5 Results

The results section is divided into four parts. In the first part, the central predictors (health and vision, personal and social resources, and self-regulation variables) and adaptational criteria (well-being and functional status in everyday life) are described. Age trends and differences between the a priori defined age groups in status and change of the variables and constructs are examined. Additionally, an overview of the bivariate associations among the predictor variables and the outcome variables within and across the measurement occasions is provided.

The second part deals with correlates of adaptation to vision and health problems prior to surgery (cross-sectional results). First, the relative predictive power of health and vision status, resources and life investment in the prediction of the criteria is examined. After that, mediating mechanisms and potential moderators in the adaptational process (age, duration of vision problems, and risk status) are analyzed.

The issue of resiliency in face of cumulative health constraints is again addressed in part three. Here, patients are grouped according to their risk profile and adaptational status and compared with respect to the *level* of their resources, regulation life investment and endorsement in coping strategies prior to surgery.

In the final section, correlates of adaptation to changes in visual acuity (both one and six weeks after surgery) are analyzed. Here, the relative predictive power of health and vision status, resources and life investment in the prediction of (a) the criteria and (b) changes in the criteria is examined. The chapter ends with the analysis of mediators and moderators in the process of post-surgical adaptation.

Part I
Age-Group Differences, Status and Change in the Central Variables and their Interrelations

5.1. Vision and Health

In this section, the objective and subjective indicators of health and vision are described. Age differences in status and change of these indicators are outlined and it is analyzed how they were associated with each other and with the health variables. Finally, it will be examined whether there were age differences in direction and strength of the associations between the health and vision indicators.

The descriptive statistics of the variables for the total sample and the three age groups can be found in Appendix A.

5.1.1. Visual Status and Age-Group Differences in Pre- and Post-Surgery Visual Acuity

Best-corrected distance vision (in Snellen-Decimals) was assessed at all three measurement occasions in both eyes separately. Two indicators were derived from this information: vision in the eye operated on (operative eye) and vision in the better eye (see 4.4.5).

For most patients ($\underline{N}$ = 101, 74%), the operative eye was equivalent to the *worse* eye prior to surgery. There was only a small correlation between acuity in the better eye and acuity in the operative eye ($\underline{r}$ = .19, $p \leq .05$), thus, these two indicators seemed to be almost independent of each other. In other words: problems in the operative eye did not necessarily reflect poor vision in the other eye.

According to the degree of visual acuity in the better eye, participants were divided into three groups: those with mild or no impairment (> 0,8 Snellen-Decimals), those with moderate impairment (0,5 - 0,8) and those with severe impairment (< 0,5; see chapter 4). Table 5.1 displays the distribution of this grouping variable pre- (T1) and post-surgery (T3 and T4). There were significant shifts in the distribution from T1 to T3, so that more people fell into the category of "no or mild impairment" after surgery.

Table 5.1

Degree of impairment in the better eye

	None or Mild (> 0,8)	Moderate (0,5 - 0,8)	Severe (< 0,5)	Sign.-Test[a]
T1	45 (33.1%)	56 (41.2%)	35 (25.7%)	
T3	72 (52.9%)	56 (41.2%)	8 (5.9%)	** (T1 and T3)
T4	78 (57.4%)	52 (38.2%)	6 (4.4%)	n.s. (T3 and T4)

[a] McNemar-Test of null hypothesis of equal distribution throughout occasion T1 and T3, and T3 and T4
** $p \leq .01$

Bivariate correlations of the vision indicators with age are shown in Table 5.2 (page 125). Prior to surgery, age differences in vision were mainly due to differences between the old (> 75 years) and the middle-aged participants (see Table A1, Appendix A). The old group had significantly lower vision in the better eye, but not in the operative eye. The young old did not differ from the two other age groups. Post surgery, the differences were even more pronounced. At both T3 and T4, the oldest participants had significantly lower visual acuity than both other age groups in both the operative eye and the better eye. Overall, age-group membership accounted for 4-6% of the variance in vision indicators prior to surgery, and 10-15% of the variance post-surgery.

5.1.2. Change in Vision

A major assumption underlying many of the hypotheses was that most participants in this study experienced a gain in visual acuity due to surgery. In addition, interindividual differences in the amount and direction of change in vision were expected. Specifically, the following assumptions were analyzed: (a) not all participants experienced the same amount of change in visual acuity (rank-order stability), (b) on the mean level, there were significant changes in all vision indicators, (c) there were age differences in the changes and (d) not everybody had improved vision after surgery (direction of change).

Stability across Measurement Occasions

The correlations among the vision indicators across the three measurement occasions are shown in Table B3, Appendix B. Across the three occasions there was a fairly high rank-order stability for the better eye, with correlations ranging from .66 to .81. Due to differences in baseline vision, surgical treatment resulted in differential changes in the operative eye. Therefore, the correlations between T1 and T3, and T1 and T4 were not significant. Post surgery, stability in operative eye acuity between T3 (after one week) and T4 (after six weeks) was relatively high ($r = .64$, $p < .01$), but there still seemed to be differential changes.

Mean Level Changes

On the mean level, there were significant changes in visual acuity across all three measurement occasions. Repeated measures analyses of variance yielded main effects for measurement occasion for the operative eye and for the better eye (see Table 5.2). Analyses of specific contrasts of adjacent occasions revealed that post-surgery acuity after one week (T3) was significantly higher than pre-surgery acuity (T1) in both the operative eye ($F(1,135) = 89.85$, $p \leq .01$; $Eta^2 = .40$) and the better eye ($F(1,135) = 69.01$, $p \leq .01$; $Eta^2 = .34$). Also, there were significant changes from T3 to T4 in the operative eye ($F(1,135) = 33.83$, $p \leq .01$; $Eta^2 = .20$) and in the better eye ($F(1,135) = 8.33$, $p \leq .01$; $Eta^2 = .06$). Thus, there were still changes in vision within the five week period between the two post-surgery occasions. Accordingly, mean change in vision at T3 (as indicated by the difference between T3 and T1) was significantly smaller than mean change at T4 (difference between T4 and T1).

Age-Group Differences

With increasing age, participants had less change in the operative eye after six weeks and tended to have less change after one week (see Table 5.2). Correspondingly, a repeated measures analysis of variance with the between subjects factor age group yielded a significant interaction occasion*age group only for the contrast between T4 and T1 ($\underline{F}(2,133) = 3.08$, $p \leq .05$; $\underline{Eta}^2 = .05$) which was due to the oldest participants who had less change than the young old and the middle-aged participants (for age-group means see Table A1, Appendix A).

Changes in the *better* eye seemed to be independent of participant's age. In Figure 5.1 pre- and post-surgical changes in better eye and operative eye vision in the three age groups are displayed graphically.

Table 5.2

Changes and age trends in vision indicators

		M *(SD)*					
		T1	T3	T4	F^a	df^b	Eta^2
Vision in operative eye		.44 *(.18)*	.69 *(.24)*	.78 *(.20)*	132.13**	1.6	.49
	r_{Age}	-.05	-.23**	-.33**			
Vision in better eye		.71 *(.21)*	.82 *(.17)*	.85 *(.17)*	71.97**	1.6	.35
	r_{Age}	-.22**	-.33**	-.30**			
Change in operative eye			.25 *(.30)*	.34 *(.25)*	33.83**	1	.20
	r_{Age}		-.15†	-.22**			
Change in better eye			.12 *(.16)*	.14 *(.17)*	8.33**	1	.06
	r_{Age}		-.06	-.01			

[a] Repeated measures analyses of variance across the three occasions, for follow up contrast analyses see text
[b] The Mauchly test indicated violation of the sphericity assumption here (p < .01). Since this test is highly influenced by departures from normality, the Greenheouse-Geisser estimator was used instead which indicated that departures from sphericity were tolerable (ε = .83 / .80). Significance of the F ratios was therefore evaluated against the adjusted degrees of freedom.
† p ≤ .10; * p ≤ .05; ** p ≤ .01

Direction of Change

Despite a general trend towards improvement of visual acuity, surgery was not successful for all participants. One week after surgery (T3), vision in the operative eye had improved in 106 patients (78%). Eight patients (6%) had no improvement, 22 (16%) had worse visual acuity than before the surgery. After six weeks 121 patients (89%) had improved vision, six (4%) had no change and nine (7%) still had worse vision in the operative eye than before. Changes in the *better* eye after six weeks were positive for 95 (70%) patients, negative for 14 (10%) patients[21] and 27 (20%) had no change in that functional indicator.

5.1.3. Subjective Impairment through Vision Problems

At all three measurement occasions, participants were asked to rate the degree to which they currently felt impaired by their vision problems on a 4-point scale. The distributions of responses across the occasions are shown in Table 5.3. As indicated by the McNemar test, there were significant shifts in responses towards less subjective impairment over time.

Correspondingly, on the mean level, there was a significant reduction in reported impairment from pre- ($\underline{M}_{T1}$ = 2.41, $\underline{SD}$ = .63) to post-surgery ($\underline{M}_{T3}$ = 2.02, SD = .77; $\underline{M}_{T4}$ = 1.82, SD = .74; $\underline{F}(2,270) = 41.08$, $p \leq .01$; $\underline{Eta}^2 = .23$). Analyses of specific contrasts of adjacent occasions revealed that subjective impairment after one week (T3) significantly differed from pre-surgery impairment ($\underline{F}(1,135) = 33.86$, $p \leq .01$; $\underline{Eta}^2 = .20$) and that there was another significant reduction in impairment from one to six weeks after surgery ($\underline{F}(1,135) = 11.08$, $p \leq .01$; $\underline{Eta}^2 = .08$). Rank-order stability in the impairment ratings was moderate from T1 to T3 and from T3 to T4 (see Table 5.4).

Table 5.3

Degree of subjective impairment experienced by vision problems

	None	Little	Very much	Extreme	Sign.-Test[a]
T1	3 (2.2%)	81 (59.6%)	45 (33.1%)	7 (5.1%)	
T3	32 (23.5%)	76 (55.9%)	21 (15.4%)	7 (5.1)	** (T1 and T3)
T4	47 (34.6%)	72 (52.9%)	12 (8.8%)	5 (3.7)	** (T3 and T4)

[a] McNemar-Test of null hypothesis of equal distribution throughout occasion T1 and T3, and T3 and T4
** $p \leq .01$

Age-Group Differences

Age was negatively related to subjective impairment only prior to surgery ($\underline{r} = -.34$, $p \leq .01$). Age-group comparisons revealed that middle-aged patients reported the highest impairment in contrast to the two other groups (see Table A1, Appendix A; also see Figure 5.1). One week after surgery, there were no age-group differences and after six weeks the oldest group reported the highest impairment.

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[21] Among these, 5 patients had a slight decrease in vision between t3 and t4 in the eye that was not operated on (range between 0,09 and 0,23 Snellen Decimals). At the same time, their vision in the operative eye had improved but was still smaller than vision in the other eye, thus these negative changes in the *better* eye.

As indicated by these differences, *change* in subjective impairment varied between age groups. In addition to the above reported main effect of measurement occasion, the interaction term occasion*age group was also highly significant ($F(4,266) = 6.16$, $p \leq .01$; $Eta^2 = .09$). Tests of within-subjects contrasts revealed that there was differential change only from pre- to post-surgery ($F(1,133) = 5.91$, $p \leq .01$; $Eta^2 = .09$ for the contrast between T1 and T3, and $F(1,133) = 10.78$, $p \leq .01$; $Eta^2 = .14$ for the contrast between T1 and T4). From T3 to T4, no differential change was observed. Change in subjective impairment was highest for the middle-aged patients ($M_{T3-T1} = -.75$; $M_{T4-T1} = -1.1$) and lowest for the oldest ($M_{T3-T1} = -.17$; $M_{T4-T1} = -.26$), the young old had scores in between ($M_{T3-T1} = -.40$; $M_{T4-T1} = -.65$).

Do these differences reflect objective differences in visual acuity between the age groups? As indicated by the correlations between age and visual status pre- and post-surgery (see Table 5.4), this was not the case for the middle-aged participants but it was for the older patients. Prior to surgery, there were no age differences in visual acuity in the operative eye and even a negative age trend for the better eye, indicating that middle-aged patients had better visual acuity while feeling more impaired. Post-surgery, age-group comparisons revealed that old participants had significantly worse visual acuity (in both the better and the operative eye) than the other two age groups (see Table A1, Appendix A).

This completely accounted for the observed age-group difference in subjective impairment, as indicated by a non-significant F test ($F(2;133) = 2.49$, n.s.) when introducing visual acuity at T4 as a covariate in the age group comparison.

Gender Differences

It is worth noting that women reported higher levels of subjective impairment than men at all occasions. This difference was only significant prior to surgery ($M_{Women} = 2.16$ ($SD = .94$); $M_{Men} = 1.88$ ($SD = .83$); $F(1;134) = 7.98$, $p \leq .01$; $Eta^2 = .06$). There were no gender differences in visual acuity at either occasion, nor were there differences in acuity change.

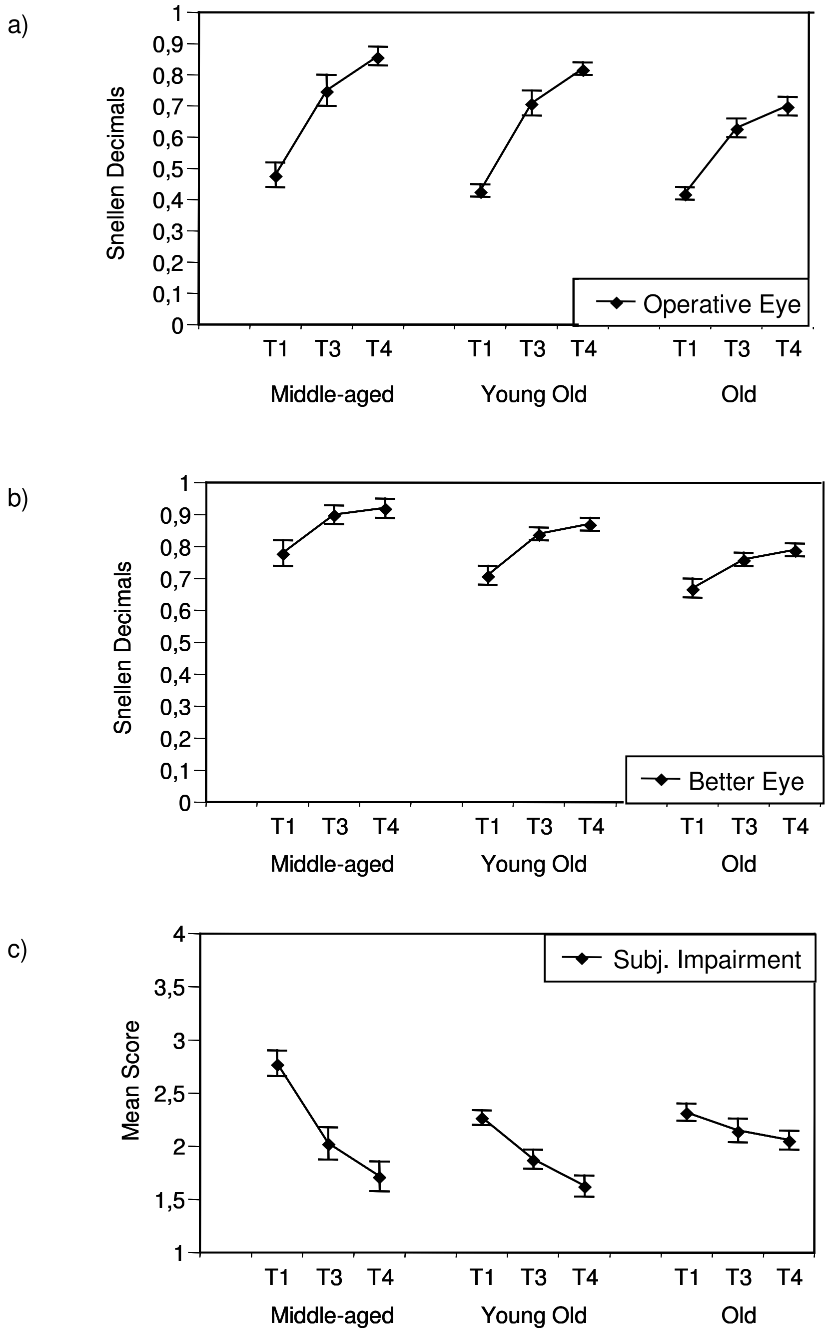

Figure 5.1 *Vision indicators in the three age groups prior to (T1) and one and six weeks after surgery (T3 and T4): (*a) o*perative eye visual acuity, (b) better eye visual acuity and (c) subjective impairment experienced by vision problems*

Note: Error bars represent one standard error of the mean

5.1.4. Associations between Visual Acuity and Subjective Impairment

Table 5.4 gives an overview of the bivariate correlations between the subjective impairment experienced by vision problems and the objectively measured vision indicators. As expected, vision in both operative and better eye was inversely related to subjective impairment at all occasions. Moreover, the more *change* participants had in their operative eye, the less they felt impaired one ($\underline{r}$ = -.23, p ≤ .01) and six weeks after surgery ($\underline{r}$ = -.26, p ≤ .01). However, the latter coefficients dropped below significance after controlling for visual *status* ($\underline{r}_{partial}$ = -.16, n.s. at T3, and $\underline{r}_{partial}$ = -.13, n.s. at T4).

Table 5.4

Stability and age trends in subjective impairment experienced through vision problems, and cross-sectional correlations with objective indicators of vision

		Subjective impairment			
		T1	T3	T4	Age
Subjective impairment	T1	--	**.39****	**.28****	**-.34****
	T3		--	**.55****	-.03
	T4			--	.12
Operative eye		**-.19***	**-.31****	**-.32****	
Better eye		**-.17***	**-.32****	**-.40****	

* p ≤ .05; ** p ≤ .01

5.1.5. Duration of Vision Problems

It was hypothesized that poor visual acuity is negatively associated with a variety of adaptational outcomes. In addition to the current visual status, the impact of vision problems on well-being and daily-life activities might critically depend on the *duration* of the problems. As outlined in the method section (4.4.5), the duration of the subjective vision impairment was selected as the critical variable here. Figure 5.2 displays the distribution of this variable in the total sample. Only a minority of participants suffered from subjective impairment for more than one year ($\underline{N}$ = 39; 29%).

How was this variable associated with indicators of visual functioning and change in visual acuity?

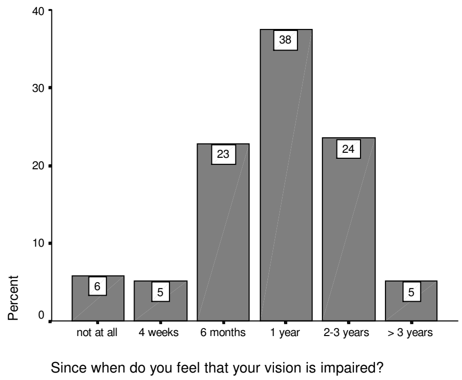

Figure 5.2 *Duration of subjective visual impairment*

Neither the objective status of visual acuity nor the acuity change were associated with how long the subjective impairment had existed (see Table B3, Appendix B). Only the *current subjective vision impairment* was positively associated with the duration of these problems prior to surgery ($\underline{r} = .26$, $p \leq .01$) and one week after it ($\underline{r} = .20$, $p \leq .05$).

5.1.6. Health Indicators

Two indicators of general health status were chosen: multimorbidity and average subjective strain experienced by health problems other than cataract (subjective health strain). For descriptives and results of age-group comparisons see Table A3, Appendix A.

Multimorbidity

Multimorbidity was indicated by the number of additional diagnoses at T1. On average, participants had 2.5 diagnoses ($\underline{M}_{middle\text{-}aged} = 2.25$, $\underline{SD} = 1.41$; $\underline{M}_{young\ old} = 2.28$, $\underline{SD} = 1.71$; $\underline{M}_{old} = 2.76$, $\underline{SD} = 1.48$). 13 participants (9.6 %) had no additional disease. 44% of the middle-aged, 42% of the young old and 55% of the old had more than two additional diagnoses (Figure 5.3).

There was a slightly positive age trend for this indicator (r = .10, n.s.). Accordingly, there was no significant difference between the three age groups ($\underline{F}(2,133) = 1.60$, n.s.)[22]. This result is in line with recent studies showing that the development of a cataract in middle age is accompanied by an increased prevalence of chronic health problems. To get a more detailed picture, the occurrence of each single disease was compared between age groups (see Figure A1, Appendix A). None of these comparisons was significant.

[22] When excluding the two young-old participants with seven additional diagnoses, and the three old participants with six diagnoses, there was still no significant difference between age groups.

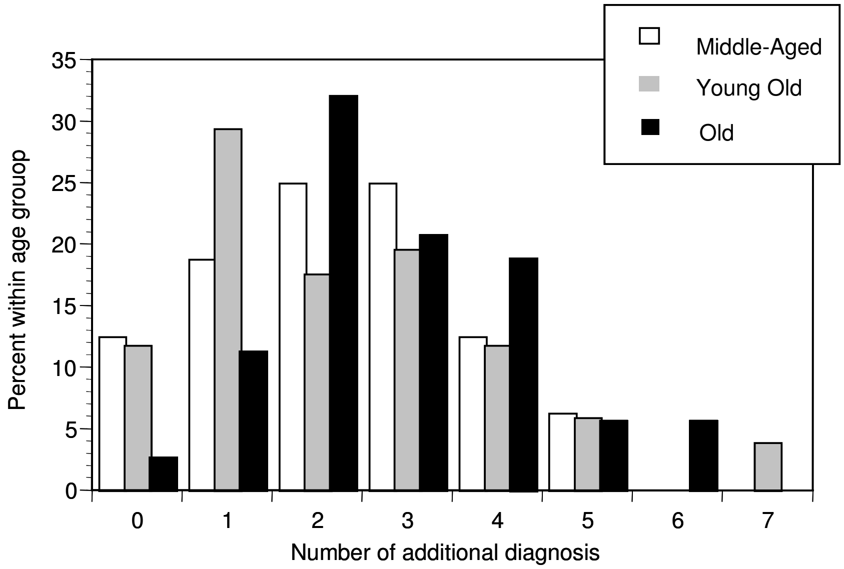

Figure 5.3 *Distribution of number of additional diagnoses in the three age groups*

Subjective Health Strain

The subjective strain that patients experienced through their additional health problems (as indicated by the averaged score across all disease-related ratings that each patient had made) was comparable across age groups. This was also the case when comparing the average strain within each specific disease (see Figure A2, Appendix A). Nevertheless, it has to be kept in mind that the disease-specific comparisons are based on small numbers of people.

Table 5.5

Intercorrelations between indicators of health and age trends

		1	2	3	4
1 Multimorbidity		--	**.47****	**.34****	**.29****
2 Subjective health strain	T1		--	**.68****	**.58****
3 - " -	T3			--	**.56****
4 - " -	T4				--
Age		.10	.13	.06	.04

** $p \leq .01$

Subjective health strain was again assessed at T3 and T4. Table 5.5 shows the stability of the strain ratings, which was relatively high across all occasions. Subjective strain and multimorbidity were positively correlated at all three occasions. This association was highest during the week prior to surgery and decreased after it. There were no significant changes in average subjective health strain over time ($\underline{F}(2,270) = 2.36$, n.s.), and also no differential changes in the age groups ($\underline{F}(4,266) = 0.24$, n.s.).

5.1.7. Age Differences in the Associations between Subjective and Objective Indicators of Health and Vision

It has been shown that the objective functional indicators were related to the subjective experience of impairment / strain attributed to vision and health problems. To test for potential age differences in these relations, several regression analyses were conducted testing the significance of the interaction term age*multimorbidity in the prediction of subjective health strain, and the interaction terms age*vision in operative eye and age*vision in better eye in the prediction of subjective impairment experienced by vision problems. Main effects of age, health and vision indicators were controlled for.

