenance–prevention of loss goals were described as demanding equal amounts of resources than when growth goals were characterized by more resource demands than maintenance–prevention of loss goals. Older adults, by contrast, did not differ in their behavioral preference for goal orientation as a function of resource information (see Figure 11).

Table 32. *Study 3b: Within-Age-Group Differences in Behavioral Preference for Personal Goal Orientation: One-Sample t-Test Analyses*

Information on resources	Growth		Maintenance–Prevention of loss		<i>t</i>	df
	<i>M</i>	<i>SE</i>	<i>M</i>	<i>SE</i>		
<i>Younger adults</i>						
Equal expected resource demands	3.54	.27	1.46	.27	7.56*	27
Unequal expected resource demands	1.50	.23	3.50	.23	-8.88*	23
<i>Older adults</i>						
Equal expected resource demands	1.29	.26	3.71	.26	-9.35*	23
Unequal expected resource demands	.68	.20	4.32	.20	-18.42*	24

Note. * $p < .025$ (alpha-level adjustment for 2 repeated analyses)

Summarizing the results, age-group differences in behavioral preference for goal orientation were more pronounced in the physical (Study 3b) than in the cognitive domain (Study 3a). While older adult primarily selected maintenance–prevention of loss goals under both experimental conditions, younger adults selected more growth goals under equal expected

⁶⁷ Reanalyzing the data with one-sample t-tests testing the means of behavioral growth goal orientation against the test value of 2.5 (chance level) yielded the same results: (1) Younger adults, equal expected resource demands: $t_{(27)} = 3.77, p < .025$; (2) younger adults, unequal expected resource demands: $t_{(23)} = -4.44, p < .025$; (3) older adults, equal expected resource demands: $t_{(23)} = -4.67, p < .025$; and (4) older adults, unequal expected resource demands: $t_{(24)} = -9.21, p < .025$.

⁶⁸ Reanalyzing the data with the one-sample Kolmogorov-Smirnov test mostly yielded the same results: (1) Younger adults, equal expected resource demand: $Z = 1.06, n.s.$; (2) younger adults, unequal expected resource demands: $Z = 1.06, n.s.$; (3) older adults, equal expected resource demands: $Z = 1.06, n.s.$; and (4) older adults, unequal expected resource demands: $Z = 1.77, p < .025$.

⁶⁹ Reanalyzing the data with the Mann-Whitney U test for two independent samples yielded the same results for younger ($U = 96.5, p < .025$) and older adults ($U = 212, n.s.$).

resource demands and more maintenance–prevention of loss goals under unequal demands. This showed that across the two conditions younger adults were strongly influenced by experimentally manipulating resource information.

Table C13 in Appendix C reports the correlations between behavioral preference for growth goal orientation and correlate variables (i.e., goal resources and additional goal characteristics). Only two relations yielded significance, namely a negative association between growth goal orientation and knowledge and a positive association between growth goal orientation and perceptual-motor speed. These correlations were in line with results obtained in the other studies reported.

Studies 3a and 3b: Summary and Short Discussion of the Findings

This section jointly discusses the main results of Studies 3a and 3b. Both studies aimed at replicating age-related differences in self-reported goal orientation on the level of preference-choice behavior. Study 3a referred to cognitive and Study 3b to physical functioning. In addition, the role of expected resource demands of growth and maintenance–prevention of loss goals as a factor underlying the age-group differences was tested.

Studies 3a and 3b showed differences in behavioral preference for goal orientation in early and late adulthood. Younger adults selected more growth goals in the cognitive and the physical domain when both types of goals were characterized as equally resource-demanding. That is, younger adults showed the expected primary orientation toward growth in the cognitive and the physical domain. Older adults selected more maintenance–prevention of loss physical goals, but equally often set growth and maintenance–prevention of loss cognitive goals under this condition. Thus, with respect to physical functioning they showed the expected stronger orientation toward maintenance–prevention of loss. In the cognitive domain, however, they showed no primary goal orientation. As hypothesized, when growth goals were described as demanding more resources than maintenance–prevention of loss goals, for both age groups a stronger behavioral preference for maintenance–prevention of loss was found. This suggests that manipulating expected resource demands of growth and maintenance–prevention of loss goals influences younger adults' goal orientation in the cognitive and physical domain and older adults' goal orientation in the cognitive domain in favor of maintenance–prevention of loss.