With one exception, all interactions were not significant, indicating that there were no age-differential associations between objective and subjective health and vision indicators. Only the interaction age*vision in operative eye at T3 explained a significant amount of variance in subjective impairment beyond the main effects of the two variables ($R^2 = .04$; $p \leq .05$). Subsequent analyses revealed that, although there was a negative association between these variables in all age groups, the strength of this association was smaller in the middle-aged ($\underline{r} = -.14$, n.s.), as opposed to the young-old ($\underline{r} = -.34$, $p \leq .01$) and oldest participants ($\underline{r} = -.39$, $p \leq .01$). This is quite remarkable, since middle-aged patients had experienced the greatest reduction in subjective impairment, which was obviously only slightly related to changes in visual acuity in the operative eye. However, age difference seemed to occur exclusively one week after surgery.

5.1.8. Bivariate Associations between Subjective and Objective Indicators of Health and Vision

Were vision and the subjective experience of vision related to multimorbidity and subjective strain? It was hypothesized that *objective* indicators of health and vision should be associated with *subjective* impairment in *both* domains.

Table 5.6 shows that these assumptions could partly be confirmed. Notably, it was the status of the operative eye and not the better eye that was significantly related to subjective health strain *prior* to surgery. Six weeks after the surgery, the better eye was also associated with subjective health problems, in such that better vision was associated with less health strain. To test the assumption that vision was related to the subjective health strain *beyond* the effects of objective health indicators, partial correlations between vision indicators and disease-related strain were performed controlling for multimorbidity. This yielded no changes in the patterns of associations, all coefficients remained stable.

Table 5.6

Bivariate correlations between indicators of health and vision[a]

	Vision								
	Operative eye			Better Eye			Subjective impairment		
	T1	T3	T4	T1	T3	T4	T1	T3	T4
Multimorbidity	.00	-.07	-.13	.01	-.16†	-.14	.09	**.30****	**.17***
Disease-related strain	**-.23****	-.04	-.15†	-.09	-.05	**-.25****	.15†	**.24****	**.21****

† $p \leq .10$; * $p \leq .05$; ** $p \leq .01$

[a] Multimorbidity was once assessed at baseline; for disease-related strain, cross-sectional (within-occasion) correlations with vision indicators are displayed

Changes in vision were not significantly associated with subjective health. Multimorbidity was positively related to subjective impairment by vision problems only after surgery. However, after partialling out visual acuity in the operative eye, this association only remained significant at T3 ($\underline{r}_{partial} = .29$, $p \leq .01$) but not at T4 ($\underline{r}_{partial} = .14$, n.s.) Also, patients with high multimorbidity tended to have less change in the better eye ($\underline{r} = -.18$, $p \leq .05$).

As predicted, subjective vision was positively related to the experience of disease-related strain, the more impaired patients felt through their vision problems, the higher was the average health strain they reported. This was independent of the number of additional diagnosis they had (coefficients did not change after partialling out multimorbidity).

Duration of vision problems was neither associated with multimorbidity ($\underline{r} = .02$, n.s.) nor with disease-related strain ($\underline{r} = .08$, n.s.).

The results indicate that visual problems were indeed associated with the degree of strain that patients experienced by other health problems. This was independent of the number of additional diagnoses. It was not always the best acuity that accounted for the associations. Prior to surgery, the closest proxy to "real" acuity, the better eye, seemed to be less important than the operative eye. Post surgery, the status of vision and the amount of change were only slightly to moderately associated with subjective health. The *duration* of vision problems was not associated with subjective health strain.

5.1.9. Summary of Findings

There was substantial improvement in visual acuity across all three measurement occasions. Post-surgery comparisons revealed that best acuity was not achieved after one week, but that there were still significant changes within the five weeks from T3 to T4. Complementary changes were found for subjective impairment ratings.

Status in the better eye, as well as change in visual acuity in the operative eye were lowest for the oldest participants (> 75 years) as compared to the middle-aged and young old. However, prior to surgery, middle-aged patients felt more impaired by their vision problems. This result is in line with the general hypothesis that middle-aged patients have more difficulties in adapting to vision and health problems prior to cataract surgery.

The notion that the onset of a cataract in the middle years denotes a marker for premature aging is supported here by the absence of age differences in multimorbidity. Although some of the specific diseases were more frequent in the oldest patients, multimorbidity and disease-specific strain did not differ between age groups.

With respect to the interrelations of vision and health indicators, the results provide tentative evidence for a *cumulative stress effect* of both vision problems and multimorbidity. Visual acuity was negatively associated with patients` subjective experience of disease-related strain *beyond* the effects of multimorbidity. Multimorbidity, on the other hand, increased the subjective experience of impairment attributed to one's vision problems[23]. However, these associations were not very strong, the amount of shared variance ranged between 4% and 9%.

In the following, the central personal and social resource and self-regulation variables that were assessed prior to surgery are described. It is shown how these variables interrelated in this sample and whether there were differences between the middle-aged, young-old and old participants. Effects of gender were analyzed where previous research indicates stable differences. For life investment, which was assessed at more than two measurement occasions, stability and mean changes are also reported.

[23] Of course, in both cases, causality could potentially be the reverse, which does, however, not seem very plausible here. Also, in each association, a third variable might underlie the mechanisms that make the two variables covary.

5.2. Generalized Expectancies: Self-Efficacy, Dispositional Optimism and Control Beliefs

On average, participants reported fairly high self-efficacy (M = 3.0, SD = .51) and optimism (M = 2.93, SD = .49), as well as a strong belief in the benefit of following their physicians` advise (powerful others; M = 3.12, SD = .65; scale range for all variables from 1 (disagree) - 4 (fully agree). Average self-efficacy is comparable to that of a heterogeneous adult sample of 1660 individuals (Schwarzer & Jerusalem, 1999).

The three variables were all positively correlated with optimism and self-efficacy sharing the greatest amount of variance. Age was positively associated only with the control dimension "powerful others". For means in the a priori defined age group see Table A4, Appendix A.

Table 5.7

Bivariate correlations between the generalized expectancies and age

	1	2	Age
1 Self-efficacy	--		.06
2 Dispositional optimism	**.55****	**--**	.04
3 Powerful others	**.29****	**.20***	**.25****

* $p \leq .05$; ** $p \leq .01$

5.3. Social Resources

Three indicators of functional aspects of social support were assessed: (1) perceived availability of (emotional and instrumental) support, (2) received emotional support prior to surgery (self-report) and (3) instrumental support seeking prior to surgery (self-report). The two latter indicators were assessed in the Brief-Cope interview and will again be reported in their relation to other coping variables in 5.5. It has been argued earlier that of the two scales only instrumental support seeking is regarded as a genuine coping strategy where the individual is actively engaged in activating sources of support. Receiving emotional support denotes a more passive act that was expected to be more strongly related to the perception of the availability of support.

As can be seen in Table 5.8 this was the case: perceived availability was positively related to received support and unrelated to support seeking. Still, there seemed to be a reciprocal relation between receiving and seeking support prior to surgery.

Table 5.8

Bivariate correlations between the functional support indicators and age

	1	2	Age
1 Perceived availability of support	--		-.05
2 Received support	**.32****	**--**	-.04
3 Support seeking	-.01	**.37****	-.08

* $p \leq .05$; ** $p \leq .01$

Perception of availability of support was generally high as indicated by an average mean score of 3.33 (SD = .69) on the 4-point likert scale ranging from 1 (not at all true) to 4 (very much true). This score was significantly higher than the average score for received support (M = 2.66, SD = .91; $t = 8.26$, $p \leq .01$) that was measured on the same scale range. Only 60% of the sample reported that they had actively asked for support in the week prior to surgery (as indicated by a mean score higher than 1.0). Consequently, the average score on this indicator was lowest (M = 1.67, SD = .70).

Despite the age-group differences in family status (see 4.5.1), age was unrelated to any of the support measures (for age group means see Table A4, Appendix A).

Gender differences were found only for one measure: women had slightly higher scores on support seeking than men ($M_{Women} = 1.74$, SD = .72; $M_{Men} = 1.51$, SD = .64), however at a non-significant level. Further analyses revealed that this gender difference was pronounced in those participants *without* a partner. In this group, women had significantly higher scores than men ($M_{Women} = 1.76$, SD = .65; $M_{Men} = 1.27$, SD = .53; $F(1,135) = 6.52$, $p \leq .01$; $Eta^2 = .09$). There were no age*gender interaction effects.

5.3.1. Interrelations of Functional Support Aspects and Partner Status

49% of the participants had a partner at baseline assessment. Participants with a partner had higher levels of received emotional support than those without partner ($M_{Partner} = 2.83$, SD = .91; $M_{No\ Partner} = 2.51$, SD = .88; $F(1,135) = 4.41$, $p \leq .05$; $Eta^2 = .03$). There was also a marginal but insignificant association between partnership and perceived support ($M_{Partner} = 3.43$, SD = .56; $M_{No\ Partner} = 3.24$, SD = .78; $F(1,135) = 4.41$, $p \leq .10$; $Eta^2 = .02$). Instrumental support seeking was not related to partnership. Age did not moderate the relationship between partner status and the functional support measures.

5.4. Personal Life Investment

As described in the method section, three indicators were derived from the personal life investment inventory: (1) the average investment across all ten life domains, (2) the number of domains with low and very low investment (as an indicator for *selective* investment) and (3) the *variability* in investment level across the ten domains. Descriptives for the three age groups are displayed in Table A5, Appendix A.

Average life investment and investment selectivity were highly correlated at each measurement occasion (see Table 5.9). Prior to and six weeks post surgery, investment variability was positively related to the number of domains with low investment, but not to average investment. One week after surgery (T3), this pattern reversed such that there was a positive correlation with average investment and no relation to selectivity. The most plausible explanation for this is that the overall level of average investment changed across occasions (see below). Thus, with average life investment being comparably low at T3, more investment was associated with greater variability, and the reverse was true for the two other occasions.

Stability across measurement occasions was relatively high for all indicators (coefficients ranged between .44 and .61, $p \leq .01$).

Figure 5.4 graphically displays changes in the average investment and in investment selectivity. In all age groups, both indicators changed in a complementary manner: one week after surgery, patients reported lowest investment and correspondingly the number of domains with low or very low investment was highest.

Table 5.9

Age trends and cross-sectional intercorrelations between average life investment, investment selectivity and variability within the three measurement occasions

	Selectivity			Variability			Age		
	T1	T3	T4	T1	T3	T4	r_{T1}	r_{T3}	r_{T4}
Average life investment	**-.72****	**-.88****	**-.80****	.02	**.25****	.11	-.05	-.10	**-.17***
Investment selectivity				**.41****	-.01	**.27****	-.03	.09	.11
Variability							.12	.12	**.17***

* $p \leq .05$; ** $p \leq .01$

A repeated-measures analysis yielded a significant main effect for measurement occasion on average investment ($\underline{F}(2,270) = 34.50$, $p \leq .01$; $\underline{Eta}^2 = .20$). Specification of polynomial contrasts indicated a quadratic rather than linear trend (linear: $\underline{F}(1,135) = 10.33$, $p \leq .01$; $\underline{Eta}^2 = .07$; quadratic: $\underline{F}(1,135) = 50.67$, $p \leq .01$; $\underline{Eta}^2 = .27$). Analyses of specific contrasts of occasions revealed that investment significantly dropped from T1 to T3 ($\underline{F}(1,135) = 55.95$, $p \leq .01$; $\underline{Eta}^2 = .25$), and then increased again from T3 to T4 ($\underline{F}(1,135) = 28.18$, $p \leq .01$; $\underline{Eta}^2 = .17$). Investment at T4 was also significantly higher than at T1 ($\underline{F}(1,135) = 10.33$, $p \leq .01$; $\underline{Eta}^2 = .07$).

Complementary changes were found for investment selectivity. Here, the overall main effect for repeated measurement was also significant ($\underline{F}(2,270) = 16.45$, $p \leq .01$; $\underline{Eta}^2 = .11$) and change followed a quadratic rather than linear trend (linear: $\underline{F}(1,135) = 2.53$, n.s.; quadratic: $\underline{F}(1,135) = 25.50$, $p \leq .01$; $\underline{Eta}^2 = .16$). Selectivity in life investment significantly increased from T1 to T3 ($\underline{F}(1,135) = 26.28$, $p \leq .01$; $\underline{Eta}^2 = .18$), and then decreased again from T3 to T4 ($\underline{F}(1,135) = 16.04$, $p \leq .01$; $\underline{Eta}^2 = .11$). The difference between T4 and T1 was not significant ($\underline{F}(1,135) = 2.53$, n.s.).

The overall main effect for repeated measurement of variability in life investment was less pronounced, but still significant ($\underline{F}(2,270) = 5.73$, $p \leq .01$; $\underline{Eta}^2 = .04$; linear: $\underline{F}(1,135) = 5.36$, $p \leq .05$; quadratic: $\underline{F}(1,135) = 6.11$, $p \leq .01$; $\underline{Eta}^2 = .04$). Variability significantly decreased from T1 to T3 ($\underline{F}(1,135) = 9.45$, $p \leq .01$; $\underline{Eta}^2 = .07$), but there was no further change from T3 to T4 ($\underline{F}(1,135) = 1.12$, n.s.).

Age was negatively related to average life investment and positively related to investment variability. However, these trends were only significant six weeks after surgery (Table 5.9).

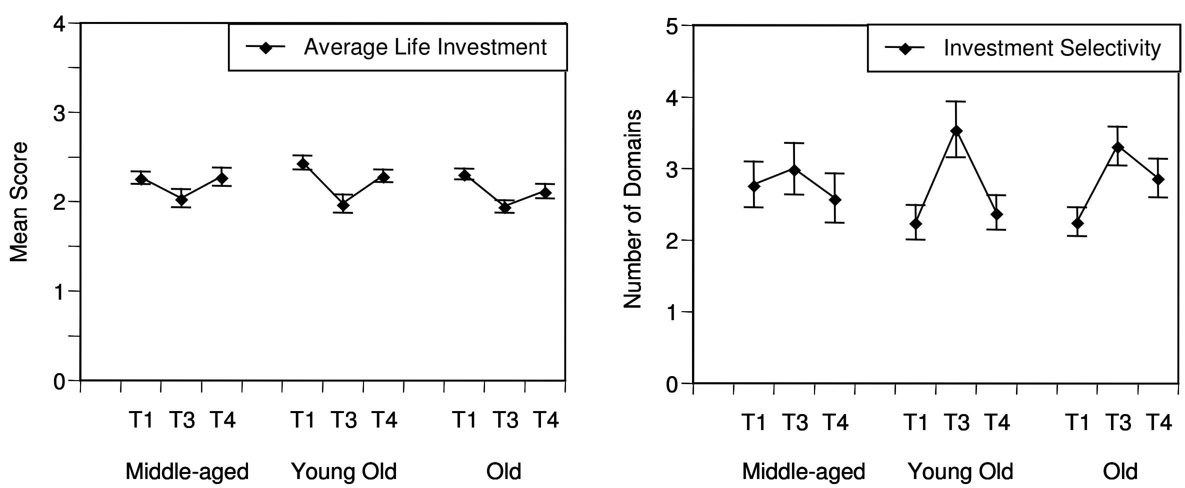

Figure 5.4 *Average Life Investment (left) and investment selectivity (number of domains with low or very low investment (right) in the three age groups prior to (T1) and one and six weeks after surgery (T3 and T4)*

Notes: Error bars represent one standard error of the mean; scale range for life investment from 0 (not at all) to 4 (very much); total number of domains = 10

Among the a priori defined age groups, no significant differences in average life investment, variability and investment selectivity were found at any occasion (see Table A5, Appendix A). *Changes* in life investment and investment variability did not differ between age groups ($F(4,266) = 1.37$, n.s.), but the interaction term age group*selective investment was marginally significant ($F(4,266) = 2.28$, $p \leq .10$; $Eta^2 = .03$). This was due to the middle-aged patients who did not change on this variable ($F(2,62) = 0.53$, n.s.), whereas the other two age groups did (young old: $F(2,100) = 10.02$, $p \leq .01$; $Eta^2 = .18$; old: $F(2,104) = 11.37$, $p \leq .01$; $Eta^2 = .18$; see Figure 5.4).

5.5. Coping

In this section, a descriptive overview of the frequency of endorsement of surgery-related coping efforts is given. It is analyzed how these were related to dispositional coping styles. Finally, age differences in coping are reported.

Before showing these results, affect changes around surgery are reported that were analyzed to ensure that patients were indeed facing a stressful event that might elicit specific coping efforts.

5.5.1. Did Cataract Surgery Represent a Stressful Event?

It was already reported that patients from the clinic in Kiel had lower scores for negative affect prior to surgery than patients from the Berlin hospital (4.4). This finding is consistent with the different design: the patients in Kiel were still at home when their positive and negative state affect was assessed, whereas the Berlin patients were already in hospital. This can be interpreted as a first hint that the surgery in an inpatient setting is indeed a stressful event.

More support for this notion is provided by examining changes in positive (PA) and negative affect (NA) around surgery, as assessed by the Positive and Negative Affect Schedule (PANAS). Figure 5.5 displays affect means during the week prior to surgery (T1) and one day after discharge from hospital. Noteworthy, prior to surgery, middle-aged adults experienced the highest level of negative affect (see Appendix A, Table A6).

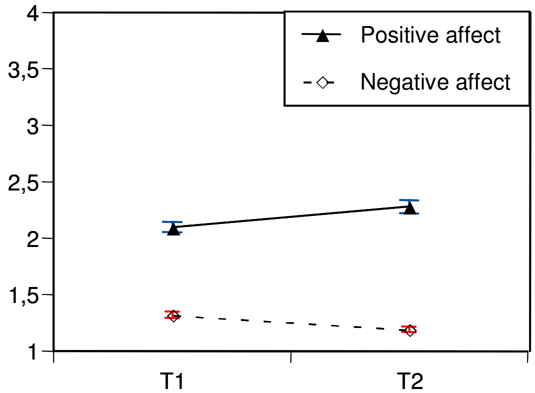

Figure 5.5 *Positive and negative affect in the three age groups prior to (T1) and two days (T2) after surgery*

In the entire sample, positive affect increased from pre- to post-surgery ($\underline{M}_{T1}$: 2.10, $\underline{SD}$ = .53; $\underline{M}_{T2}$: 2.28, $\underline{SD}$ = .67) and negative affect decreased ($\underline{M}_{T1}$: 1.32, $\underline{SD}$ = .31; $\underline{M}_{T2}$: 1.19, $\underline{SD}$ = .26). Repeated measures analyses yielded a significant main effect for measurement occasion for both positive and negative affect (PA: $\underline{F}(1,133) = 10.80$, $p \leq .01$; $\underline{Eta}^2 = .08$; NA: $\underline{F}(1,133) = 22.66$, $p \leq .01$; $\underline{Eta}^2 = .14$).

There were no significant age group*occasion interactions. Also, there was no interaction sample site*occasion, indicating that these changes equally occurred in the Berlin and in the Kiel sample. It was not possible to determine whether the observed changes in affect were due to a *pre*-surgical increase in negative affect and decrease in positive affect, or due to the positive outcomes of surgery. More detailed analyses on peri-operative changes in subfacets of positive and negative affect are provided by Knoll (2002), who administered the PANAS to another sample of cataract patients at four occasions. She found converging evidence that cataract surgery represents a mildly stressful event. For example, the subfacet *anxiety* was higher prior to surgery than after admission, and even higher in comparison to an additional measurement occasion six weeks post-surgery.

5.5.2. Rank Order and Frequency of Endorsement of the Surgery-Related Coping Strategies

The intercorrelations amongst the nine coping strategies in dealing with surgery have already been reported in Chapter 4. There were only small to moderate correlations among the surgery-related strategies. Table 5.10 provides an overview of the means and the frequency of endorsement of the nine coping strategies analyzed here.

Five of the eight surgery-related coping strategies that were analyzed here were used by more than two thirds of the participants to a greater or lesser extent (acceptance, reframing, active coping, distraction, and humor). Almost all people (more than 97%) reported that they had accepted the situation and had found some positive meaning in it (reframing). Not only did they use these strategies, they also reported using them to a great extent, as indicated by the mean scores. Most people (93%) also reported that they had *received* emotional support. It has been noted earlier that this is not regarded as a coping strategy, but rather as an indicator of social support. Only half of the sample used religious coping and support seeking in dealing with their thoughts around surgery. Denial was the least frequent coping strategy.

Table 5.10

Descriptives and frequency of endorsement of the surgery-related coping strategies (ranked in descending order)

			Number of participants who endorsed in the strategy	
	M	*SD*	N	%
Acceptance	3.07	*.71*	133	97.8
Reframing	2.75	*.78*	132	97.1
Receiving Support	2.66	*.91*	126	92.6
Active	2.11	*.82*	111	81.6
Distraction	2.01	*.90*	99	72.8
Humor	1.74	*.68*	96	70.6
Religion	1.73	*.93*	72	52.9
Support Seeking	1.67	*.70*	83	61.0
Denial	1.34	*.58*	48	35.3

Notes: Scale range from 1 (not at all) to 4 (very much);
a score of more than 1.0 was coded as having endorsed in the strategy

5.5.3. Dispositional Coping Styles

On the mean level, the tendency for flexible goal adjustment (FGA; M = 2.68, SD = .49) was significantly higher than the tendency for tenacious goal pursuit (TGP; M = 2.08, SD = .42; t[24](135) = -11.96, $p \leq .01$). The two subscales FGA-Reframing (FGA-R; M = 2.61, SD = .65) and FGA-Orientation Towards New Things (FGA-N; M = 2.64, SD = .58) did not significantly differ from each other. It has already been reported in the method section (4.4.4) that TGP and FGA shared some, but not much, common variance (r = .19) and so did the two subscales FGA-R and FGA-N (r = .36).

5.5.4. Interrelations of Surgery-Related Coping Strategies and Dispositional Coping Styles

It was expected that the dispositional coping styles were related to the coping strategies in dealing with the event of surgery. Table 5.11 displays the bivariate correlations. As predicted,

[24] Paired-samples t test

a dispositional tendency towards more flexible goal adjustment was associated with more positive reframing in dealing with surgery, and humor. In addition, it was positively correlated with active coping. All of these associations were only significant for the subscale FGA-Reframing. Tenacious goal pursuit was only related to more positive reframing.

Table 5.11

Bivariate correlations between coping strategies, dispositional coping styles and age

	TGP	FGA-R	FGA-N	Age
Acceptance	-.04	.04	.03	.06
Reframing	**.18***	**.26****	.10	.14
Receiving Support	.04	-.07	.03	-.04
Active	.02	**.19***	.10	.11
Distraction	-.06	-.04	-.04	-.16
Humor	.08	**.17**†	.01	.06
Religion	.08	**.16**†	.08	.04
Support Seeking	-.06	.00	.01	-.08
Denial	-.04	.11	-.10	.00
Age	-.07	.14	-.01	

† $p \leq .10$; * $p \leq .05$; ** $p \leq .01$

Notes: TGP = Tenacious Goal Pursuit, FGA = Flexible Goal Adjustment, FGA-R = FGA by Reframing, FGA-N = FGA by Orientation towards New Things

5.5.5. Age Differences in Coping

There was a small age trend for three of the coping strategies in dealing with surgery (see Table 5.11). Distraction was negatively related to age (r = -.16), a positive age trend was found for active coping (r = .11) and for positive reframing (r = .14). The dispositional coping subscale reframing (FGA-R) was also positively associated with age (r = .14). However, none of these correlations reached statistical significance at $p \leq .05$.

When comparing the three age groups, a more differentiated picture emerged. Figure 5.6 displays the mean scores of the 9 coping strategies in the three age groups. The group comparisons revealed significant differences for distraction ($F(2;134) = 4.89$, $p \leq .01$; Eta^2 = .07) and positive reframing ($F(2;134) = 4.52$, $p \leq .01$; Eta^2 = .07). Post-hoc analyses (Scheffé Test) further revealed that the middle-aged participants reported significantly less positive reframing and more distraction only in comparison to the young old. When adjusting the α-level by the number of analyses repeated here (which was nine - one for each coping scale), the difference in distraction was still significant at the 5% level and the difference in positive reframing at the 10% level (see Table A7, Appendix A).

The dispositional coping styles did not differ across the age groups. There was only a small but insignificant increase in goal reframing (FGA-R) in the oldest participants (see Table A8, Appendix A).

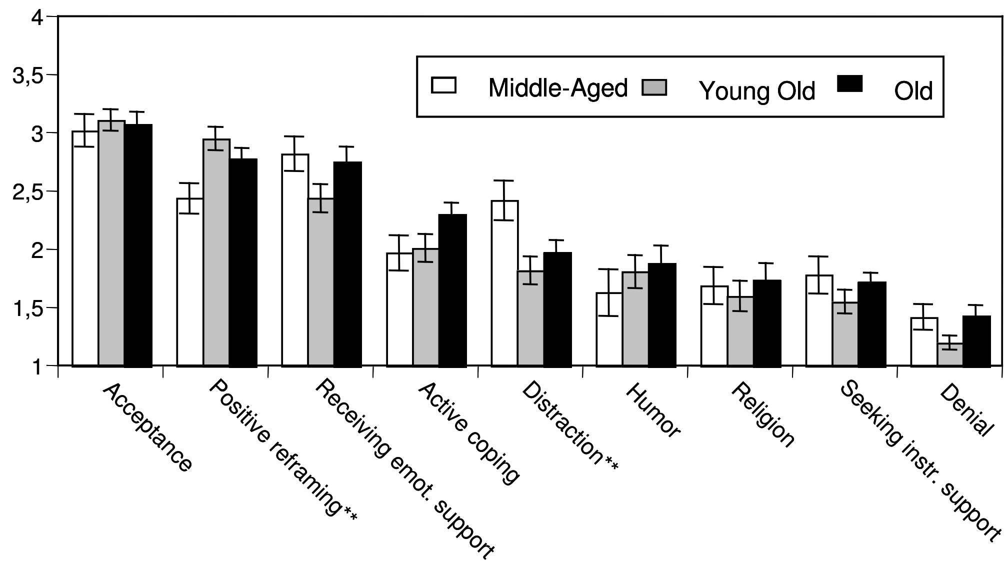

Figure 5.6 *Use of coping strategies in the three age groups*

Notes: Scale range from 1 (not at all) to 4 (very much);
Multivariate F Test across all coping strategies: $\underline{F}(18,250) = 2.21$, $p \leq .01$; $\underline{Eta}^2 = .14$
** $p \leq .01$ (F Tests for age-group comparisons with 2;133 degrees of freedom);

5.5.6. Summary

Following the dichotomy proposed by Lazarus and colleagues (1966, 1987), it can be concluded that emotion-focused coping strategies (e.g, acceptance, positive reframing) were more prevalent here than more problem-focused strategies (active, support seeking). This had been predicted given that the present stressor (cataract surgery), is highly standardized and there is little if any possibility for situation-related changes.

Young-old and old patients had a greater tendency to seek for positive aspects of the situation. Middle-aged patients used less positive reframing and more distraction. A small trend towards more dispositional reframing of goals was observed in the oldest group.

5.6. Criteria of Adaptation I: Subjective Well-Being

Well-being was measured using the Philadelphia Geriatric Centre Morale Scale (PGCMS) that comprises the aspects "life-satisfaction", "aging-satisfaction" and "non-agitation". In addition, the Centre of Epidemiological Studies Depression Scale (CES-D) was used to assess a variety of depressive symptoms. For reasons discussed in Chapter 4 (see 4.4.7), for both scales, the composite score was used instead of the subscales. The scales were administered to patients at all measurement occasions (see Appendix A, Table A9, for the descriptives).

5.6.1. The Positive Side: Well-Being

On the PGCMS, response options range from 0 (not at all true = very low well-being) to 4 (very true = very high well-being). The average mean score of the scale in the entire sample was 2.5 (SD = .73) prior to surgery. This increased to 2.65 (SD = .73) one week (T3) and to 2.68 (SD = .74) six weeks after surgery (T4). A repeated measures analysis yielded a significant main effect for measurement occasion ($F(2,270) = 9.54$, $p \leq .01$; $Eta^2 = .07$). Analyses of specific contrasts of adjacent occasions revealed that well-being at T3 was significantly higher than well-being at T1 ($F(1,135) = 10.16$, $p \leq .01$; $Eta^2 = .07$), but that there was no significant increase from T3 to T4 ($F(1,135) = 0.98$, n.s.).

Post-surgery, men reported significantly higher well-being than women ($M_{T3} = 2.84$ for men vs. 2.56 for women; $M_{T4} = 2.87$ for men vs. 2.60 for women; $F_{T3}(1,135) = 4.06$, $p \leq .05$; $Eta^2 = .03$; $F_{T4}(1,135) = 3.79$, $p \leq .05$; $Eta^2 = .03$). A significant interaction sex*occasion was not found, thus, men and women experienced comparable changes in well-being over time.

Stability between the measurement occasions was considerably high (see Table 5.12).

Age-Group Differences

With increasing age, participants tended to report slightly higher well-being at all measurement occasions (see Figure 5.7). However, these trends were not significant. When partialling out visual acuity in the better eye (as the only objective health indicator with slight age differences), correlation coefficients were slightly higher (ranging from .11 to .15), albeit still not significant at $p \leq .05$. Comparing the three age groups yielded no significant differences either (see Appendix A, Table A9)[25].

[25] Also, there were no significant age-group differences in the three subscales life-satisfaction, aging-satisfaction, and non-agitation (see Table A9, Appendix A). This finding is another argument for the appropriateness of the decision to use the aggregated composite score as a global measure of well-being here.

Above, a significant increase in well-being from pre- to post-surgery has been reported. Did this apply to all age groups? The repeated measures analysis was repeated introducing age group as a between-subjects factor. The interaction term age group*occasion was not significant ($F(4,266) = 0.41$, n.s.). Thus, well-being changed comparably across the measurement occasions in all three age groups.

5.6.2. The Negative Side: Depressive Symptoms

In this study, the CES-D was not used as a screening instrument for clinical depression but as an indicator of the degree to which patients experienced depressive symptoms before and after surgery. The total score computed across the twenty item scale ranges from 0 (no depressive symptoms) to 60 (frequent occurrence of depressive symptoms).

The average sumscore of the scale in the entire sample was 14.13 ($SD = 8.67$) at T1, 13.38 ($SD = 7.93$) at T3 and 13.33 ($SD = 8.14$) at T4. Although the average score decreased over time, there was no significant main effect for measurement occasion ($F(2,270) = 1.17$, n.s.).

Men and women did not differ in their depression scores at either occasion. Also, changes in depression over time were similar for both groups.

Table 5.12

Stability in well-being and depressive symptoms across the measurement occasions

	$r_{T1,T3}$	$r_{T3,T4}$	$r_{T1,T4}$
PGCMS	**.78****	**.83****	**.77****
CES-D	**.62****	**.67****	**.67****

** $p \leq .01$

Stability of depressive symptoms was somewhat lower than stability in well-being, although still considerably high (Table 5.12). Depressive symptoms prior to surgery explained 45% of the variance in depressive symptoms both one and six weeks after surgery. Well-being and frequency of depressive symptoms were substantially correlated ($r_{T1} = -.68$, $r_{T2} = -.70$, $r_{T3} = -.72$, all $p \leq .01$).

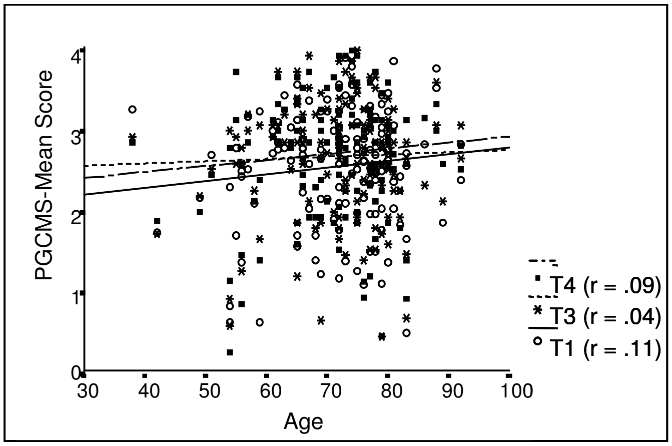

Figure 5.7 *Age trends in well-being prior to (T1) and one and six weeks after surgery (T3 and T4)*

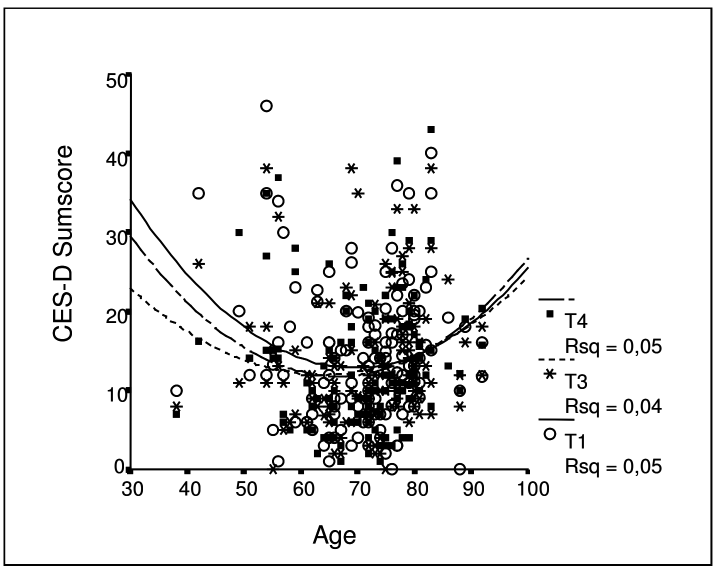

Figure 5.8 *Age trends in depressive symptoms prior to (T1) and one and six weeks after surgery (T3 and T4)*

Age-Group Differences

There was no significant linear age trend for depressive symptoms. However, a quadratic model fit the data here at all three measurement occasions (T1: $\underline{F}(3,133) = 3.30$, $p \leq .05$; $R^2 = .05$; T2: $\underline{F}(3,133) = 2.37$, $p \leq .10$; $R^2 = .04$; T3: $\underline{F}(3,133) = 3.61$, $p \leq .05$; $R^2 = .05$). Accordingly, significant differences emerged when comparing the three age groups (see Table

A9, Appendix A; also see Figure 5.8). At all three measurement occasions, the young old had the lowest depression scores. Post-hoc comparisons revealed that depression scores were significantly lower only in comparison to the oldest group. However, when controlling for visual acuity in the better eye, the post-hoc comparisons between young old and middle-aged patients were significant also ($p \leq .05$) at baseline and after six weeks. Thus, when accounting for differences in visual acuity, middle-aged patients reported a higher level of depressive symptoms than the young old, and comparable symptom-levels to the old both prior to and six weeks after surgery. At one week after surgery, age-group comparisons were not significant any more when controlling for visual acuity (either better eye or operative eye).

There was no significant decrease in depressive symptoms over time, and no significant age group*occasion interaction ($\underline{F}(4,266) = 1.45$, n.s.). Thus, on the mean level, the age groups did not experience differential changes in overall frequency of depressive symptoms[26].

5.7. Criteria of Adaptation II: Range of Activities and Perceived Difficulties with Activities

The second set of criteria includes functional indicators of adaptation in everyday life (see 4.4.8). Three variables were derived: (1) average perceived difficulty with Activities of Daily Living (ADL) and Instrumental Activities of Daily Living (IADL), (2) average perceived difficulty with activities other than ADL / IADL, and (3) *overall* range of activities other than ADL / IADL. With respect to the latter indicator, it should be noted again that it will be treated as a criterion as well as a predictor variable, since it is assumed to reflect both the degree of *involvement and purpose in life*, as well as processes of *selection*.

5.7.1. Perceived Difficulty with Activities

Participants rated 14 ADL /IADL (e.g., getting up, preparing food) and 18 other activities (e.g., sports, reading, going to the theatre) with respect to the degree of subjective difficulty with each activity on a 5-point likert scale ranging from 0 (very easy) to 4 (very difficult).

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[26] Looking at the subscales of the CES-D, however, yielded some interesting age-differential trends (see figure A2, Appendix A). The young-old patients reported no changes in all subscales across time. In contrast, one week after surgery, old patients reported a significant increase in *lack of well-being* ($\underline{F}(1;52) = 6.01$, $p \leq .05$; $\underline{Eta}^2 = .10$) and middle-aged patients reported a significant decrease in *somatic symptoms* ($\underline{F}(1;31) = 6.80$, $p \leq .01$; $\underline{Eta}^2 = .18$). However, repeated measures analyses with the within-subjects factor age group yielded no significant age group*occasion interaction for the two subscales, thus, these age group differences should be regarded as trends only.

Average Difficulty with ADL / IADL

The average mean score across all ADL / IADL in the entire sample was 1.03 (SD = .79) prior to surgery, 1.01 (SD = .78) one week (T3) and 1.11 (SD = .82) six weeks after surgery (T4). A repeated measures analysis yielded a significant main effect for measurement occasion ($F(2,270) = 3.37$, $p \leq .05$; $Eta^2 = .02$) with a quadratic rather than linear trend (linear: $F(1,135) = 2.98$, $p \leq .10$; $Eta^2 = .02$; quadratic: $F(1,135) = 3.96$, $p \leq .05$; $Eta^2 = .03$). Analyses of specific contrasts of adjacent occasions revealed that difficulty in ADL / IADL did not differ between T1 and T3 ($F(1,135) = 0.34$, ns.), but there was a significant increase from T3 to T4 ($F(1,135) = 7.86$, $p \leq .01$; $Eta^2 = .06$). Thus, participants reported an increase in ADL/IADL difficulty from one to six weeks after surgery.

Average Difficulty with Other Activities

The average difficulty mean score across all other activities in the entire sample was 1.33 (SD = .75) prior to surgery, 1.43 (SD = .78) one week (T3) and 1.23 (SD = .69) six weeks after surgery (T4). At all measurement occasions, these scores were higher than the ADL / IADL difficulty scores (T1: $t = 5.67$, $p \leq .01$; T3: $t = 6.51$, $p \leq .01$; T4: $t = 2.25$, $p \leq .05$). Both indicators were highly intercorrelated ($r_{T1} = .68$; $r_{T3} = .53$; $r_{T4} = .70$; all $p \leq .01$).

For average difficulty with other activities, there was an overall main effect for measurement occasion ($F(2,270) = 5.24$, $p \leq .01$; $Eta^2 = .04$) with a quadratic rather than linear trend (linear: $F(1,135) = 2.35$, n.s.; quadratic: $F(1,135) = 9.15$, $p \leq .01$; $Eta^2 = .06$). However, the pattern of change was different from that in the ADL / IADL score.

Average difficulty with other activities slightly increased from T1 to T3 ($F(1,135) = 2.49$, $p \leq .10$; $Eta^2 = .02$), and then decreased from T3 to T4 ($F(1,135) = 12.60$, $p \leq .01$; $Eta^2 = .09$). The difference between T4 and T1 was not significant.

Table 5.13

Stability of perceived difficulty with activities across the measurement occasions

	$r_{T1,T3}$	$r_{T3,T4}$	$r_{T1,T4}$
Perceived difficulty with ADL / IADL	**.80****	**.85****	**.77****
Perceived difficulty with other activities	**.55****	**.60****	**.43****

** $p \leq .01$

Stability between the measurement occasions seemed to be somewhat higher for difficulty with ADL / IADL than for other activities (Table 5.13).

Age-Group Differences

In contrast to well-being, age-group differences on the functional indicators were found both with respect to level *and* change around surgery (for means, univariate F-Tests and post-hoc comparisons see Table A10, Appendix A).

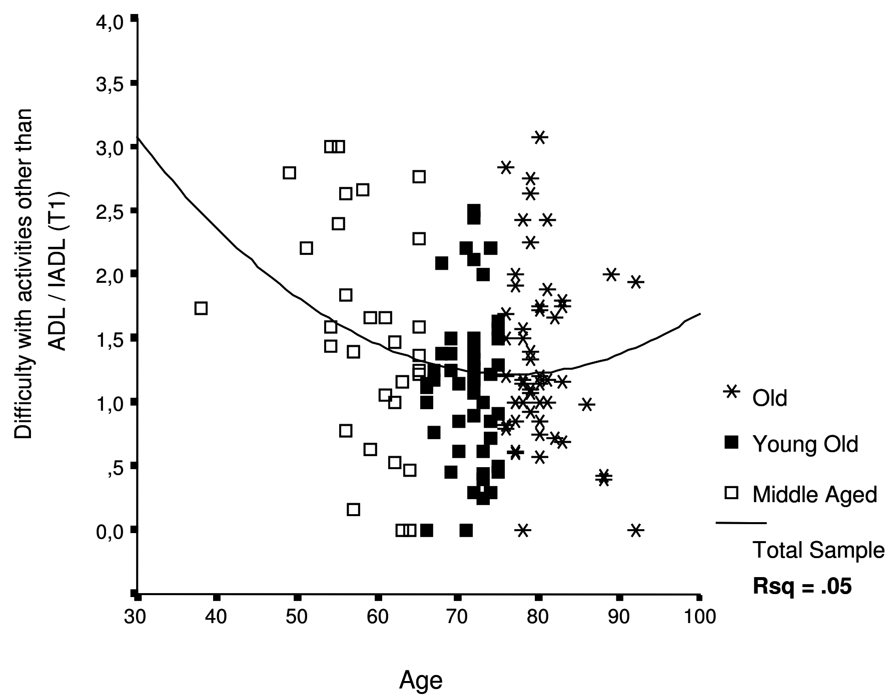

Figure 5.9 *Average difficulty with activities other than ADL / IADL in the three age groups prior to surgery*

There were no linear relations between age and perceived difficulties. A quadratic model best fit the relation between age and difficulty with ADL / IADL (T1: $\underline{F}(3,133) = 3.30$, $p \leq .05$; $R^2 = .05$; T2: $\underline{F}(3,133) = 4.67$, $p \leq .01$; $R^2 = .07$; T3: $\underline{F}(3,133) = 8.51$, $p \leq .01$; $R^2 = .11$). At all three occasions, the old reported more difficulty with ADL / IADL than the two other groups, the middle-aged and young old did not differ. In contrast, prior to surgery, the middle aged perceived more difficulty with *other activities* than the young old but did not differ from the old group (Figure 5.9)[27]. One week after surgery, there were no significant differences between the groups, and after six weeks, the old had the highest scores (quadratic trend: $\underline{F}(3,133) = 3.82$, $p \leq .05$; $R^2 = .05$).

As can be seen in Figure 5.10, there were age-differential changes in the difficulty perception, as indicated by significant age-group*occasion interactions for ADL / IADL difficulty ($\underline{F}(4,266) = 4.49$, $p \leq .01$; $\underline{Eta}^2 = .06$) and difficulty with other activities ($\underline{F}(4,266) = 3.74$, $p \leq .01$; $\underline{Eta}^2 = .05$).

Middle-aged participants experienced a significant decrease in difficulty with ADL / IADL from T1 to T3 ($\underline{F}(1,31) = 16.21$, $p \leq .01$; $\underline{Eta}^2 = .34$), and a significant increase from T3 to T4 ($\underline{F}(1,31) = 5.27$, $p \leq .05$; $\underline{Eta}^2 = .15$; overall F-Test for occasion: $\underline{F}(2,62) = 7.29$, $p \leq .01$; $\underline{Eta}^2 = .19$). The difference between T1 and T4 was not significant ($\underline{F}(1,31) = 2.22$, n.s.), indicating that after six weeks, they had again reached their initial level of subjective difficulties. Average difficulty with activities other than ADL / IADL decreased in a linear fashion ($\underline{F}(2,62) = 3.32$, $p \leq .05$; $\underline{Eta}^2 = .10$), whilst only the differences between T3 and T4 and T1 and T4 were significant (T1 vs. T3: $\underline{F}(1,31) = 0.51$, n.s.; T3 vs. T4: $\underline{F}(1,31) = 3.43$, $p \leq .10$; $\underline{Eta}^2 = .10$; T1 vs. T4: $\underline{F}(1,31) = 5.0$, $p \leq .05$; $\underline{Eta}^2 = .16$).

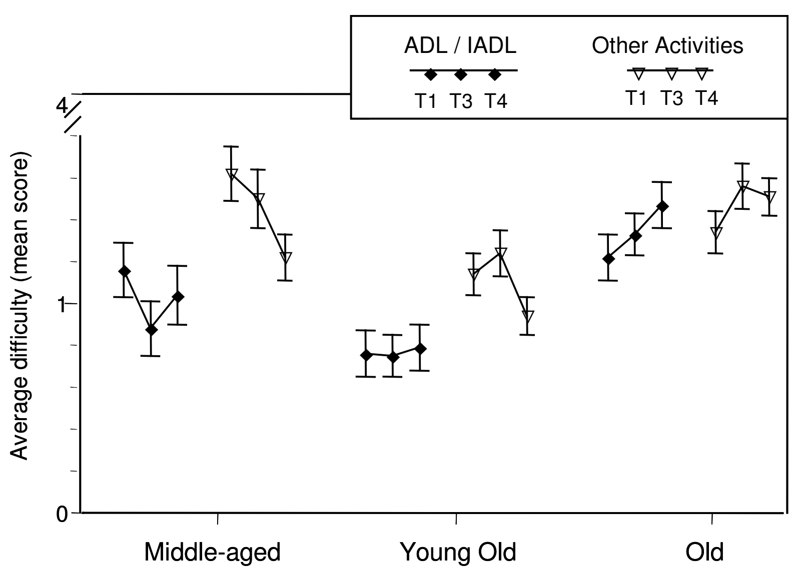

Figure 5.10 *Average difficulty with ADL / IADL and other activities in the three age groups prior to (T1) and one and six weeks after surgery (T3 and T4)*

Note: Error bars represent one standard error of the mean; scale range from 0 (very easy) to 4 (very difficult)

[27] This was even the case when excluding one middle-aged patient (female, age 42), who had an average difficulty score of 4 (indicating extreme difficulties).

Young-old patients did not experience any significant change in ADL / IADL difficulty ($\underline{F}(2,100) = 0.27$, n.s.). They did, however, experience changes in difficulty with other activities ($\underline{F}(2,104) = 5.68$, $p \leq .01$; $\underline{\text{Eta}}^2 = .10$). Scores did not differ from prior- to one week after surgery ($\underline{F}(1,50) = 1.41$, n.s.), but had significantly decreased after six weeks ($\underline{F}(1,50) = 11.14$, $p \leq .01$; $\underline{\text{Eta}}^2 = .18$).

The oldest group reported a steady, linear increase in difficulty with ADL / IADL ($\underline{F}(2,104) = 4.97$, $p \leq .01$; $\underline{\text{Eta}}^2 = .09$). Significant changes emerged from T3 to T4 ($\underline{F}(1,52) = 4.22$, $p \leq .05$; $\underline{\text{Eta}}^2 = .08$), and from T1 to T4 ($\underline{F}(2,52) = 7.58$, $p \leq .01$; $\underline{\text{Eta}}^2 = .13$) but not from T1 to T3 ($\underline{F}(2,52) = 2.04$, n.s.). Average difficulty with other activities increased after one week (overall F-Test: $\underline{F}(2,104) = 3.56$, $p \leq .05$; $\underline{\text{Eta}}^2 = .06$; contrast between T1 and T3: $\underline{F}(1,52) = 5.70$, $p \leq .01$; $\underline{\text{Eta}}^2 = .10$) but there was no further change after six weeks ($\underline{F}(1,52) = 0.61$, n.s.).