Interestingly, the age-related differences in goal orientation and the influence of expected resource demands on behavioral preference for goal orientation were more pronounced in the physical than the cognitive domain. This finding clearly diverges from results of Studies 1 and 2. One interpretation could be that in the context of Studies 3a and 3b physical as compared to cognitive functioning was more important for older than younger adults. Post-hoc analyses

supported these assumptions: Older adults rated both domains as more important than younger adults and they evaluated the physical domain as more important than the cognitive domain.⁷⁰ Alternatively, it is possible that the specific physical tasks presented in the computer program (e.g., lifting free weights) were less familiar and interesting to older adults than the tasks presented in the cognitive domain (e.g., solving crossword-puzzles). Older adults might have felt more competent to solve the cognitive tasks. This could have led to a stronger growth goal orientation in older adults in the cognitive compared to the physical domain. Future research is needed to solve this inconsistent empirical pattern with respect to age-related differences in personal goal orientation of cognitive and physical functioning across the four studies of this dissertation.

When interpreting the findings on expected resource demands as a mechanism underlying age-related differences in goal orientation, one needs to take into consideration that Studies 3a and 3b adopted between-subjects designs. This does not allow the conclusion that manipulating information on expected resource demands of goals *changed* a person's behavioral goal orientation. That is, the differences do not represent intraindividual change in a more general sense, but rather constitute differences within the younger respectively older age group that might also have in parts been influenced by the specific tasks. In addition to reasons of parsimony of the study design, this between-subjects design was adopted for two practical reasons. After participants had set up their personal training program, they were told that they would not actually have to perform the selected tasks. Moreover, participants were provided with information on equal or unequal expected resource demands to pursue the two types of goals. Thus, both instructions made it practically impossible to use a within-subject design because they probably would have caused priming and frame-switching effects. Future research, however, needs to adopt a within-subject design to test the influence of expected resource demands on intraindividual change in the goal orientation of younger and older adults.

The high temporal stabilities of self-reported goal orientation detected in Study 1 proposed that goal orientation as conceptualized in this dissertation covers dispositional, moment- and situation-unspecific aspects. Studies 3a and 3b aimed at showing that situation-specific information, such as that on equal vs. unequal expected resource demands of goals, can influence behavioral preference for goal orientation. Again, gaining a clearer picture on malleability and situation-dependency of goal orientation in early and late life would have required a within-

⁷⁰ A 2 (goal domain: cognitive vs. physical) x 2 (age group: younger vs. older) univariate ANOVA on importance of goal domain across Studies 3a and 3b yielded significant main effects for goal domain ($F_{(1, 158)} = 32.53, MSE = 29.70, p < .05, \eta^2 = .17$) and age group ($F_{(1, 158)} = 22.54, MSE = 20.57, p < .05, \eta^2 = .13$). In addition, the goal domain x age group reached significance ($F_{(1, 158)} = 9.82, MSE = 8.97, p < .05, \eta^2 = .06$). However, one needs to be careful when interpreting these results, as information on the importance of cognitive functioning under equal resources was not available. This missing information probably impacted upon the overall importance ratings of cognitive functioning.

subject design. Still, this result supports the idea that the present dissertation's definition of goal orientation covers both chronically accessible as well as situational aspects (cf. Higgins & Silberman, 1998). Table 33 summarizes the main results of Studies 3a and 3b.

Table 33. *Studies 3a and 3b: Overview of Specific Research Hypotheses and Main Findings*

Hypotheses	Supported by results?
1. <i>Investigation of age-related differences in personal goal orientation</i>	
1.1 There is an age-related difference in the behavioral preference for goal orientation.	Yes
1.1.1 Younger adults primarily select growth goals.	Yes
1.1.2 Older adults primarily select maintenance–prevention of loss goals.	Partly
2. <i>Investigation of the role of expected resource demands of goals to explain age-related differences in personal goal orientation</i>	
2.1 When growth and maintenance–prevention of loss goals are described as demanding an equal amount of resources ...	
2.1.1 ... younger adults primarily select growth goals.	Yes
2.1.2 ... older adults primarily select maintenance–prevention of loss goals.	Partly
2.2 When growth goals are described as demanding more resources than maintenance–prevention of loss goals both age groups primarily select maintenance–prevention of loss goals.	Partly