5.7.2. Range of Activities

The overall range of activities was only computed at T1, because it involved the range of activities that participants had engaged in within six months prior to surgery (see 4.4.8).

The average number of different activities reported for the six months prior to surgery was 10.69 ($\underline{SD} = 3.88$).

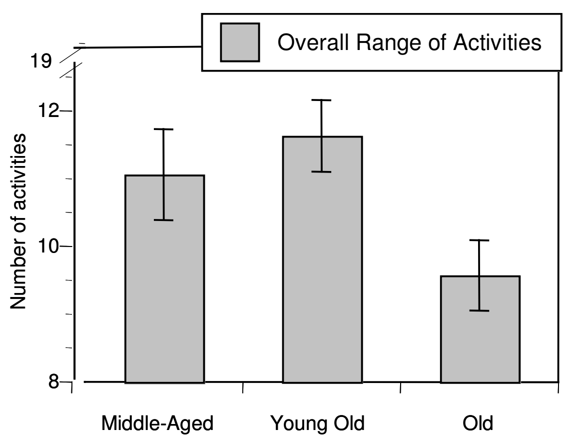

Figure 5.11 *Activity range in the three age groups*

Note: Error bars represent one standard error of the mean; possible range of activities = 19

Age-Group Differences

There was a significant main effect of age group on range of activities ($F(2,135) = 4.03$, $p \leq .05$; $Eta^2 = .06$). The oldest participants reported less activities than the others (see Figure 5.11). For means and post-hoc comparisons see Table A10, Appendix A.

5.7.3. Intercorrelations between Difficulty with and Range of Activities

At all measurement occasions, a higher range of activities was associated with lower difficulty ratings for both ADL / IADL and other activities (Table 5.14). This negative association applied to all age groups.

Table 5.14

Bivariate correlations between activity indicators within the measurement occasions

	Difficulty with ADL / IADL			Difficulty with other activities		
	T1	T3	T4	T1	T3	T4
Overall range of activities[a]	**-.37****	**-.33****	**-.39****	**-.28****	**-.21****	**-.25****

† $p \leq .10$; * $p \leq .05$; ** $p \leq .01$

[a] Overall range of activities was only computed for the first measurement occasion

5.7.4. Why did Middle-Aged Patients Experience More Difficulties? Some Alternative Explanations

Although there were no age differences in multimorbidity (5.1.6), and even a negative age trend for visual acuity (5.1.2), prior to surgery, middle-aged in contrast to the young-old and old participants had experienced more difficulties with those activities that are not part of ADL / IADL (see 5.7.1). This finding fits well into the idea that edlderly adults have a higher self-regulation competence than young and middle-aged adults. This notion was further explored by examining several alternative explanations.

First of all, it could have been that the small subsample of middle-aged study participants had experienced more difficulties because their functional abilities were worse due to more severe health impairments that were not fully captured by the health indicators used here. This concern can be ruled out by the fact that post-surgery, the difficulty rating of the middle-aged significantly dropped and the direction of age differences reversed after six weeks (see 5.7.1). It seems very unlikely that changes in vision had been accompanied by equally rapid changes in other health domains. Visual acuity prior to surgery was highest in middle-aged adults, thus objective age differences in visual status could also not account for this finding.

Two other possible explanations pertain to age group differences in the *living context* of participants. It was hypothesized that at least part of the self-regulation competency of older adults may be due to their tendency of being more selective in their activities. A trend towards higher activity selectivity with increasing age was found in this study: besides experiencing less difficulties, young-old and old participants were also engaged in a *smaller range* of activities compared to the middle-aged. However, this difference in activity range could not account for the higher level of average difficulty in the middle-aged. On the contrary: as shown in Table 5.14, higher selectivity in overall range of activities other than ADL / IADL was associated with *more* subjective difficulty. This negative association was found in all age groups (middle-aged: $\underline{r} = -.32$, $p \leq .10$; young-old: $\underline{r} = -.37$, $p \leq .01$; old: $\underline{r} = -.33$, $\leq .05$). Thus, activity range did not serve as a mediator between age and perceived difficulty.

Another critical context variable might be the occupational status, which differed between age groups. Ten middle-aged (31.3%) as opposed to one young old participant (2.0%) and none of the oldest were employed at the time of the study (see 4.5.1). Ten of them reported to pursue their occupation daily; one did this once per week. Another seven participants pursued some kind of occupation (working or taking courses) without being employed - either on a daily basis, once a week, once per month, or once during the six month prior to surgery. Four of these participants belonged to the young old group and three to the old group. To test whether age group differences in occupational status accounted for the observed differences in average perceived difficulty prior to surgery, the univariate analysis of variance for average difficulty by age group was repeated, this time excluding a) all 11 participants that were employed and b) all 18 participants that had reported some form of occupation during the past six months. Doing that, the main effect of age group was not significant any longer (a): $\underline{F}(2,123) = 1.63$, n.s., b): $\underline{F}(2,116) = 0.91$, n.s.), although the middle aged still had the highest difficulty scores.

In a next step, a new average difficulty score across the activities other than ADL / IADL was computed, excluding the "difficulty with work" ratings for those participants that were employed[28]. This was done to explore if these specific ratings had been responsible for the higher average scores of the middle-aged participants. This was not the case. A univariate analysis of variance for the new average difficulty score by age group was again conducted with all participants, yielding the same age-group differences as reported above (5.7.1):

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[28] These ratings were not excluded for those participants who were not employed but still worked or took courses. It was assumed that they had *actively* chosen to do this and thus worked on a more voluntary basis, as opposed to the middle-aged participants who had either not yet reached an appropriate age for retirement or had other reasons (e.g., financial pressure) for working.

middle-aged participants still had significantly more difficulties with their leisure activities than the young old ($p \leq .05$), but equally high scores in comparison to the old ($\underline{M}_{middle\text{-}aged}$ = 1.53, $\underline{SD}$ = .89; $\underline{M}_{young\ old}$ = 1.14; $\underline{SD}$ = .60; $\underline{M}_{old}$ = 1.34; $\underline{SD}$ = .70; overall $\underline{F}(2,134) = 3.02$, $p \leq .05$; $\underline{Eta}^2 = .04$).

To conclude, there is evidence that the higher difficulty perception in the middle-aged prior to surgery can at least partly be explained by their employment status. This, however, was not simply due to the fact that the ten employed middle-aged participants experienced a comparably high degree of difficulty in pursuing their work ($\underline{M}$ = 2.0; $\underline{SD}$ = .87). Rather, they also experienced a high degree of difficulty in other activity domains[29].

5.7.5. Summary

The status and change of the adaptational criteria within the three age groups were mostly in the predicted direction. In all age groups, there was an immediate increase in well-being one week after surgery, with no further increase after six weeks. The decrease in depressive symptoms was not significant. ADL/IADL activity difficulty changes were different for the three age groups: middle-aged participants reported a temporary decrease after one week, but again an increase in difficulties after six weeks. There were no changes in this indicator in the young old, and among the oldest, there was a steady increase across all occasions, reflecting more difficulties in adapting to post-surgical vision. Prior to surgery, the average difficulty with activities other than ADL/IADL had been highest in the middle-aged patients. However, they also reported a steady decrease in difficulties after surgery, as opposed to the oldest old, who reported increased post-surgical difficulties here also.

The young old participants had the most favorable scores on all indicators. These differences were not significant for well-being and depressive symptoms, but trends point to better adaptation in the young old. This is supported by better functional adaptation in the young old, than in the middle-aged. The oldest group reported the highest frequency of depressive symptoms, however, at no cost for general well-being which was equally high as in the young old. As expected, overall activity range was lowest in the oldest, and the more activities participants pursued, the less difficulties they reported.

[29] This score was somewhat higher than that for the middle-aged participants who were not employed ($\underline{N}$ = 21, $\underline{M}$ = 1.46, $\underline{SD}$ = .90; one outlier excluded). To conclude from this that being employed *enhanced* overall difficulty in leisure domains would be too preliminary, given the small number of people in both groups. However, it may be one possible explanation, when considering that a full employment is often very resource demanding with respect to time, energy and attentional resources.

5.8. Bivariate Associations Between the Criteria of Adaptation

Both well-being and the frequency of depressive symptoms were related to ADL / IADL difficulty at all occasions (Table 5.15). Associations with average difficulty with other activities were somewhat lower, but still highly significant. In addition, patients pursued more activities when they had higher well-being and lower depressive symptoms.

Age did not moderate the associations between activity difficulty, overall range of activities and the well-being indicators at any occasion.

Table 5.15

Bivariate correlations between well-being and activity indicators across the measurement occasions

		Well-Being			Depressive symptoms		
		T1	T3	T4	T1	T3	T4
Difficulty with ADL / IADL	T1	-.59**	-.51**	-.48**	.45**	.42**	.42**
	T3	-.37**	-.50**	-.47**	.42**	.48**	.42**
	T4	-.39**	-.50**	-.47**	.41**	.49**	.52**
Difficulty with other activities	T1	-.36**	-.36**	-.30**	.28**	.24**	.27**
	T3	-.29**	-.40**	-.29**	.28**	.34**	.36**
	T4	-.36**	-.47**	-.46**	.42**	.44**	.49**
Overall range of activities	T1	.26**	.32**	.27**	-.34**	-.25**	-.30**

** $p \leq .01$

5.9. Bivariate Associations between the Predictor Variables

Table B4 (Appendix B) displays the bivariate associations between the various sets of predictor variables. As expected, many of the variables were substantially intercorrelated. Both flexible goal adjustment (FGA) and tenacious goal pursuit (TGP) tendencies were positively associated with optimism, self-efficacy and average life investment. The FGA subscale reframing was furthermore associated with belief in powerful others, investment variability and perceived availability of support. Likewise, there were positive correlations between the generalized expectations and average life investment, investment variability and perceived support. Coefficients were mostly moderate. It is important to note that high correlations (e.g., between self-efficacy and FGA-R) do not reflect item overlap between scales.

Receiving emotional support during the week prior to surgery and seeking instrumental support were not significantly related to the personal resources and life investment. The generalized expectations were related to the situational coping strategies in the same directions as the tendency to reframe ones goals when they are blocked (FGA-R). They showed positive associations with reframing, active coping, and religious activities. Individuals who reported higher scores on reframing, active coping and religious activities also had higher scores on average life-investment, being less selective at the same time. Perceived availability of support was positively associated with reframing and humor.

Family status made a difference in the dispositional coping styles and support measures. Patients with a partner had lower scores on the flexible goal adjustment subscale reframing ($\underline{M}_{partner}$ = 2.43; SD = .67; $\underline{M}_{no\ partner}$ = 2.78; SD = .58; $\underline{F}(1,135) = 11.01$, $p \leq .01$; $\underline{Eta}^2 = .08$). As has been reported in 5.3.1, they also had higher levels of support availability and received emotional support.

5.9.1. Were Indicators of Health and Vision Related to Self-Regulation and Level of Psychosocial Resources?

Were functional indicators related to the level of resources patients had? The dispositional coping strategies as well as the generalized expectations were unrelated to health status and vision at all measurement occasions. There were, however, some significant associations with social support indicators and situational coping strategies (Table 5.16).

Consistently across all occasions, perceived availability of support was associated with lower subjective impairment experienced by vision problems. In contrast, patients who experienced higher impairment and subjective health strain reported more instrumental support seeking. Objective vision was unrelated to support at all occasions, but the more additional diagnoses patients had, the less available support they perceived and the more they endorsed support seeking. However, all of the associations were not very strong.

Lower vision in the operative eye was slightly related to more reframing, active coping, and less humor in dealing with the event of surgery. Patients with higher subjective impairment prior to surgery reported more active coping, more distraction, and more denial, the same trends were observed for experience of health strain.

Patients with a partner had better vision in the better eye at all occasions and less subjective impairment prior to and six weeks after surgery (see Table G1, Appendix G).

For life investment, which was assessed at all three measurement occasions, cross-sectional correlations with vision and health are displayed in Table 5.17. Apart from one marginally significant negative association with subjective strain at T3, investment *selectivity* was unrelated to health and vision indicators.

Table 5.16

Bivariate correlations between social support and coping and vision and health indicators

	Vision in operative Eye	Multimorbidity	Subjective impairment experienced by vision problems			Subjective strain averaged across all diseases		
			T1	T3	T4	T1	T3	T4
Social Support								
Perceived availability	-.00	-.16†	**-.19***	**-.27****	**-.19***	-.08	-.12	-.08
Received support	.03	.07	-.04	.02	.02	.00	.01	.08
Support seeking	.12	.15†	.16†	**.26****	**.17***	.11	**.24****	**.17***
Coping Strategies in dealing with Surgery								
Acceptance	.13	.04	.04	.08	.10	.12	.11	.13
Reframing	**-.18***	-.03	.02	-.06	-.14	.06	.11	.07
Active Coping	-.15†	-.04	**.25****	.14	-.02	.08	.14†	.06
Distraction	-.02	.11	**.20***	.09	.01	**.17***	.11	**.19***
Humor	.15†	-.06	-.11	-.02	-.06	-.09	-.02	-.05
Religion	-.06	-.12	.10	-.05	-.02	.01	.08	.03
Denial	.06	.15†	**.18***	.15†	.07	.12	.13	.11

† $p \leq .10$; * $p \leq .05$; ** $p \leq .01$

Table 5.17

Cross-sectional correlations between life investment and vision and health indicators at the three measurement occasions

	Vision in operative eye			Subjective impairment experienced by vision problems			Subjective strain averaged across all diseases		
	T1	T3	T4	T1	T3	T4	T1	T3	T4
Average Investment	-.04	.15†	**.18***	.11	-.08	-.08	-.02	.14†	.07
Investment Selectivity	.04	-.10	-.11	.00	.04	.11	.03	-.14†	.03
Investment Variability	.01	.06	-.09	.08	.12	**.20***	.16†	.16†	**.24****

† $p \leq .10$; * $p \leq .05$; ** $p \leq .01$

Better vision in the operative eye post-surgery was associated with higher degree of life investment. Investment *variability* was related to higher subjective strain and impairment experience post-surgery. Multimorbidity was unrelated to all life investment indicators.

5.9.2. Were Health, Vision, Resources and Self-Regulation associated with the Duration of Vision Problems?

The duration of subjective impairment[30] was unrelated to age, sex, family status, subjective and objective health, personal resources, self-regulation and coping styles and strategies. Only the amount of received emotional support during the week prior to surgery was positively associated with it ($r = .15$, $p < .10$).

It had been reported earlier that apart from the subjective impairment through vision problems, there were no significant associations between the duration of vision problems and visual acuity indicators.

PART II
ADAPTATION TO VISION PROBLEMS AND HEALTH PROBLEMS PRIOR TO SURGERY: CROSS-SECTIONAL RESULTS

In the following, the role of health and vision indicators, as well as personal and social resources, coping strategies, and life investment in the prediction of the criteria prior to surgery is examined. In addition to main effects of the predictors, hypotheses about mediating pathways and conditional (moderator) effects are analyzed.

The issue of resilience is addressed in two ways: first, buffering effects of resources in the face of severe health and vision problems are examined. In a second approach, "resilient" individuals are identified and subsequently compared to non-resilient and low-risk individuals on a number of dimensions (Part III).

5.10. Correlates of Adaptation prior to Surgery: Bivariate Associations

Before examining the joint and unique effects of the predictors in multiple regression analyses, bivariate associations with the criteria are outlined.

Table 5.18 shows the correlations of the vision and health indicators with the criteria variables prior to surgery. It was one of the central assumptions that poor vision and ill health are threats to positive adaptation. This can be confirmed for multimorbidity, which was negatively associated with well-being, and positively with depressive symptoms and activity

[30] Although the response format was categorical, this variable was treated as continuous with greater values indicating longer duration. Eight participants had reported that they felt no impairment due to vision problems, they were subsequently excluded from analyses including the duration variable.

difficulty. Coefficients were moderate, 7 - 17% of the criteria variance was explained. Associations with vision as indicated by visual acuity in the better eye were in the same direction, however at a much lower level.

Surprisingly, there was a small (nonsignificant) *negative* trend in the association between vision in operative eye and well-being. Whilst there were only two significant correlations between the objective vision indicators and the criteria (better visual acuity in better eye was associated with lower ADL / IADL difficulty and a higher range of activities), the *subjective* impairment experienced through vision problems was consistently and moderately associated with the criteria. Patients with higher levels of subjective impairment experienced lower well-being, more depressive symptoms, higher activity difficulty and a smaller range of activities. Subjective health strain showed equal associations with the criteria.

Table 5.18

Bivariate correlations of the vision and health indicators with the criteria prior to surgery

	Well-Being	Depressive symptoms	Difficulty with ADL / IADL	Difficulty with other activities	Activity range
Vision Indicators					
Vision in surgery eye	-.13	.03	.00	-.11	.05
Vision in better eye	.12	-.13	**-.18***	$-.15^{\dagger}$	**.19***
Subjective impairment through vision problems	**-.26****	**.32****	**.27****	**.28****	**-.17***
Health Indicators					
Multimorbidity	**-.27****	**.28****	**.41****	**.32****	-.08
Subjective health strain	**-.28****	**.26****	**.41****	**.37****	**-.26****

† p ≤ .10; * p ≤ .05; ** p ≤ .01

Why was pre-surgical visual acuity in the operative eye negatively associated with well-being? A subsequent age-group comparison revealed that there was a moderate negative correlation in the oldest patients *only* ($\underline{r}$ = -.36, p ≤ .01), as opposed to no association in the two other age groups ($\underline{r}_{\text{middle-aged}}$ = -.03; $\underline{r}_{\text{young old}}$ = .02, both n.s.). To further explore this finding, items on the *personal valence* of the stressor surgery, that were also assessed in the study, were examined[31]. It appeared that in the oldest age group, vision in operative eye was

[31] Eleven items were constructed to assess the personal meaning of the surgery and the degree to which it occupied patients thoughts at baseline. An exploratory factor analysis yielded a three-factor solution. The first factor contained items indicating stress and rumination (Even now, I think a lot about surgery), the second factor items indicating information seeking and anxiety (I very strongly wish that the surgery was over), and the third factor was composed of items indicating a sense that the operation was useless or could be postponed (If I were the one to decide, this operation would not be necessary).

positively associated with a stress / rumination factor ($\underline{r} = .25$, $p \leq .10$), and also positively correlated with a second factor indicating information seeking / anxiety ($\underline{r} = .34$, $p \leq .01$). In middle-aged and young old participants, the relationship with stress and rumination was reversed: in these patients, better vision in the operative eye was associated with *less* stress and rumination ($\underline{r}_{\text{middle-aged}} = -.29$; $\underline{r}_{\text{young old}} = -.26$., both $p \leq .10$). No association was found with the information seeking / anxiety factor. Another age-group difference emerged concerning the association between operative eye vision and *distance to diagnosis*: there was a positive correlation between these variables in the old age group ($\underline{r} = .25$, $p \leq .10$), a negative correlation in middle-aged participants ($\underline{r} = -.28$) and no association in the young old. Thus, old patients with better vision in the operative eye had already known their diagnosis for a longer period of time, and were at the same time more anxious when thinking about surgery, experienced more stress and ruminated more.

Associations between the criteria and resources, life investment and coping are displayed in Table 5.19. As predicted, the dispositional coping styles, generalized expectancies and life investment were positively associated with well-being and negatively with depressive symptoms. Tenacious goal pursuit was associated with a higher range of activities.

Patients with higher self-efficacy and higher acceptance of powerful others tended to experience less activity difficulty. Higher self-efficacy and greater optimism were positively associated with overall range of activities. Life investment was positively associated with range of activities, correspondingly, greater selectivity in life investment was negatively associated with it. Life investment variability, was unrelated to any of the criteria.

The perception of availability of instrumental and emotional support was also associated with higher well-being and less depressive symptoms. In addition, patients with higher support levels experienced less ADL / IADL difficulty. Average difficulty with *other* activities, although highly correlated with ADL / IADL difficulty, was unrelated to social support availability. This result supports the general notion that those activity domains that reflect peoples` own choices to a greater extent (e.g., physical, social, political, organizational activities), can be regulated by the individual in such that their successful pursuit is less dependent on support from the individual's social environment. Receiving support during the week prior to surgery was positively associated with well-being, but not with depressive symptoms or activity difficulty.

Patients who reported higher levels of support seeking had also experienced higher levels of activity difficulty. Having a partner or being a parent was unrelated to adaptational criteria at this occasion.

Table 5.19

Bivariate correlations of the resource and self-regulation variables with the criteria prior to surgery

	Well-Being	Depressive symptoms	Difficulty with ADL / IADL	Difficulty with other activities	Activity range
Dispositional Coping					
TGP	**.20***	**-.22****	-.03	-.07	**.28****
FGA-R	**.23****	**-.20***	-.01	-.05	.11
FGA-N	**.37****	**-.34****	-.12	.00	.13
General. Expectations					
Optimism (Opti)	**.47****	**-.43****	-.11	-.06	**.25****
Self-Efficacy (GSE)	**.36****	**-.33****	-.11	**-.18***	**.20***
Powerful Others (CPO)	**.25****	-.11	**-.20***	-.15†	-.11
Life Investment					
Average L-I_T1	**.18***	**-.21***	-.11	-.08	**.26****
Selectivity sL-I_T1	-.03	.14	.00	-.08	**-.17***
Variability vL-I_T1	-.02	.02	.14†	-.02	.03
Social Support					
Perceived (Avail)	**.38****	**-.32****	**-.21****	-.06	.13
Received (Receiv)	.17†	-.02	.06	.07	.09
Seeking (ISS)	-.04	.07	**.20****	.15†	.01
Coping strategies					
Acceptance	.08	-.06	.09	-.02	-.07
Reframing	**.24****	**-.28****	-.16†	-.05	.09
Active Coping	-.02	-.05	.06	.03	-.07
Distraction	**-.17***	.08	**.18***	**.24****	-.10
Humor	.14†	**-.19***	-.14†	-.12	.07
Religion	.08	-.11	-.03	.00	**.17***
Denial	-.16†	**.18***	.08	.04	**-.25****

† $p \leq .10$; * $p \leq .05$; ** $p \leq .01$

Note: TGP = Tenacious Goal Pursuit, FGA = Flexible Goal Adjustment, FGA-R = FGA by Reframing, FGA-N = FGA by Orientation towards New Things

Of the coping strategies, only positive reframing and humor were positively associated with well-being, and negatively with depressive symptoms and ADL / IADL difficulty. Higher levels of distraction were associated with less well-being and more activity difficulty in both domains, higher levels of denial went along with less well-being, more depressive symptoms, and a smaller range of activities.

Active coping and acceptance were both unrelated to the criteria, and religious coping was positively associated with a greater overall range of activities[32].

In sum, most of the associations between the criteria of adaptation and the vision and health indicators, as well as the associations between the criteria and the resources and self-regulation variables, were in the expected directions. Coefficients were small to moderate, common variance with any of the criteria ranged between 3% and 22%. Multimorbidity was a stronger predictor than visual acuity, amongst the resources, the generalized expectations had the highest correlations with the criteria.

5.11. Correlates of Adaptation prior to Surgery: Multiple Regression Analyses

The following section is concerned with the multivariate prediction of well-being and activity indicators. First, the unique effects of the health and vision indicators are determined in order to select the most powerful amongst them and thus reduce the set of predictors for subsequent analyses. After that, the relative predictive power of social and personal resources and life investment *above and beyond* the effects of health and vision is determined.

This sequential procedure was chosen to acknowledge the differential predictor status of health and vision variables on the one hand and social and personal resources and self-regulation in the other. It is supposed to provide a "hard" test for the psychosocial factors. To be sure, this choice shall not reflect the notion that health and psychosocial factors are generally independent of one another. In this context however, with the exception of perceived availability of social support, none of the resources were significantly associated with any of the (subjective and objective) indicators of health and vision (5.9.1). Also, the development of a cataract has not yet been linked to any kind of behavior or personality disposition and affects almost everyone sooner or later in their lives. Thus it was reasoned here that none of the psychosocial factors predisposed individuals for a cataract.

5.11.1. Health and Vision and Criteria of Adaptation

How much variance in the criteria can be accounted for by considering the set of vision and health predictor variables jointly? In order to select out the most powerful variables, and thus being able to reduce the amount of predictors for following analyses, vision and health variables were entered in a *forward stepwise* procedure after controlling for age and gender

[32] This small association was solely due to the fact that religious activities constituted an own category in the list of activities. When computing an activity sumscore without this category, the positive correlation with religious coping was no longer significant.

that were entered simultaneously in a first step[33]. This procedure was also chosen to assess the amount of unique variance for each predictor separately. Table 5.20 shows the results of a series of multiple regressions predicting the six criteria variables prior to surgery. As can be seen, the unique variance contribution of the predictors varied between the criteria, and so did the total amount of explained variance[34].

Remarkably, each of the vision and health variables – although intercorrelated – contributed unique variance to well-being. The negative bivariate association between vision in the operative eye and well-being is even more pronounced here (see 5.10). In contrast, objective vision was not associated with depressive symptoms beyond the effects of multimorbidity and subjective impairment due to health and vision problems.

The average difficulty with activities was most strongly associated with patient's objective and subjective *health*. In addition, visual acuity in the better eye, assumed to be the best proxy for objective vision, shows a negative association with perceived difficulty with activities. Interestingly, the *range* of people's activities, i.e. how many different activities other than ADL / IADL they had engaged in during the past six month, was negatively associated with the *subjective* health strain, with no additional variance being explained by objective indicators and subjective impairment through vision problems. Also, the amount of explained variance was comparatively low for these indicators.

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[33] Where previous analyses have suggested non-linear relationships between age and an outcome, the quadratic term of the z-score of age was entered instead of the first order term (Aiken & West, 1991). Wherever that was done, all variables were z-standardized before entering them in the regression.

[34] One univariate outlier with a sumscore of 46 on the CES-D was exluded from the prediction of well-being and depressive symptoms. This procedure led to the inclusion of two more variables in the prediction of well-being (multimorbidity and vision in better eye). Also the amount of explained variance (adj. R^2) increased from .16 to .21. In all following regression analyses predicting adaptation *prior* to surgery, two multivariate outliers in the prediction of depressive symptoms and three multivariate outliers in the prediction of activity difficulties were detected according to the Mahalanobis distance criterion ($p < .001$). Their exclusion, however, did not lead to any significant changes of the results.

Table 5.20

Hierarchical multiple regression of well-being, depressive symptoms, activity difficulty and activity range prior to surgery on vision and health indicators

		PGCMS				CES-D		
		β[b]	R^2	Δ R^2		B[b]	R^2	Δ R^2
Step I: enter	Age	.09			Age^2	.09		
	Sex	.03	.01		Sex	-.02	.03	
Step II: stepwise[a]	Subj. strain	-.27**	.12	**.10**	Multimorbidity	.23**	.14	**.11**
	Multimorbidity	-.20**	.16	**.04**	Subj. vision	.20**	.19	**.05**
	Operative eye	-.25**	.19	**.03**	Subj. strain	.16*	.21	**.02**
	Better eye	.17*	.23	**.04**				
	Subj. vision	-.18*	.25	**.02**				
		Adj. R^2	*.21*			***Adj. R^2***	*.18*	

		Difficulty with ADL /IADL				Difficulty with other activities		
		B[b]	R^2	Δ R^2		B[b]	R^2	Δ R^2
Step I: enter	Age^2	-.17**			Age^2	.25**		
	Sex	-.01	.04		Sex	.00	.09	
Step II: stepwise[a]	Multimorbidity	.30**	.21	**.17**	Subj. strain	.25**	.23	**.14**
	Subj. strain	.26**	.27	**.06**	Multimorbidity	.22**	.27	**.04**
	Better eye	-.17*	.30	**.03**	Better eye	-.17**	.30	**.03**
		Adj. R^2	*.28*			***Adj. R^2***	*.27*	

		Activity range		
		β[b]	R^2	Δ R^2
Step I: enter	Age^2	-.23**		
	Sex	.10	.06	
Step II: stepwise[a]	Subj. strain	-.29**	.15	**.09**
		Adj. R^2	*.13*	

* $p \leq .05$; ** $p \leq .01$

[a] Predictors include: all vision and health indicators at T1, variables are listed in their empirical order of entry (probability of F < .05), variables not included in the equation (probability of F ≥ .10) are not displayed

[b] Coefficients and significance pertain to the last model, unstandardized coefficients are displayed for the prediction of CES-D and activity difficulty because predictors had been z-standardized

Note: Subj. strain = average subjective strain experienced by additional diseases; subj. vision = subjective impairment experienced by vision problems

Table 5.21

Hierarchical regression of the criteria of adaptation prior to surgery on resources and life investment

		PGCMS		
		β	R^2 / *adj.*	Δ R^2
Step I:	Rival predictors[a]		.25	
Step II:	FGA-N	.21**		
	Perceiv. avail. of social support	.14†		
	Life Investment	.00		
	Optimism	.28**	.45 / *.40*	**.20**
		CES-D		
		B[b]	R^2 / *adj.*	Δ R^2
Step I:	Rival predictors[a]		.21	
Step II:	FGA-N	-.18**		
	Perceiv. avail. of social support	-.06		
	Life Investment	-.05		
	Optimism	-.25**	.38 / *.34*	**.17**
		Difficulty with ADL /IADL		
		B[b]	R^2 / *adj.*	Δ R^2
Step I:	Rival predictors[a]		.30	
Step II:	Perceiv. avail. of social support	-.11		
	Powerful Others	-.10	.33 / *.30*	**.03**
		Activity range		
		B[b]	R^2 / *adj.*	Δ R^2
Step I:	Rival predictors [a]		.15	
Step II:	TGP	.19*		
	Life Investment	.17*		
	Powerful Others	-.16*	.24 / *.20*	**.09**

* p ≤ .05; ** p ≤ .01

[a] Rival predictors: age or age², sex, and all baseline vision and health indicators with unique contributions to respective criteria variance (see Table 5.20)

[b] Unstandardized coefficients are displayed because variables had been centered

Note: FGA-N = Flexible Goal Adjustment by Orientation towards New Things, TGP = Tenacious Goal Pursuit

5.11.2. Beyond Vision and Health: The Contribution of Social and Personal Resources, Dispositional Coping and Life Investment

Were there unique contributions of the psychosocial factors to the various outcome criteria, that could not be accounted for by differences in vision and health? It was hypothesized that personal as well as social resources and life investment were associated with well being and functional indicators of adaptation in everyday life above and beyond patients` visual acuity and health status. Also, it was assumed that resources should be more powerful in the prediction of well-being than in the prediction of the activity indicators, which should be more strongly associated with vision and health.

It is important to note again, that - with the exception of support availability - all resources were *unrelated* to vision and health indicators.

A series of hierarchical regressions of the criteria on the respective resources was conducted, controlling for age, sex, and vision and health indicators that were identified as contributing unique variance to the respective criterion. Again, in regressions involving a second order term (age^2), all variables were z-standardized.

First, separate regression analyses were performed for each resource domain (dispositional coping, social support, etc. …). The results of these regressions are shown in Tables C1 - C3 (Appendix C). After that, all resources that have been found to contribute to outcome variance beyond the effects of health and vision were entered simultaneously, to test for their unique contributions. These results are shown in Table 5.21[35].

As expected, most of the resources as well as life investment contributed to variance in the prediction of well-being and depressive symptoms *beyond* the effects of vision and health (Table C1, Appendix C). Despite their intercorrelations, *unique* contributions to variance in well-being were found for the flexible goal adjustment subscale orientation towards new things (FGA-N), perceived availability of social support, and optimism (Table 5.21). FGA-N and optimism also accounted for unique variance in depressive symptoms.

For the prediction of difficulty with ADL / IADL, significant F-change was obtained when adding perceived support and powerful others to the rival predictors ($\underline{F}_{change}(2;126) = 3.176$, $p \leq .05$). However, the respective beta-weights were not significant any longer (as opposed to regressing the criterion on each predictor separately, see Table C2), indicating a supressor effect of both variables on each other. As in the bivariate associations, all other personal and social resources as well as life investment did not account for criteria variance when controlling for age, sex, vision and health.

[35] Tenacious goal pursuit (TGP) was not included in the prediction of well-being, depressive symptoms and average difficulties. Although it was positively related to well-being and depressive symptoms, it shared no unique variance with them beyond the effects of flexible goal adjustment strategies (FGA-R and FGA-N). Furthermore, the inclusion of TGP in the multiple regressions caused a suppressor effect on FGA-R, which dropped below significance.

Of the three life investment variables, only average life investment was consistently associated with the criteria. To avoid collinearity problems, the two other indicators (investment selectivity and variability) were not included in the regressions. This decision is further supported by theoretical assumptions: no main effects were expected for these indicators.

The regression of difficulty with activities *other* than ADL / IADL on the resources whilst controlling for rival predictors yielded no significant effects with the exception of partnership (Table C2, Appendix C). Having a partner was associated with more difficulty ($B = .17$).

Tenacious goal pursuit, life investment and belief in powerful others still accounted for variance in the range of activities even after controlling for health and vision. In addition, optimism and self-efficacy were positively associated with activity range (at $p \leq .10$), pointing to unique contributions of all three generalized expectations in the range of pursued activities.

To conclude, perceived availability of support as well as flexible goal adjustment tendencies, generalized expectancies and life investment were associated with well-being and depressive symptoms prior to surgery above and beyond the effects of vision and health, with a considerable amount of additional variance explained by their joint consideration (20% / 17%). Unique variance components were found for FGA-N, optimism and perceived support. Belief in powerful others remained a predictor for experiencing less difficulty with ADL / IADL and having a smaller range of activities, whereas life investment and TGP were positively associated with overall range of activities. The amount of additional variance contributions of the single resources to the activity indicators was comparatively small (ranging from 0 to 9 %), with no increase in explained variance when entering them jointly.

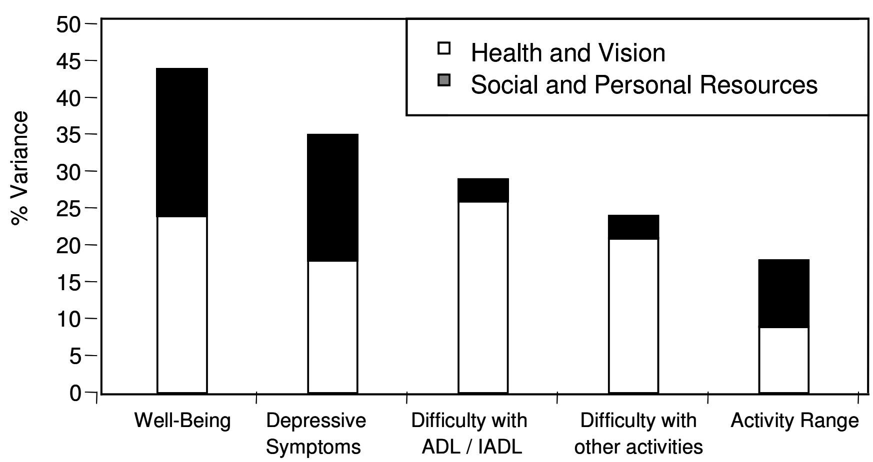

Figure 5.12 *Prediction of the criteria of adaptation prior to surgery: unique variance components of the social and personal resources (including life investment) above and beyond the amount of variance explained by objective and subjective vision and health indicators (age and sex partialled)*

Figure 5.12 shows a graphical summary of the previous regression analyses. It displays the amount of criteria variance explained by the vision and health indicators, as well as the *unique* variance of the social and personal resources.

Health and vision indicators shared more variance with activity difficulties than with well-being / depressive symptoms and activity range. In the latter criteria, psychosocial factors added a considerable amount of explained variance. This supports the notion that health constraints are important predictors of well-being and perceived activity difficulty, but only part of the story. Being optimistic and flexible in goal adjustment, having a sense of self-efficacy, a supportive background and being involved with important life domains are important covariates of well-being, beyond the threats of poor health and vision. They even explain additional variance in activity indicators, less so in the perception of difficulty and more in the range of activities.

5.12. Cumulation of Stress Through both Vision and Health Problems

Patients with low vision, who at the same time suffer from multiple diseases, were assumed to be at greater risk for maladaptive outcomes than patients suffering from *either* low vision or multimorbidity. In addition, the latter two groups should report less well-being and greater activity difficulty than patients with comparatively good visual acuity and low multimorbidity.

To test these hypotheses, a stress index was computed combining each individual's scores on multimorbidity and visual acuity (better eye). This was done by performing a median split on both variables and subsequently building four groups: patients below the median on both variables (low-risk group, $\underline{N} = 32$), patients above the median only on the multimorbidity indicator (high-multimorbidity group, $\underline{N} = 30$), patients above the median only on the vision indicator (low-vision group, $\underline{N} = 42$), and patients with values above the median on both indicators (high-risk group, $\underline{N} = 32$). Mean age was highest in the high-risk group, but did not significantly differ from the other groups (see Table D1, Appendix D). More than 50% of the patients in the high risk group were older than 75, as opposed to approximately 30% in the three other groups. There were more women in the high-risk group (87.5%) as opposed to the gender ratio in the three other groups (62 - 65% women).

The four groups were compared with respect to differences in level of their resources and adaptation. Looking at the resources, only one comparison reached statistical significance: there was an overall effect of group membership on belief in powerful others ($\underline{F}(3;132) = 2.86$, $p \leq .05$). Post-hoc tests revealed that the high-risk group scored significantly lower on this dimension than the low-vision group, the two other groups had scores in between ($\underline{M}_{low\ risk}$

= 3.09, SD = .63; $M_{high\ MM}$= 3.10, SD = .73; $M_{low\ vision}$, = 3.34, SD = .54; $M_{high\ risk}$ = 2.90, SD = .68).

The descriptives of the objective and subjective health and vision indicators, as well as the criteria of adaptation are shown in Table D1 (Appendix D). Apart from the dimensions that were used to build the groups (multimorbidity and vision in better eye), the four groups did not differ with respect to vision in the operative eye, subjective impairment experienced by vision problems and activity range.

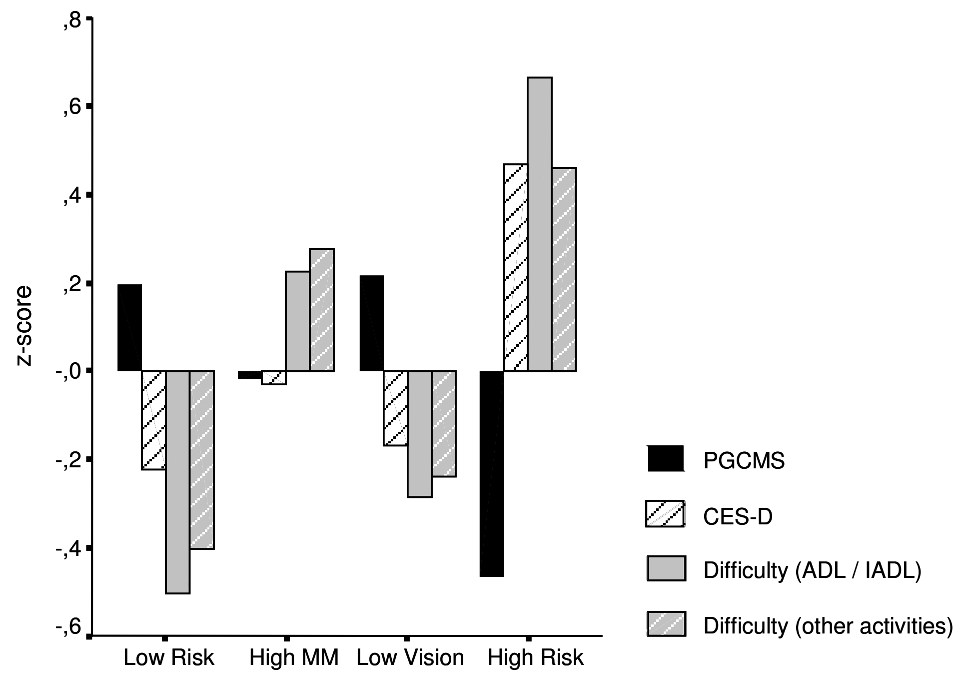

Figure 5.13 *Criteria of adaptation in four risk groups*

Note: z-scores were computed because of differences in scaling; MM = multimorbidity

Observed differences between groups were mainly due to the high-risk group which had significantly lower scores on well-being, and significantly higher scores on depressive symptoms, activity difficulty and subjective health strain in comparison to both the low-risk and the low-vision group. Scores in the high-risk group were also worse than in the high-multimorbidity group, however, these differences were not significant[36].

[36] It should be noted that the Scheffé test applied for post-hoc testing here is very conservative, because it allows for all possible linear combinations of group means to be tested.

The high multimorbidity group significantly differed from the low risk and the low vision group only with respect to a higher level of activity difficulty, both in average ADL / IADL difficulty as well as in the average difficulty score across other activities. The two "single risk "groups did not differ from each other on any of the measures. In Figure 5.13, group differences in the adaptational criteria are displayed graphically.

To conclude, it was shown that the joint occurrence of multimorbidity and low vision was associated with lowered well-being, greater frequency of depressive symptoms and more activity difficulty in comparison to having just one of the stressors to deal with. Patients with comparatively low vision but also low multimorbidity did not differ from the low risk group, whereas patients with high multimorbidity and at the same time fairly good visual acuity were more similar to the high-risk group. Taken together, this evidence further supports for the notion of a cumulative stress effect of poor health and vision.

5.13. Activity Indicators as Mediators in the Association between Health and Well-Being

It was hypothesized that the associations between the objective health and vision indicators and well-being are mediated through the experience of difficulty in the pursuit of activities.

As indicated by the bivariate associations reported in the previous sections, the statistical prerequisites for testing this hypothesis (Baron & Kenny, 1986) are given only for multimorbidity. There were significant associations between this predictor variable and the mediators (average activity difficulty with ADL / IADL and average activity difficulty with other activities), and it was significantly associated with the criterion. Furthermore, the potential mediator variables were significantly correlated with the criterion. Neither vision in operative eye nor vision in better eye showed significant associations with well-being prior to surgery (Table 5.18). To test whether activity difficulty served a mediator status between multimorbidity and well-being, well-being was first regressed on multimorbidity alone, and then the potential mediators were entered. Age and sex were controlled for.

Structural equation modeling was used to specify direct and indirect effects of multimorbidity on well-being and depressive symptoms. As outlined in the method section, subscales or *parcels* rather than single items were used to indicate constructs where possible. Well-being was indicated using the three theoretical subscales of the PGCMS (non-agitation, aging satisfaction, and life satisfaction). The difficulty ratings were randomly assigned to two parcels indicating ADL / IADL difficulty, and three parcels indicating difficulty with other activities (for complete model see Figure E1, Appendix E).

Regressing multimorbidity on well-being whilst controlling for age and sex yielded a regression weight of -.32 for multimorbidity. In a second step, the activity indicators were entered in the model. Figure 5.14 shows the results of this model. It includes the two difficulty indicators, allowing for direct and indirect effects of multimorbidity on the criteria. It can be seen that when entering the two potential mediators jointly, ADL / IADL difficulty mediated the association between multimorbidity and the criterion, as indicated by a lowered, now nonsignificant regression coefficient of the direct path between multimorbidity and criterion (-.09). Taking into account the significant paths only, the total *indirect* effect of multimorbidity was -.27.

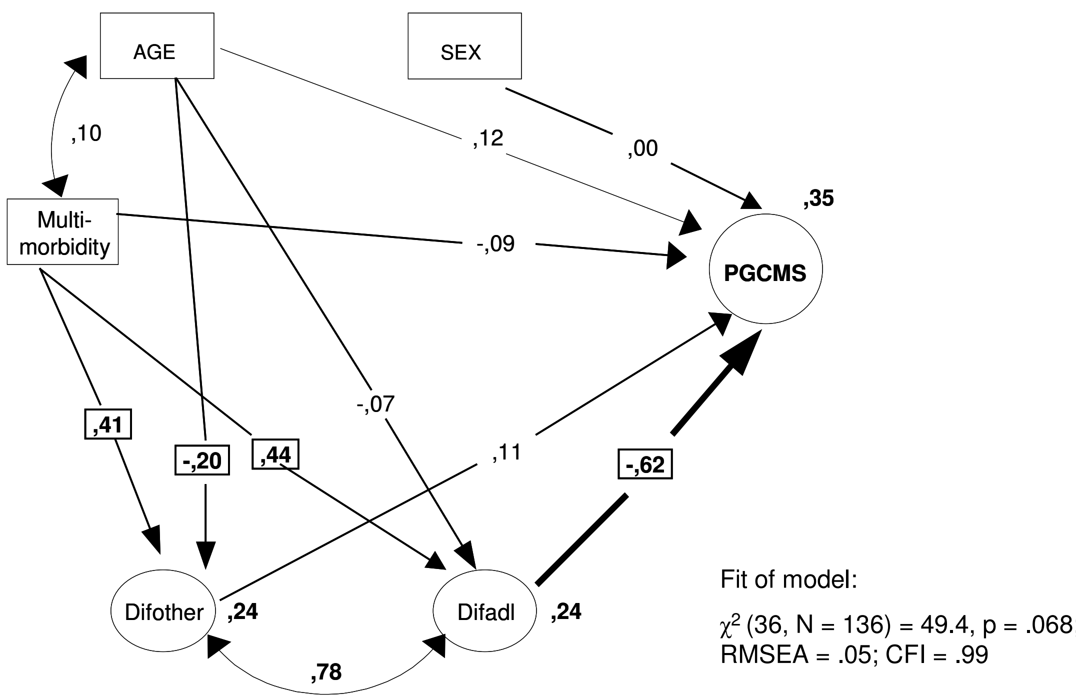

Figure 5.14 *Structural model of cross-sectional relations between age, multimorbidity, activity difficulty and well-being*

Note: Displayed are standardized regression weights, significant coefficients are surrounded by rectangles. PGCMS = Philadelphia Geriatric Centre Morale Scale; Better Eye = visual acuity in better eye; Difother = average difficulty with activities other than ADL / IADL; Difadl = average difficulty with ADL / IADL

Notably, average difficulty with activities other than ADL / IADL did not account for a significant proportion of criteria variance beyond ADL / IADL difficulty. Goodness of fit indices were acceptable (see figure). The alternative model, where the path between multimorbidity and well-being was not specified, yielded no significant change in overall model fit ($\Delta\chi^2 = 0.91$, $p = .340$).

When specifying the same mediator model without ADL / IADL difficulty, the regression weight of multimorbidity dropped from -.32 (model without mediator) to -.16 (model including difficulty with other activities), but was still marginally significant ($p \leq .10$). This indicated that the average difficulty with activities other than ADL / IADL mediated only a small proportion of the association between multimorbidity and well-being.

5.14. Moderators in the Adaptational Process

So far, main effects of health and vision status and the psychosocial variables on well-being and functional status in everyday life have been examined, along with some assumed sequential interrelations (mediator effects). The next section is dedicated to the analysis of potential moderators in the observed associations.

First, the potential moderating role of age is examined. It had been hypothesized that age moderates the associations between the health and vision indicators and the outcomes, in such that multimorbidity and vision problems should be more strongly associated with well-being and depressive symptoms in middle-aged as opposed to young old and old adults. Furthermore, it was assumed that well-being in middle-aged patients should more strongly be related to flexibility in goal adjustment and partnership than well-being in the young old and old. For the other resources, no age-differential effects were expected.

The *duration* of subjective vision problems was supposed to influence the associations between the psychosocial resources and the criteria of adaptation, in such that well-being and depressive symptoms in patients with the more recent onset of subjective impairment should be *more* closely related to their current personal resources. With respect to health and vision, no specific hypotheses were formulated.

In a third set of moderator analyses, the issue of resilience in the face of health constraints is addressed. It was hypothesized that - in addition to their main effects - personal and social resources contribute to positive adaptation by serving a *buffering* function in face of poor vision and health. In patients with low vision and / or high multimorbidity, the positive associations between psychosocial resources and criteria of adaptation should be stronger than in patients with less severe health constraints. Moreover, being selective, as defined by (1) a high number of life domains with low or very low investment and (2) a lower range of activities within the past six months, was assumed to be a protective mechanism under health constraints, but not when vision impairment was weak and multimorbidity low.

5.14.1. Age as a Moderator for Health and Vision?

It was a general hypothesis that middle-aged participants have more problems in adapting to vision and health problems than young old and old adults. Indeed, they had reported more depressive symptoms (5.6.2) and more difficulties with activities other than ADL / IADL in comparison to the young old (5.7.1). Here it is tested whether these differences in level of adaptation were accompanied by age group differences in the strength of *associations* between (objective) measures of health and vision and cognitive-emotional adaptation.

Hierarchical regression analyses predicting well-being and depressive symptoms were conducted entering sex in a first step. Age (or age^2) and the respective health or vision indicator were entered then and in a third step the interaction of both variables[37].

Only one interaction with vision reached significance: the interaction term age*vision in operative eye in the prediction of well-being ($p \leq .05$; $\Delta R^2 = .03$). This interaction was due to the oldest participants who had lowered levels of well-being with better visual acuity in the surgery eye ($\underline{r} = -.36$, $p \leq .01$), whereas there was no association between these variables in the two other age groups. This seemingly paradox finding was already explored in 5.10.

Contrary to what had been expected, the correlations between the health and vision indicators and well-being and depressive symptoms were not stronger in middle-aged participants.

5.14.2. Age as a Moderator for Social Resources?

Was well-being in middle-aged patients negatively associated with not having a partner? Two 2 (partnership) x 3 (age groups) univariate analyses of variance were conducted, testing the significance of the interaction term age group*partnership in the prediction of well-being and depressive symptoms, beyond main effects of the predictors (sex was entered as a covariate). The interaction term was significant in the prediction of well-being ($\underline{F}(2;129) = 3.89$, $p \leq .05$; $\Delta R^2 = .06$) as well as in the prediction of depressive symptoms being ($\underline{F}(2;129) = 3.75$, $p \leq .05$; $\Delta R^2 = .06$). Post-hoc t tests within each age group revealed that, as expected, not having a partner was associated with lowered well-being and more depressive symptoms only in

[37] In all analyses that tested the moderator status of age, separate analyses were conducted using *either* age or age^2 as a predictor. The first order term was not included with the higher order term at the same time. As Aiken & West have pointed out, the omission of the first order term is justified if "strong theory and prior empirical evidence" indicate that linear relations do not fit the data well (p. 97).

middle-aged participants (well-being: t(30) = -1.67, $p \leq .10$; depressive symptoms: t(30) = 1.92, $p \leq .10$), but not in young old (t(49) = 1.36 / -1.27, n.s.) and old patients (t(51) = 0.13 / 1.00, n.s.; see Figure 5.15).

Figure 5.15 *Not having a partner was associated with well-being only in middle-aged, but not young old and old patients*

5.14.3. Age as a Moderator for Flexibility in Goal Adjustment?

Was well-being in middle-aged patients more strongly associated with the tendency to flexibly adjust one's goals, either by means of reframing (FGA-R) or by means of looking for new goals (FGA-N)? Hierarchical regression analyses were conducted, testing the significance of the interaction terms age (or age^2)*FGA-R and age (or age^2)*FGA-N in the prediction of well-being and depressive symptoms, beyond main effects of the predictors (sex partialled).

None of the expected interactions was significant, indicating that both dispositional tendencies were associated with positive adaptation, regardless of patients` age.

5.14.4. Duration of Vision Problems as a Moderator for Personal and Social Resources?

The duration of subjective impairment was not associated with the criteria of adaptation (see 5.10). However, it was assumed that it moderates the relationships between the personal resources and criteria of adaptation.

Hierarchical regression analyses were conducted excluding eight participants who had reported that they felt no impairment in vision[38]. In a first step, age (or age^2), sex, as well as vision and health variables previously identified as predictors were entered simultaneously. Secondly, duration of vision problems and the respective resource were entered and in a third step the interaction term of both variables. In Table 5.22, the significant interactions are displayed. Beyond the effects of vision and health, the interactions between duration of vision problems and flexible goal adjustment by means of orientation towards new things (FGA-N), and duration and self-efficacy contributed an additional amount of variance in the prediction of well-being (PGCMS). For the prediction of depressive symptoms, only the association with self-efficacy was moderated by the duration variable. No significant interaction terms were found when predicting the activity indicators.

Table 5.22

Results of hierarchical regression analyses testing the moderator status of duration of vision problems in the relation between resources and well-being / depressive symptoms prior to surgery

		PGCMS		CES-D	
		R^2	ΔR^2	R^2	ΔR^2
Step I:	Rival predictors[a]	.24		.22	
Step II:	Duration, FGA-N	.34	**.11****	.32	**.10****
Step III:	Duration * FGA-N	.36	**.02†**	.33	.01
Step II:	Duration, Self-Efficacy	.33	**.09****	.28	**.06****
Step III:	Duration * Efficacy	.35	**.02†**	.31	**.03***

† p ≤ .10; * p; ** p ≤ .01

[a] Rival predictors: age (depr. Symptoms: age^2), sex, and all baseline vision and health indicators with unique contributions to respective criteria variance (see table Table 5.20)

Note: FGA-N = Flexible Goal Adjustment by Orientation towards New Things

The interactions were further explored dividing the sample into two groups: participants who had vision problems for more than one year (N = 39) and participants who had these problems for a year or less (N = 88). The two groups did not differ with respect to any of the health and vision indicators and psychosocial resources. Although there was no significant linear or nonlinear association between duration and any of the outcome variables, one significant difference emerged when comparing the two groups: patients with a long duration of subjective impairment (> one year) reported significantly more difficulty with ADL / IADL

[38] As in previous analyses, one univariate outlier with a high CES-D score was excluded from the prediction of well-being and depressive symptoms (see 55.11.2). The same two multivariate outliers were detected as in the previously reported multiple regressions, again their exclusion did not alter the results.

than did patients with only recent impairment ($\underline{M}_{long\ duration}$ = 1.25; $\underline{SD}$ = .85; $\underline{M}_{short\ duration}$ = .95; $\underline{SD}$ = .74; $\underline{F}(1;127) = 4.17$, $p \leq .05$; $\underline{Eta}^2 = .03$).

As can be seen in Figure 5.16, orientation towards new things was an important coping style only in the recent impairment group, accounting for 23% of the variance in well-being prior to surgery (21% after adjusting for age, sex, vision and multimorbidity). In contrast, there was only a small, insignificant association between the two variables in patients who suffered from impaired vision for more than one year (1% before and 0% after adjusting for rival predictors).

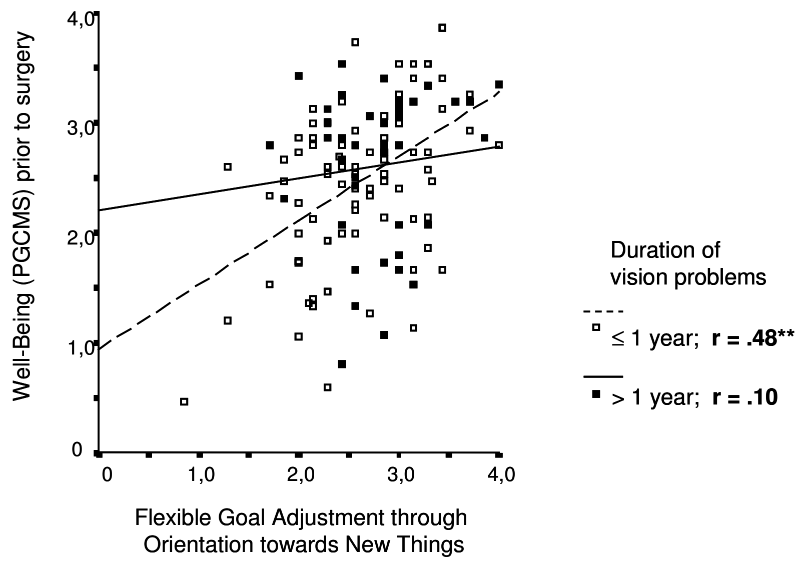

Figure 5.16 *Duration of vision problems moderates the relation between flexible goal adjustment by means of orientation towards new things and well-being prior to surgery*

Note: displayed are zero-order correlations, for adjusted coefficients see text

Similar moderator effects were found for self-efficacy. Statistical comparisons of the bivariate correlations between the respective resource and well-being / depressive symptoms revealed that all associations in the two groups were mostly in the same direction, but significantly stronger in the recent impairment group (Table 5.23).

The duration of vision problems did not moderate the associations between resources and activity difficulties. The perception of available support was an important predictor for adaptation in *all* patients, independent of the duration of vision problems. For life investment, no predictions were made, and it appeared that its predictor status was also not moderated by the duration variable.

Table 5.23

Associations[a] between FGA-N, self-efficacy and well-being in patients with long duration of vision problems (> one year; N = 39) and patients with short duration of vision problems (≤ one year; N = 88)

	PGCMS			CES-D		
Duration	*≤ one year*	*> one year*	z [b]	*≤ one year*	*> one year*	z [b]
FGA-N	.46**	.02	**2.41****	-.40**	-.25	0.85
Self-Efficacy	.42**	.13	**1.60***	-.42**	.02	**2.15***

* p ≤ .05; ** p ≤ .01

[a] partial correlations, adjusted for age, sex, vision and health

[b] comparison of two correlations from independent samples, z of normal distribution

Note: FGA-N = Flexible Goal Adjustment by Orientation towards New Things

5.14.5. Duration of Vision Problems as a Moderator for Health and Vision?

Both vision and health problems were negatively associated with the criteria of adaptation. Were these associations conditional on the duration of the visual impairment?

Table 5.24 displays the results of hierarchical regressions on the two activity indicators. Only one of the interactions was significant: the interaction between duration of subjective vision problems and multimorbidity in the prediction of difficulty with activities other than ADL / IADL.

Again, the interaction was further explored dividing the sample into the recent impairment group (N = 88) and the long impairment group (N = 39). Higher multimorbidity was associated with a higher degree of activity difficulty in both groups. However, this association was significantly stronger in patients suffering from visual impairment for more than one year ($r_{short\ duration} = .31$; $r_{long\ duration} = .48$, both $p \le .01$). After partialling out age, sex, vision and subjective health strain, the coefficient in the recent impairment group dropped to .20, and increased to .54 in the group with longer duration of vision problems ($z = 1.95$, $p \le .05$).

Visual acuity in the better eye was also more strongly related to activity difficulties in patients with a longer duration of vision problems as compared to more recently impaired patients, however, these interactions were not significant (Table 5.24).

The associations between the health and vision indicators and well-being did not differ between the two groups, no significant interactions were obtained in the multiple regressions.

In sum, the findings underscore the hypothesized importance of the *duration* of existing vision problems. Current status of well-being in those patients who had been experiencing vision problems for a longer period of time (more than one year) was not significantly associated with patients` dispositional tendencies in adjusting their goals.

In contrast, well-being in patients who were more recently affected by the cataract was strongly related to having a tendency to disengage from blocked goals and look for new ones instead (FGA-N). This suggests a temporary efficacy of this particular facet of goal adjustment in the maintenance of well-being. Also, the positive associations with self-efficacy were significantly stronger in patients who only recently felt impaired. It is important to note that these differences in the protective status of FGA-N and self-efficacy could not be accounted for by differences in visual acuity and health parameters between the two groups, but seem to be a function of time only.

Table 5.24

Results of hierarchical multiple regression analyses testing the moderator status of duration of vision problems in the relation between multimorbidity / visual acuity and activity difficulty prior to surgery

		Difficulty with ADL / IADL		Difficulty with other activities	
		R^2	ΔR^2	R^2	ΔR^2
Step I:	Rival predictors[a]	.27			
Step II:	Duration, multimorbidity	.33	**.10****	.31	**.06****
Step III:	Duration * multimorbidity	.34	.01	.34	**.03***
Step II:	Duration, vision in better eye	.33	**.05****	.31	**.04***
Step III:	Duration * vision in better eye	.33	.01	.32	.01

† p ≤ .10; * p; ** p ≤ .01

[a] Rival predictors: age², sex, and all baseline vision and health indicators with unique contributions to respective criteria variance (see table Table 5.20) with the exception of the respective variable in step two

Furthermore, a longer duration of vision impairment goes along with a stronger negative association of multimorbidity and activity difficulty – regardless of severity of visual impairment. This finding might be due to having to deal with two simultaneous sources of stress for a long time. Still, alternative explanations are likely here also, such as a longer duration or greater severity of health problems in the "long impairment group". This information however was not precisely assessed in the study.

5.14.6. Resilience in the Face of Health Constraints: Do Resources and Selectivity *Buffer* the Negative Impact of Poor Health and Vision?

Multimorbidity was negatively associated with well-being and activity difficulty. In contrast, the associations were relatively weak for vision (see Table 5.18). This might indicate that the objective vision impairment had not been so severe, as was indeed the case (see 4.4.5). Another explanation is that buffering effects of personal and social resources might be responsible for the lack of stronger associations in the entire sample. In this case, cognitive-emotional adaptation to vision problems had been quite successful, despite the increased difficulty with activities. Some participants had low vision and high multimorbidity at the same time, and these had been shown to constitute a special high-risk group (see 5.12).

Before looking at this particular high-risk group, it was examined whether resources, dispositional coping and selectivity in life investment and activity range served a buffering function for the negative impact of health problems (multimorbidity), and vision problems (low vision in better eye) on the other. This was done with hierarchical multiple regression, using the same set of rival predictors as in previous analyses (5.14.5) in a first step. In the second step, either visual acuity or multimorbidity were entered together with the respective resource and after that the interaction term of both predictors.

None of the expected interactions was significant at $p \leq .05$. Contrary to what had been expected, the psychosocial resources did not serve a buffering function here, neither for vision nor for health problems. It was also expected that under health and vision constraints, being *selective* in the life investment domains and in the overall range of activities is an adaptive mechanism. There were only two (marginally) significant interactions between vision in the better eye and activity range in the prediction of well being (not depressive symptoms) and difficulty with ADL / IADL (see Table 5.25).

Using a median split on the vision variable revealed that these interactions reflected the opposite of what had been expected: in those participants with worse vision (< median), there was a *positive* relation between the range of activities and well-being ($\underline{r} = .37$, $p \leq .01$), in participants with better vision, this positive trend was not significant ($\underline{r} = .13$).

In other words: a greater activity range rather than the selective reduction of activities seemed to be protective especially in face of greater vision impairment.

Table 5.25

Results of hierarchical regression analyses testing the buffering effects of selectivity in investment and activity range

		PGCMS		Difficulty with ADL / IADL	
		R^2	ΔR^2	R^2	ΔR^2
Step I:	Rival predictors[a]	.23		.28	
Step II:	Vision in better eye, activity range	.28	**.05****	.36	**.08****
Step III:	Vision in better eye * activity range	.29	**.01**[†]	.39	**.03***

[†] $p \leq .10$; * p; ** $p \leq .01$

[a] Rival predictors: age (difficulty: age^2), sex, and all baseline vision and health indicators with unique contributions to respective criteria variance (see table Table 5.20)

However, when partialling out age, sex, multimorbidity and health strain, the correlation coefficients changed to $\underline{r}_{partial}$ = .32 ($p \leq .01$) for the low vision group and $\underline{r}_{partial}$ = .17 (n.s.) for the high vision group, and the difference between these was not significant (z = 0.91, n.s.).

A greater activity range was also negatively related to *activity difficulty*, even after controlling for age, sex, multimorbidity and health strain. This trend was stronger for patients with less visual acuity ($\underline{r}$ = -.45; $\underline{r}_{partial}$ = -.46, $p \leq .01$) in comparison to patients with better visual acuity in the better eye ($\underline{r}$ = -.24; $\underline{r}_{partial}$ = -.21, n.s.; z = 1.62, $p \leq .05$). Again, here, the buffering effect was due to doing *more* different activities rather than selecting few. In other words, patients with poorer vision had less ADL / IADL difficulty when they were more active. It should be noted that this effect could not be explained by lower multimorbidity or less health strain of those participants reporting a greater activity range, because these indicators have been partialled out.

The reported findings could not be replicated with the second selectivity indicator, investment selectivity. This indicates that less selectivity in personal life investment was related to positive adaptation regardless of vision and health status.

The unexpected lack of buffering effects of the resources in face of multimorbidity and vision problems warrants explanation. In the following, two alternative explanations for the lack of significant buffering effects are explored:

1. Resources were only effective in patients with a shorter duration of vision impairment, just as some of the relations between personal resources and outcomes were found in this group only (see 5.14.4). It might be the case that adaptation in patients with longer duration of impairment was less dependent on the severity of impairment, since they had already learned how to adapt to vision problems and established effective mechanisms that made them more independent of their actual resource status. Resources might simply not have been protective in face of severe health constraints, when at least one of these constraints existed for a longer period of time.

2. Impairment in visual acuity and multimorbidity were each not severe enough to pose a substantial threat to successful adaptation here, which is why a specific "effectiveness" of resources in the sense of protective buffers was not found here. Although vision had been impaired in all participants and variance was sufficiently high across the entire sample, the range of impairment was only within a moderate to mild degree (4.4.5). In case of multimorbidity, this variable, although explaining 7% of variance in well-being and 17% in

activity difficulty, might not be a sufficient indicator for the level of stress where buffering effects would become obvious.

Were Buffering Effects Dependent on the Duration of Vision Problems?

The above reported interaction analyses were repeated introducing duration of vision problems as an additional predictor in the second step, and adding the three-way interaction term resource*multimorbidity*duration or resource*vision in better eye*duration in a final step. None of these second-order interaction terms reached significance beyond main effects and first-order interactions, indicating that there were no buffering effects that were conditional on the duration of vision problems.

Buffering Effects of Resources in Face of Cumulative Stress through both Multimorbidity and Poor Vision

The second alternative explanation for the absence of buffering effects pertains to the weakness of vision and multimorbidity in the prediction of the criteria when considered as separate stressors. It was already shown that the joint occurrence of high multimorbidity and poor vision should set individuals at greater risk for maladaptive outcomes than individuals who had high impairment in only one of the domains or low impairment in both (5.12).

Thus, interaction analyses were repeated using the single vs. combined stressor index as a moderator instead of using either multimorbidity or visual acuity alone. As reported before, patients had been assigned to four risk groups depending on their status on multimorbidity and vision in better eye. Because of the small number of people in the four risk groups, and the similarity of the low-risk and low-vision group on the one hand, and the high-risk and high-multimorbidity group on the other (with respect to the criteria of adaptation, see 5.12), a new variable was computed where the two pairs of groups were each combined into one group. The resulting variable thus has only two values instead of four, a value of 1 was assigned to the low-risk / low-vision group (subsequently labeled "low-risk" group, N = 74) and a value of 2 was assigned to the high-risk / high-multimorbidity group (subsequently labeled "high-risk" group, N = 62). It was then tested whether resources had a buffering effect in patients with a high risk status as indicated by this variable.

In Table 5.26 it can be seen that there were indeed some significant interactions between risk status and resources in the prediction of well-being and difficulty with activities (other than ADL / IADL). Subsequent analyses, however, revealed that - with the exception of belief in powerful others - all resources were more effective in the *low*-risk group (see figures Figure

5.17 and Figure 5.18), as indicated by significantly higher resource - outcome correlations in this group as opposed to the high risk group[39]. Self-efficacy was positively related to well-being in both groups, but the association was significantly stronger in the low-risk group. In contrast, tenacious goal pursuit was positively related to well-being *only* in the low-risk group and there was no relation at all in the high risk group (Figure 5.17). No such interaction effects were found for the prediction of depressive symptoms, although there were complementary trends to the prediction of well-being.

Table 5.26

Results of hierarchical multiple regression analyses testing the buffering effects of resources on high risk status in the prediction of well-being and activity difficulty

		Predicting PGCMS		Difficulty with activities other than ADL / IADL	
		R^2	ΔR^2	R^2	ΔR^2
Step I:	*Rival predictors*[a]	.20		.19	
Step II:	Risk status, TGP	.30	**.10****	.23	**.05***
Step III:	Risk status * TGP	.32	**.02**†	.24	.01
Step II:	Risk status, self-efficacy	.22	.02	.25	**.06****
Step III:	Risk status * self-efficacy	.25	**.03***	.27	**.02**†
Step II:	Risk status, FGA-N	.32	**.12****	.23	**.04***
Step III:	Risk status * FGA-N	.32	.00	.25	**.02***
Step II:	Risk status, optimism	.41	**.21****	.23	**.04***
Step III:	Risk status * optimism	.41	.00	.27	**.04****
Step II:	Risk status, belief in powerful others	.24	**.04***	.24	**.05***
Step III:	Risk status * belief in powerful others	.24	.00	.26	**.02**†

† p ≤ .10; * p; ** p ≤ .01

[a] Rival predictors: age (difficulty: age^2), sex, and all baseline vision and health indicators with unique contributions to respective criteria variance (see table Table 5.20)

Note: TGP = Tenacious goal pursuit
FGA-N = Flexible Goal Adjustment by Orientation towards New Things

In the prediction of activity difficulty (Figure 5.18), there was a buffering effect of belief in powerful others in the high-risk group. In contrast, self-efficacy, optimism and flexibility in goal adjustment were positively associated with experiencing less difficulty only in the low-risk group. Furthermore, in the high risk group, there was a tendency towards experiencing *more* difficulties with increased optimism and goal flexibility, however, at a nonsignificant level. All interactions were specific for the prediction of difficulty with activities *other* than

[39] Because the group variable had already been used as the moderator in regression analyses, further significance testing of differences between correlations was not necessary.

ADL / IADL. ADL / IADL difficulty was thus equally associated with resources in high- and low-risk patients. The associations between the criteria and *perceived availability of social support* were not conditional on risk status, neither were the associations with selectivity in life investment and activity range.

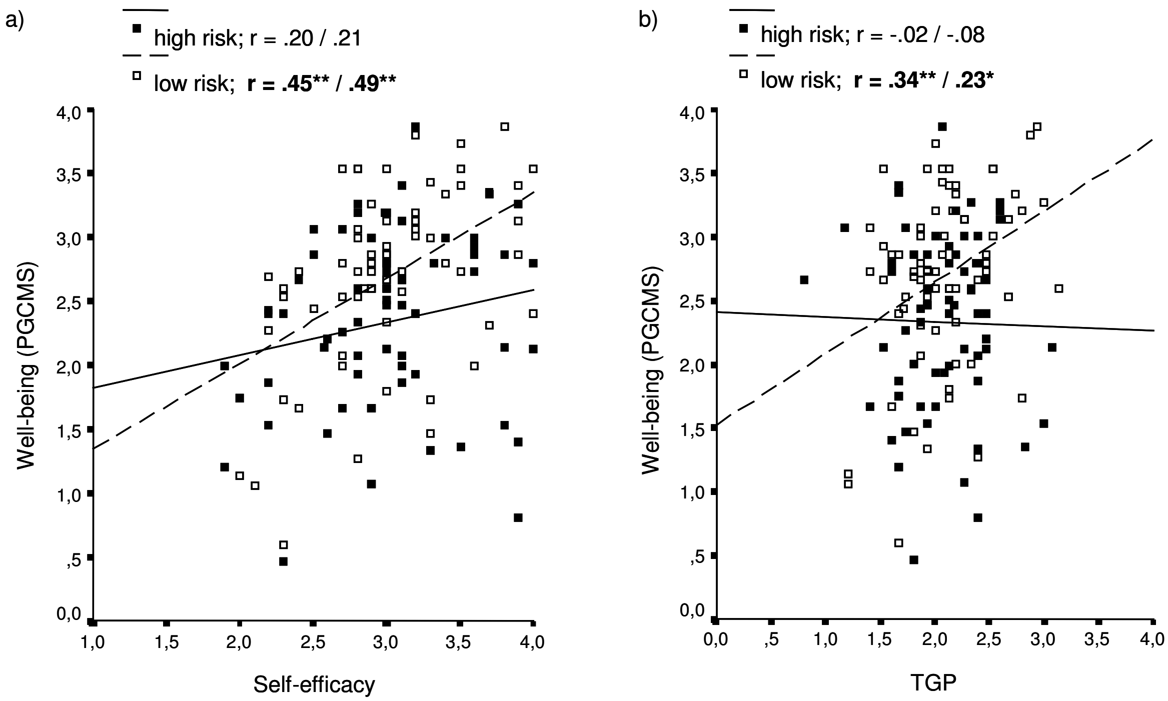

Figure 5.17 *Prior to surgery, the associations between self-efficacy and well-being, and tenacious goal pursuit (TGP) and well-being were conditional on risk status*

Note: displayed are zero-order correlations / and partial correlations (adjusted for age, sex, subjective vision and health and vision in operative eye)

To conclude, it was shown that some of the resource-criteria associations were conditional on patients` risk status when considering the cumulative risk of facing both high multimorbidity and vision problems. However, most of the effects were not in the expected direction. Rather then having a protective function *specific* to patients at high-risk (as the buffering hypothesis would predict), the personal resources showed stronger associations with well-being and activity difficulty in low-risk patients, sometimes exclusively in this group. Only the control dimension belief in powerful others had the expected buffering effect. Patients in the high-risk but not the low-risk group experienced less difficulty when believing to some extent in the benefits of delegating control over their health to others (i.e., their physician).

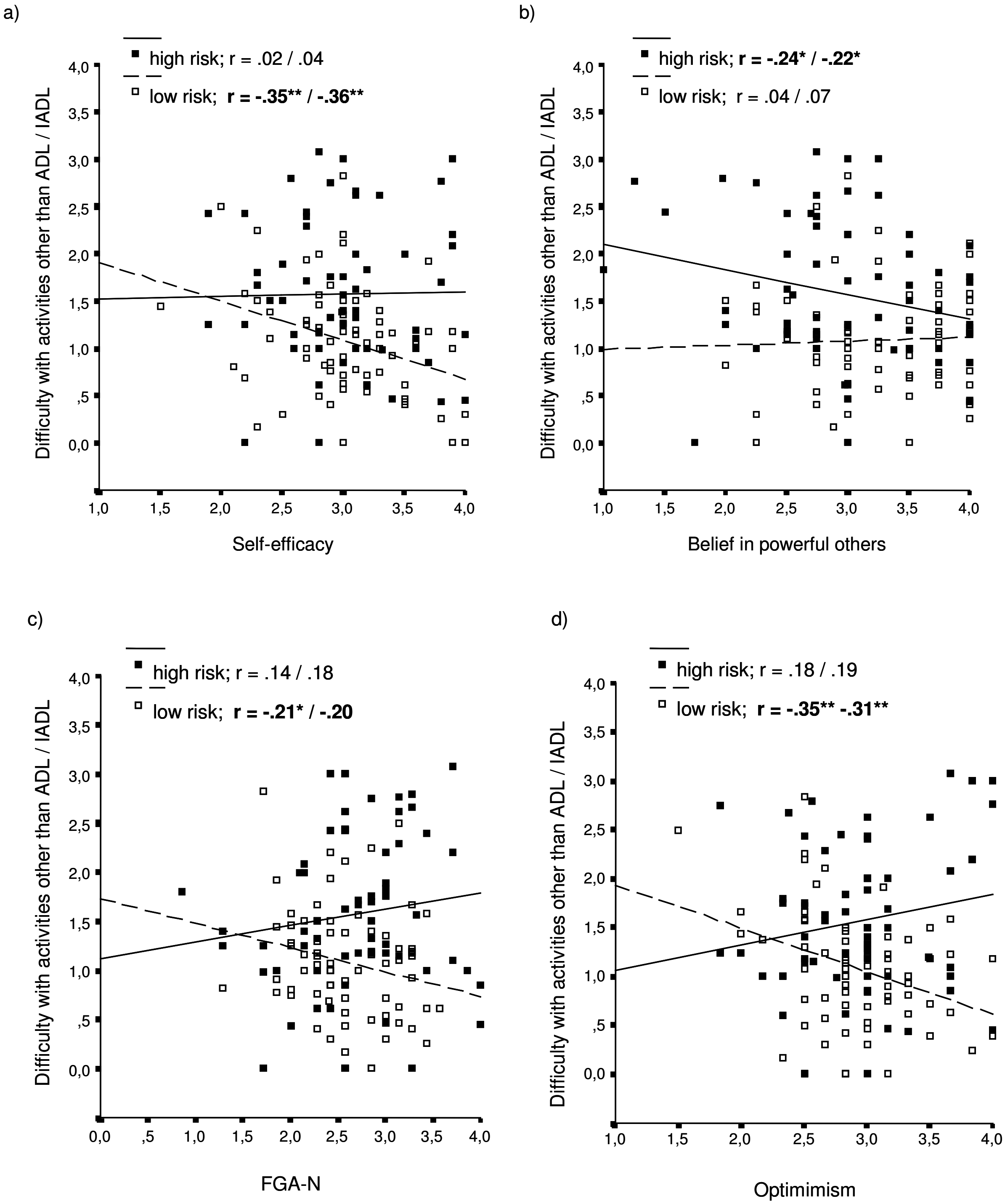

Figure 5.18 *Prior to surgery, the associations between activity difficulty and self-efficacy, flexible goal adjustment by means of orientation towards new things (FGA-N), optimism and belief in powerful others, were conditional on risk status*

Note: displayed are zero-order correlations / and partial correlations (adjusted for age, sex, and subjective health strain)

PART III
RESILIENCE IN THE FACE OF HEALTH CONSTRAINTS: JUST "ORDINARY MAGIC"?

Thus far, the issue of resilience has been approached by examining *relations* between variables (resources and criteria) under two different conditions (low risk vs. high risk). A protective function specific to the high-risk group (moderate to severe health and vision problems) was found only for the control dimension "powerful others". In this section, another methodological approach is pursued. Individuals with a resilient profile (i.e. those with positive adaptation under increased health constraints) in the setting of the study are identified and compared to individuals identified as "non-resilient" (i.e., those with negative adaptation under increased health constraints) and "normal" (i.e., patients with positive adaptation and low health constraints).

Especially the latter comparison is of interest. Instead of examining the differential adaptivity of resources across groups, as has been done in the previous analyses, the average group *level* of reported resources and coping strategies is examined here.

Specifically, three questions are addressed: (1) Did resilient individuals report a higher level of personal and social resources, and accommodative and assimilative coping strategies than normal patients? (2) Did they differ from non-resilient and normal patients with respect to the coping strategies they employed in dealing with surgery? (3) Did they differ from non-resilient and normal patients in regulating their life investment around surgery?

5.15. Identification of Resiliency

On the basis of the risk-status - adaptational-level combination, four groups of individuals were identified and subsequently compared: patients low at risk with positive adaptation (normal group), patients low at risk with negative adaptation (vulnerable group), patients high at risk with positive adaptation (resilient group) and patients high at risk with negative adaptation (non-resilient group)[40]. Well-being was chosen as the criterion variable (see 2.6.4). Since on average, poorer visual acuity was not associated with poorer adaptation, individual

[40] The vulnerable group is not of primary interest here, still their values are reported for descriptive purpose and they are included in *overall* group comparisons. However, contrasts were specified a priori for the comparison between the resilient and the normal group and the resilient and the non-resilient group only.

risk status was determined by multimorbidity alone[41]. A median split was performed on both variables, defining the "low / negative" and "high / positive" categories. For theoretical considerations (see 2.6.4), only patients who were consistently either "above median" or "below median" in well-being at both baseline measurement (one week prior to surgery) and T4 (six weeks after surgery) were included ($\underline{N} = 103$). This resulted in group sizes of $\underline{N} = 17$ (resilient), $\underline{N} = 30$ (non-resilient), $\underline{N} = 35$ (normal) and $\underline{N} = 21$ (vulnerable).

Age, gender, and family status did not significantly differ between the four groups (see Table F1, Appendix F)[42]. With respect to objective vision, resilient individuals did not differ from normal and non-resilient patients at any occasion (see Table F2, Appendix F for descriptives of the objective and subjective health indicators, as well as criteria of adaptation in the four groups).

5.16. Group Comparisons of Changes in Outcomes Across Occasions

Positive adaptation in the present context was defined as high well-being at baseline and six weeks post-surgery. High well-being at T3 (one week post surgery) was not regarded as a necessary component of resiliency, because it was reasoned that adaptation to a new situation (here: changes in visual acuity due to surgery) might require time, especially when resources are low. In Figure 5.19, the development of well-being, depressive symptoms and activity difficulty across all occasions is displayed. It shows that there were differential changes in well-being (occasion*group status: $\underline{F}(6,198) = 3.31$, $p \leq .01$; $\underline{Eta}^2 = .09$) and depressive symptoms ($\underline{F}(6,198) = 3.64$, $p \leq .01$; $\underline{Eta}^2 = .10$) in the groups.

Specifically, only the resilient patients experienced change on those indicators, namely a drop in well-being and a slight increase in depressive symptoms one week after surgery, as opposed to no change in the normal group and the resilient group. Changes in activity difficulties did not significantly differ between groups, although a trend towards more change

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[41] The differentiation between patients at very high risk (those with both high multimorbidity *and* low vision) and patients with only one risk factor (high multimorbidity and acceptable visual acuity) was not maintained here because of the small sample sizes (see 5.15).

[42] In comparison to the respective three other groups, individuals classified as resilient tended to be slightly older. In the normal group, the gender ratio was more balanced, and in the non-resilient group, less participants had a partner. However, none of the comparisons reached statistical significance.

10 (59%) of the resilient and 12 (40%) of the non-resilient patients were above the median on multimorbidity, but had comparatively good vision (above median on visual acuity in better eye, prior to surgery). 7 (41%) of the resilient and 18 (60%) of the non-resilient were above the median on multimorbidity and had low vision (below median) at the same time. This apparent difference in cumulative risk status was not significant.

(i.e., a decrease in difficulty with other activities from T3 to T4) was observed in resilient patients.

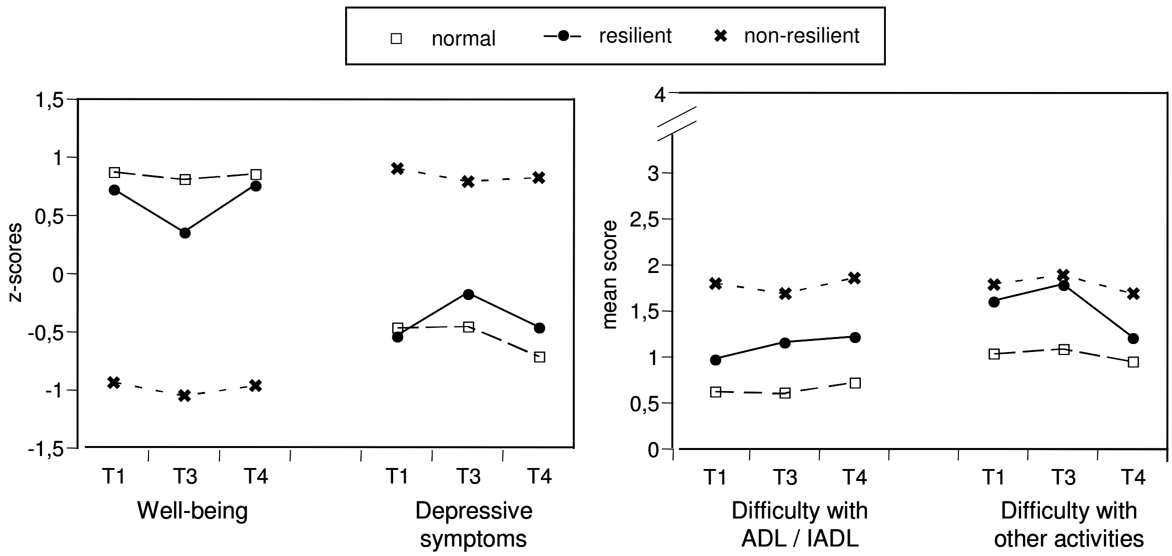

Figure 5.19 *Comparison of outcome changes in the resilient, the normal and the non-resilient group*

Note: Error bars are not displayed for clarity of presentation, for significant differences see text and Table F3, Appendix F

5.17. Group Comparisons of Level of Resources and Coping

As expected, there were marked differences in the level of resources between resilient individuals and non-resilient individuals (see Table F3, Appendix F, and Figure 5.20). The more interesting comparison is that between the resilient and the "normal" patients. It was reasoned that positive adaptation when having to deal with multiple chronic diseases should be associated with an increased level in the flexibility of goal adjustment. In comparison to patients who showed positive adaptation under normal circumstances, resilient individuals indeed reported slightly higher levels of flexibility in goal adjustment. This trend was observed for both subscales, however, the specified group contrasts were only marginally significant ($p = .11$ for reframing and $p = .16$ for orientation towards new things). There were no differences in the personal and social resources between the resilient and the “normal” group.

Group differences in coping with the event of surgery were more pronounced (Table F4, Appendix F, and Figure 5.21). Resilient individuals reported significantly higher levels of positive reframing in comparison to the non-resilient group ($p \leq .01$), and higher levels of positive reframing and denial in comparison to the normal group (both $p \leq .05$). There was also a trend showing higher levels of acceptance in the resilient group.

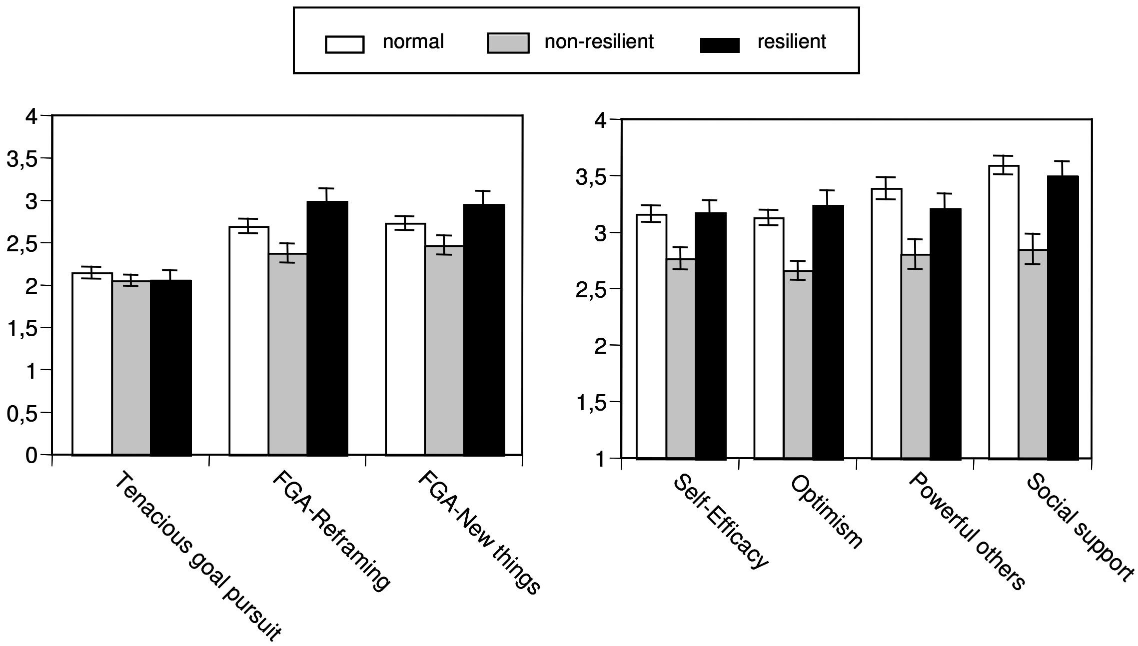

Figure 5.20 *Comparison of dispositional coping, generalized expectancies and social support in the resilient, the normal, and the non-resilient group*

Note: Error bars represent one standard error of the mean; FGA = Flexible goal adjustment

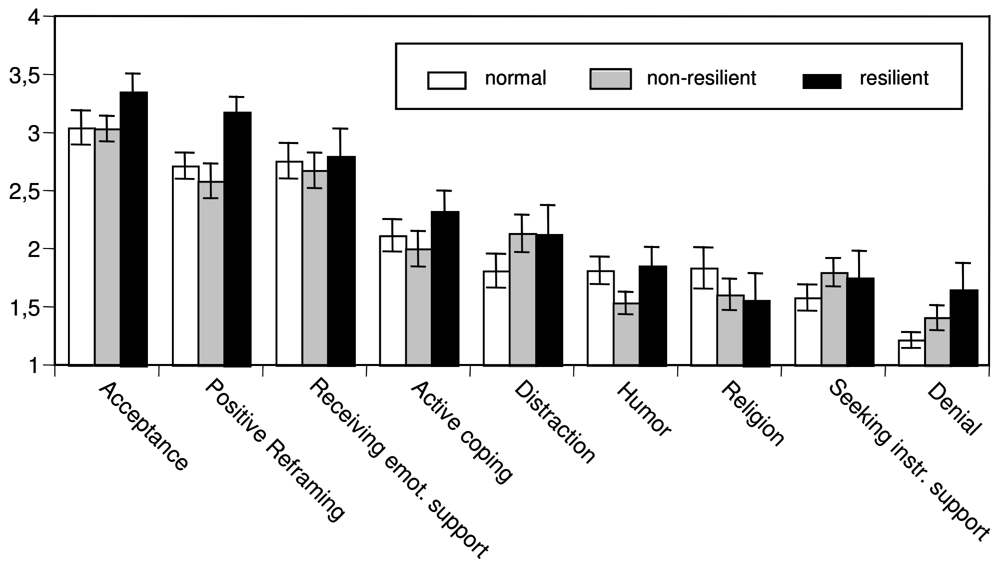

Figure 5.21 *Comparison of surgery-related coping strategies in the resilient, the normal, and the non-resilient group*

Note: Error bars represent one standard error of the mean

5.18. Regulation of Life Investment around Surgery

How did resilient individuals regulate their life investment around surgery and did they differ from "normal" and non-resilient individuals? With respect to overall life investment, there was no main effect for group at any of the measurement occasions, nor were there differential changes over time (see Table F3, Appendix F for descriptives and significance tests). The same was true for investment selectivity. For the third life investment indicator, variability, a marginally significant effect of group status emerged one week after surgery (T3). Contrast analyses revealed that this was due to a significant difference between normal and resilient patients ($p < .02$). Although only significant at T3, resilient patients tended to be more variable in their investment than the normal group at *all* occasions (see Figure 5.22). The non-resilient and vulnerable group had scores in between the other two groups. Differential changes in variability across groups were not apparent (the interaction term occasion*group status was not significant: $\underline{F}(6,198) = 0.64$).

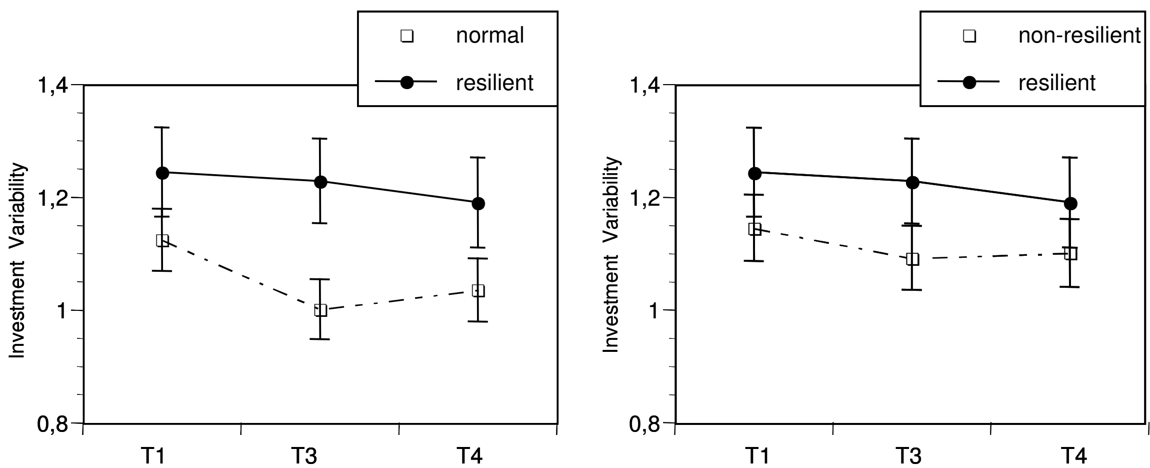

Figure 5.22 *Comparison of investment variability in the resilient, the normal and the non-resilient group*

Note: Error bars represent one standard error of the mean

It is beyond the scope of this dissertation to provide detailed analyses on all the context variables (e.g. age, sex, vision) or constellations of context variables that might be associated with differences in the *pattern* of life investment across the ten domains. In this case, however, it seemed desirable, to get an idea of what particular investment profile was associated with resiliency in face of multimorbidity.

For that purpose, domain-specific life investment at baseline was compared across groups. A multivariate analysis of variance with the ten investment domains as dependent variables yielded a significant group effect ($\underline{F}(30,276) = 1.73$, $p \leq .01$; $\underline{Eta}^2 = .16$). Groups differed in the domains hobby ($p \leq .01$), friends and family (both $p \leq .10$) and death ($p \leq .01$). Specified contrasts revealed that there were no differences between the resilient and the normal group, and the resilient and the non-resilient group differed only in the domains hobby and death (with more investment in hobbies in the resilient group and more thoughts about death in the non-resilient group, see *Figure 5.23*).

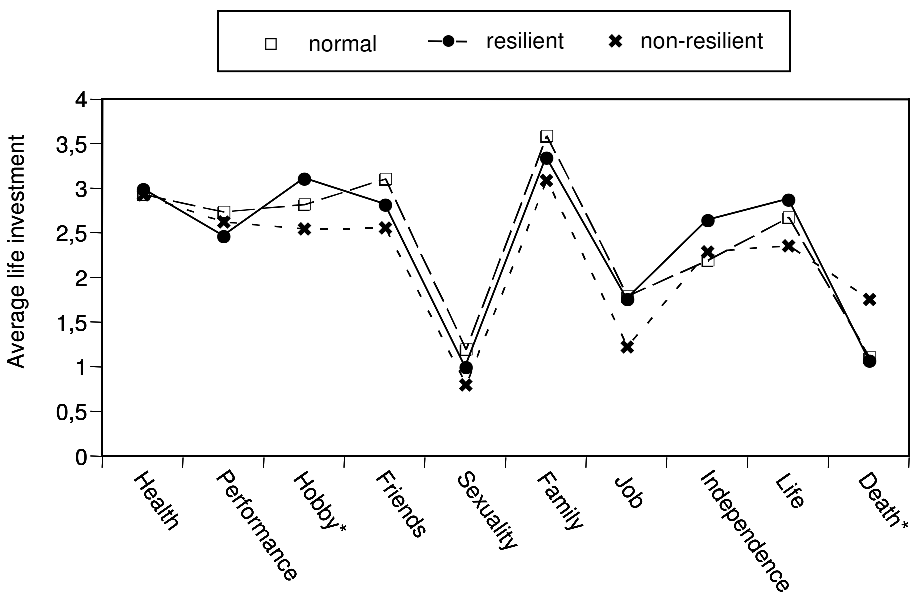

Figure 5.23 *Comparison of domain-specific investment (T1) in the resilient, the normal and the non-resilient group*

Note: * $p \leq .05$ (specified contrast for comparison between resilient and non-resilient patients)

5.19. Summary

Taken together, the results provide good evidence that resiliency as it was defined here was not merely the result of a general tendency to report high scores on socially desirable dimensions (e.g., well-being, optimism, availability of support), and low scores on undesirable ones (e.g., depressive symptoms and activity difficulties). Rather, resilient individuals showed a marked decline in well-being one week after surgery. This finding is in line with the notion that adaptation to new situations requires time, especially when resources are low. It was shown that resiliency does not mean to feel good and be satisfied with one's life *all* of the time, a finding that stresses the importance of a priori definitions of criteria of positive adaptation in face of adversity.

Resilient patients had more resources than non-resilient patients and were also able to benefit from surgery in terms of functional adaptation in everyday life: although they had no better vision than the non-resilient at any occasion, and a comparable amount of change in visual acuity, they experienced a decline in activity difficulty after six weeks.

As compared to well-adjusted patients with no additional health constraints through multimorbidity, resilient patients were slightly more flexible in adjusting their goals, reported more positive reframing in dealing with surgery, and at the same time more denial.

A particular profile of life investment specific to resilient patients did not emerge. They invested more action and thought in the domain of hobbies and thought less about death than non-resilient patients, but did not differ from the normal group in any of the domains. In the regulation of life investment across the different measurement occasions, resilient individuals were not, as expected, more selective than the two other groups. Instead, they tended to be more *variable* in their investment (for patterns of individuals high in variability vs. low in variablity see figure A1, Appendix A). This, however, was only the case *within* the three occasions. There were no *changes* in variability across time that would reflect regulatory efforts in face of increased strain one week after surgery.

PART IV
POST-SURGICAL ADAPTATION

The final results section is concerned with the predictions regarding post-surgical adaptation. It was hypothesized that beyond patients' concurrent visual acuity and health status, the amount of *change in visual acuity* that patients experienced as a consequence of surgery also contributed to post-surgical well-being and depressive symptoms. In addition, high levels of resources and accommodative and assimilative coping were assumed to facilitate adaptation both in the domain of well-being and functional status in everyday life.

As in the cross-sectional relationships, it was hypothesized that the associations between health and vision and well-being are mediated by activity difficulties. Finally, the issue of differential benefit from gain in visual acuity is addressed. Age, multimorbidity and flexibility in goal adjustment are examined as potential moderators in the relations between visual acuity change and the criteria.

5.20. Correlates of Post-Surgical Adaptation: Bivariate Associations

Was the pattern of associations between the predictors and criteria variables the same as it had been prior to surgery? The zero-order correlations displayed in Table 5.27 indicate that multimorbidity and subjective health strain were related to the criteria in the same direction and strength as prior to surgery. However, there were some differences in the associations between the criteria and the vision indicators.

Visual acuity in the operative eye was not related to depressive symptoms prior to surgery (.03), but one week after it (-.23). The associations between operative eye acuity and activity difficulties also reached statistical significance only after surgery (coefficients ranging from -.18 to -.27), and were highest after six weeks. General well-being was still unrelated to the status of the operative eye, but *change* in operative eye was related to it: the more change patients experienced in the operative eye, the higher was their well-being and the lower the frequency of their depressive symptoms one and six weeks after surgery.

When partialling out either visual acuity status of the operative eye / or better eye visual acuity at the respective occasions, the associations between change in vision and well-being dropped below significance after one week, but remained significant after six weeks ($r_{partial}$ = .18 / .14). When partialling out multimorbidity, the coefficient was also still significant after six weeks (r = .17).

When partialling out the status of the operative eye / better eye, vision change was still significantly associated with depressive symptoms after one, but not after six weeks (T3: $r_{partial}$ = -.18; -.25; T4: $r_{partial}$ = -.13 / -.13). When partialling out multimorbidity, the coefficient remained significant after one week (r = -.29), and six weeks (r = .17)[43].

Pre-surgical visual acuity in the operative eye was negatively associated with well-being six weeks after surgery. This could be accounted for by the fact that better vision in the operative eye was naturally associated with less change. Consequently, the association between operative eye and well-being at T4 dropped below significance when controlling for change in visual acuity ($r_{partial}$ = -.06).

Better eye vision was significantly related to well-being and depressive symptoms only one week after surgery, and the negative relationships with activity difficulties at T3 and T4 were somewhat stronger than prior to surgery. The subjective impairment that patients reported at T3 and T4 was also more strongly related to the criteria of adaptation than at baseline (coefficients ranged from .26 to .32 prior to surgery, and .32 to .52 after surgery).

[43] All partial correlation coefficients between .14 and .17 were significant at $p \leq .10$, all other at $p \leq .05$.

In sum, the status of visual acuity (both in better and operative eye) was related to well-being and depressive symptoms one week after surgery. Beyond the actual acuity status and multimorbidity, *change* in vision accounted for variance in depressive symptoms after one week, and it accounted for variance in well-being after six weeks.

Table 5.27

Bivariate correlations of the vision and health indicators with the criteria variables one (T3) and six weeks (T4) after surgery

		Well-Being		Depressive symptoms		Difficulty with ADL / IADL		Difficulty with other activities	
		T3	T4	T3	T4	T3	T4	T3	T4
Vision Indicators									
Vision in operative eye	T1	-.09	**-.17***	.18*	.11	-.07	-.07	-.14†	-.07
	T3	.10	.02	**-.23****	.01	**-.21****	-.15†	**-.18***	**-.25****
	T4	.14†	.09	**-.27****	-.12	**-.28****	**-.27****	-.13	**-.23****
Vision in better eye	T1	.13	.09	**-.18***	-.14†	**-.20***	**-.21****	**-.23****	**-.25****
	T3	**.19***	.16†	**-.24****	-.15†	**-.26****	**-.26****	**-.22****	**-.30****
	T4	**.19***	.15†	**-.27****	-.15†	**-.37****	**-.31****	**-.27****	**-.31****
Change in operative eye	T3	.14†	.12	**-.29****	-.06	-.13	-.08	-.06	-.16†
	T4	**.18***	**.19***	**-.35****	**-.18***	**-.17***	-.16†	.00	-.13
Change in better eye	T3	.03	.05	-.01	.02	-.02	.01	.07	.01
	T4	.02	.04	-.03	.02	-.12	-.03	.04	.01
Subjective impairment through vision problems	T1	**-.34****	**-.29****	**.23****	**.17***	**.30****	**.23****	**.34***	**.32****
	T3	**-.45****	**-.37****	**.41****	**.32****	**.46****	**.41****	**.57****	**.54****
	T4	**-.44****	**-.41****	**.41****	**.39****	**.39****	**.32****	**.37****	**.51****
Health Indicators									
Multimorbidity		**-.36****	**-.22****	**.32****	**.25****	**.43****	**.41****	**.36****	**.27****
Subjective health strain	T1	**-.26****	**.19***	**.20***	**.26****	**.36****	**.37****	**.34****	**.23****
	T3	**-.25****	**-.24****	**.24****	**.32****	**.33****	**.34****	**.34****	**.26****
	T4	**-.29****	**-.31****	**.31****	**.35****	**.46****	**.50****	**.39****	**.31****

† p ≤ .10; * p ≤ .05; ** p ≤ .01

Bivariate associations between resources and the post-surgical criteria are displayed in Table 5.28.

Table 5.28

Bivariate correlations of the resource and self-regulation variables with the criteria variables one (T3) and six weeks (T4) after surgery

		Well-Being		Depressive symptoms		Difficulty with ADL / IADL		Difficulty with other activities	
		T3	T4	T3	T4	T3	T4	T3	T4
Dispositional Coping									
TGP		**.23****	**.24****	**-.18***	**-.26****	-.12	-.11	-.09	-.16†
FGA-R		**.23****	**.26****	-.04	**-.21****	.11	-.08	-.07	-.07
FGA-N		**.29****	**.30****	**-.27****	**-.26****	-.08	-.15†	-.10	-.08
General. Expectations									
Optimism		**.43****	**.48****	**-.23****	**-.33****	-.09	-.13	-.06	**-.21****
Self-Efficacy		**.39****	**.34****	**-.17***	**-.32****	-.04	-.15†	**-.18***	**-.24****
Powerful Others		**.25****	**.26****	-.04	**-.21****	-.10	**-.17***	**-.19***	**-.20***
Life Investment									
Average	T1	.13	.16†	-.11	**-.19***	-.09	**-.26****	-.04	-.11
	T3	.03	.09	-.14	-.10	-.04	-.16†	.01	-.08
	T4	.05	.12	-.08	-.15†	-.07	**-.19***	.00	**-.21****
Variability	T1	-.02	.01	.11	.09	.13	.08	-.03	-.06
	T3	-.03	-.01	-.01	.07	**.18***	.06	.16†	.05
	T4	.02	.01	.01	.01	.14†	.03	.04	-.02
Social Support									
Perceived		**.40****	**.39****	**-.24****	**-.35****	**-.23****	**-.19***	**-.20***	**-.32****
Received		.02	.06	.07	-.03	.13	**.17***	.10	.08
Seeking		**-.24****	-.14	**.24****	**.23****	**.24****	**.24****	**.34****	**.22****
Coping strategies in dealing with surgery									
Acceptance		.04	.05	.04	.03	.03	.01	.07	-.07
Reframing		.16†	**.26****	-.13	**-.27****	-.07	-.13	-.03	**-.17***
Active Coping		-.01	.07	.02	.00	.07	.01	.01	.02
Distraction		-.13	-.12	.05	**.20***	.08	.11	**.18***	.09
Humor		.12	**.17***	-.08	-.07	-.08	-.11	-.05	-.11
Religion		**.21****	.09	-.12	-.03	.01	-.10	.07	.02
Denial		-.15†	-.13	**.17***	.14	.10	.09	.10	-.02

† p ≤ .10; * p ≤ .05; ** p ≤ .01

Note: TGP = Tenacious Goal Pursuit, FGA = Flexible Goal Adjustment, FGA-R = FGA by Reframing, FGA-N = FGA by Orientation towards New Things

Both at one and six weeks after surgery, dispositional coping, generalized expectations and average life investment were related to the criteria in the same directions and with approximately the same strength as prior to surgery[44]. Interestingly, at T3 (one week after surgery) but not at T4 (six weeks after surgery), greater variability in life investment was associated with more activity difficulties (the same trend had been observed prior to surgery), but not with increased depressive symptoms or decreased general well-being.

Perceived availability of social support was related to the criteria in the same way as prior to surgery, with one exception: post-surgery, support was negatively associated with difficulty with activities other than ADL / IADL, as opposed to no relation prior to surgery (r = -.06). This points to an increased need of social support after surgery for succesful adaptation in everyday life. Patients with high levels of pre-surgical support seeking not only had more activity difficulties, but also less well-being and more depressive symptoms. This points to an obvious mismatch between expectations when seeking support and the amount of actually received support or its consequences.

Having a partner had not made a difference for adaptation prior to surgery (5.10), but was consistently related to better post-surgical adaptation both after one and six weeks. Patients with a partner reported significantly higher well-being, lower depressive symptoms and less ADL / IADL difficulty at T3 and T4, and less difficulty with activities other than ADL / IADL at T4 (see Table G1, Appendix G). It should again be noted that patients with a partner also had better vision in the better eye at all occasions and reported less impairment through vision problems at T1 and T4.

The coping strategies were each either not or only moderately associated with post-surgical adaptation. Religious coping seemed to have a protective function for well-being shortly after surgery, but not in the long run. In the case of positive reframing, the result was the reverse: here, associations with well-being and depressive symptoms were only significant after six weeks, and patients with a tendency to endorse this coping strategy also reported lower post-surgical activity difficulty. Distraction and denial were negatively associated with well-being and positively with depressive symptoms. However, these associations were barely significant.

5.21. Correlates of Post-Surgical Adaptation: Multiple Regression Analyses

The following section is concerned with the multivariate prediction of well-being and activity indicators one (T3) and six weeks (T4) after the surgery, as well as the prediction of

[44] Coefficients for the associations between the criteria and investment selectivity are not displayed in the table, they ranged from -.08 to .12 and were all non-significant.

intraindividual *change* in these criteria. Here, not the *concurrent*, but the *predictive* power of the health and vision variables was of interest, which relates to the question of the impact of the pre-surgical resource status on post-surgical adaptation. Thus, baseline health and vision variables were included in the set of predictors.

Following the analytical procedure applied to the cross-sectional data, it was first analyzed which of the vision and health variables contributed unique variance to the criteria measured at T3 and T4, as well as to *change* in the criteria from T1 to T3 and from T1 to T4. After that, the relative predictive power of the social and personal resources and life investment *beyond* the effects of health and vision was determined.

5.21.1. Health and Vision and Criteria of Adaptation One and Six Weeks After Surgery

Zero-order correlations have shown small to moderate associations between post-surgery adaptation and *baseline* vision and health indicators (Table 5.27). Do these associations remain when simultaneously taking into account the changes in vision that have occurred and the strain that patients experienced as a consequence?

The subjective and objective health and vision indicators were of course not completely independent (see 5.1.8). However, it was the aim here to determine the *maximum* amount of post-surgery criteria variance accounted for by the joint effects of (a) patients` baseline and post-surgery vision and health, b) the related subjective strain, and (c) the change in acuity in the surgery eye. Subsequently, unique effects of resources, dispositional coping and life investment were determined.

Predicting Post-Surgical Adaptation One and Six Weeks After Surgery

Predictors in the regression analyses predicting the *level* of post-surgical adaptation include all vision and health indicators measured at baseline, and all post-surgery vision and health indicators (either T3 or T4). As in the cross-sectional analyses, the predictors were entered in a *forward stepwise* procedure after controlling for age and gender that were entered simultaneously in a first step. Results are displayed in Tables C4 and C5 in Appendix C[45].

As expected, most of the post-surgical criteria variance (level) was explained by *subjective* health and vision at the respective measurement occasion. Moreover, in addition to subjective

[45] One univariate outlier with a sumscore of 45 on the CES-D at T1, 18 at T2, and 35 at T4 was excluded from the prediction of well-being and depressive symptoms. Doing that did not significantly alter the results. In all following regression analyses, two multivariate outliers in the prediction of depressive symptoms and two multivariate outliers in the prediction of activity difficulties were detected according to the Mahalanobis distance criterion ($p < .001$). These were the same as in cross-sectional analyses. Again, their exclusion did not lead to any significant changes of the results.

strain experienced at T3 and T4, multimorbidity as well as other baseline indicators and even the change in the surgery eye were *uniquely* associated with well-being at T3 / T4. In other words, these indicators were related to post-surgical adaptation independent of patients` concurrent problems. Most notably, pre-surgical acuity in the eye operated on remained a significant predictor: better vision in operative eye at baseline was negatively associated with post-surgery well-being when controlling for all other vision and health variables[46].

Patients with high multimorbidity experienced higher levels of ADL / IADL difficulty both at T3 and T4. Apart from that, subjective health strain and vision-related impairment were associated with greater difficulty in all activity domains.

Predicting Changes in Adaptation

Next, it was examined whether pre-surgical health and vision status as well as changes in visual acuity due to surgery were associated with *changes in adaptation* from pre- to post-surgery. Hierarchical regression analyses were conducted entering the respective criterion as measured at baseline in a first step, and then age and sex. In a third step, all *baseline* vision and health indicators, as well as change in visual acuity in the eye operated on (either T3 or T4) were entered, again using a *forward stepwise* procedure. Results are displayed in Table C6 and C7, Appendix, C.

As had already been reported in 5.6 and 5.7, the respective baseline measures accounted for considerable proportions of post-surgical criteria variance. This was very high for well-being and ADL / IADL difficulty (57 - 64%), moderate for depressive symptoms (39% at T3 and 43% at T4) and comparatively low for average difficulty with other activities (31% at T3 and only 17% at T4). Thus, the unique variance contributions of health and vision to the residualized criteria were generally small. Subjective impairment through vision problems at baseline was associated with negative change in well-being and an increase in activity difficulties one week after surgery[47]. Patients with high multimorbidity also experienced negative change in well-being and more ADL / IADL difficulty at this occasion. In contrast, a relative decrease in depressive symptoms was associated with change in the operative eye, with a considerable amount of variance explained by this predictor (R^2 = 8%).

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[46] This finding contradicts the previous notion that better pre-surgical acuity in the operative eye was negatively associated with post-surgical adaptation *because* it was at the same time associated with the experience of less acuity change. Partial correlations had led to this conclusion (see 5.20). However, as seen here, when controlling for other predictors, pre-surgical acuity "regained" a significant predictor status, pointing to some part of unique criteria variance that was not associated with the experience of less change.

[47] Repeating the analyses without the subjective impairment indicator as a predictor did not lead to the inclusion of any other predictor, suggesting that the contribution of this indicator was unique in the prediction of outcome changes (i.e., not related to objective vision indicators).

With the exception of average difficulty with activities other than ADL / IADL, criteria changes from baseline to six weeks after surgery were neither associated with baseline vision and health, nor with the change in visual acuity. Here, age was the only significant predictor, with older patients experiencing less change in activity difficulties than younger ones (also see 5.7.1).

5.21.2. Beyond Vision and Health: Were Personal and Social Resources, Dispositional Coping and Life-Investment Associated with Post-Surgical Adaptation?

Were there unique contributions of the psychosocial factors to post-surgery adaptation that could not be accounted for by differences in visual acuity change in visual acuity and health?

A series of hierarchical regressions of the criteria on the respective resources were conducted, controlling for vision and health indicators that have previously been identified as contributing unique variance to the respective criterion. Again, in regressions involving a second order term (age^2), all variables were centered first.

Predicting Post-Surgical Adaptation One and Six Weeks After Surgery

In a first step, separate regression analyses were performed for each resource domain separately (coping, social support, etc. …), to predict criteria at T3 and T4. The results of these regressions are shown in Tables C8 to C9, Appendix C. After that, all resources that have been found to contribute to outcome variance beyond the effects of health and vision were entered simultaneously, to test for their unique contributions[48].

The first series of regressions yielded significant contributions of at least one resource per resource domain to post-surgical variance in well-being and depressive symptoms beyond vision and health (see Tables C8 to C9). When jointly entering all significant predictors, flexible goal adjustment through orientation towards new things shared unique variance with both well-being and depressive symptoms. Also, optimism remained a significant predictor for well-being, and support for depressive symptoms at T4 (Table 5.29).

[48] As in cross-sectional multivariate predictions, tenacious goal pursuit was not included in the prediction of well-being, depressive symptoms and average difficulties. Although it was positively related to well-being and depressive symptoms, it shared no unique variance with them beyond the effects of flexible goal adjustment strategies (FGA-R and FGA-N). Furthermore, the inclusion of TGP in the multiple regressions caused a suppressor effect on either FGA-R or FGA-N, which dropped below significance.

Of the three life investment variables as measured at baseline, only average life investment was consistently associated with the criteria. To avoid collinearity problems, investment selectivity and variability were not included in the regressions.

Table 5.29

Hierarchical regressions of criteria of adaptation one (T3) and six weeks (T4) after surgery on resources, dispositional coping and life investment

		PGCMS (T3)			**PGCMS (T4)**		
		β	R^2 / *adj.*	Δ R^2	β	R^2 / *adj.*	Δ R^2
Step I:	Rival predictors[a]		.34			.28	
Step II:	FGA-R	.05			.07		
	FGA-N	.15*			.17*		
	Life Investment	.00			-.01		
	Perceiv. avail. of social support	.09			.15*		
	Optimism	.26**	.49 / *.45*	**.15**	.28**	.50 / *.47*	**.22**
		CES-D (T3)			**CES-D (T4)**		
		B [b]	R^2 / *adj.*	Δ R^2	*B* [b]	R^2 / *adj.*	Δ R^2
Step I:	Rival predictors[a]		.26			.31	
Step II:	FGA-N	-.25**			-.18**		
	Life Investment	--			-.06		
	Perceiv. avail. of social support	--	.32 / *.28*	**.06**	-.24**	.42 / *.38*	**.11**
		Difficulty with ADL /IADL (T3)			**Difficulty with ADL /IADL (T4)**		
		B [b]	R^2 / *adj.*	Δ R^2	*B* [b]	R^2 / *adj.*	Δ R^2
Step I:	Rival predictors[a]		.35			.45	
Step II:	FGA-R	.10			--		
	Partner (0 = no; 1 = yes)	-.15†			--		
	Life Investment	--	.39 / *.35*	**.04**	-.18**	.48 / *.45*	**.03**
		Difficulty with other activities (T3)			**Difficulty with other activities (T4)**		
		B [b]	R^2 / *adj.*	Δ R^2	*B* [b]	R^2 / *adj.*	Δ R^2
Step I:	Rival predictors[a]		.38			.33	
Step II:	Self-Efficacy	-.16†			--		
	Perceiv. avail. of social support	--	.40 / *.37*	**.02**	-.22**	.38 / *.36*	**.05**

† $p \leq .10$; * $p \leq .05$; ** $p \leq .01$

[a] Rival predictors: age or age^2, sex, and all vision and health indicators with unique contributions to respective criteria variance (see Tables C4 and C5, Appendix C)

[b] Unstandardized coefficients are displayed because variables had been centered

Note: FGA-N = Flexible Goal Adjustment through Orientation towards New Things, FGA-R = Flexible Goal Adjustment through Reframing; -- indicates that the respective predictor had not been included in the regression, because it had not been significant in the preceding domain-specific prediction analyses (see Tables C8 and C9, Appendix C)

For the prediction of activity difficulties, results were mixed, depending on activity domain and measurement occasion. Having a partner and reporting higher levels of life investment were negatively associated with ADL / IADL difficulty, flexible goal adjustment by reframing was positively associated with it at T3. In contrast, difficulty with other activities was negatively related to self-efficacy (T3) and support availability (T4).

Predicting Changes in Adaptation

Were there any contributions of the resources and self-regulation variables to post-surgical criteria variance that was not explained by baseline criteria? Again, separate regression analyses were performed for each resource domain separately, this time controlling for baseline criteria variance and vision and health indicators that have previously been identified as contributing unique variance to changes in the respective criterion. The results of these regressions are shown in Tables C10 to C11, Appendix C.

Proportions of *residualized* criteria variance that were explained by resources and life investment were considerably small (ranging from 0 to 6%). Flexible goal adjustment by means of reframing was positively associated with residualized well-being at both one and six weeks after surgery. There was a slight tendency towards less depressive symptoms six weeks post surgery when levels of social support and the belief in powerful others were higher. All associations, however, were small (βs between .10 and .12) and only marginally significant.

ADL / IADL residuals were only associated with tenacious goal pursuit ($\beta = -.11$, $p \leq .05$), indicating that being more tenacious was related to experiencing less ADL / IADL difficulty over time and goal adjustment through reframing, ($\beta = .10$, $p \leq .10$). Changes in average difficulty with activities other than ADL / IADL were negatively associated with perceived availability of support ($\beta = -.23$, $p \leq .01$) and the belief in powerful others ($\beta = -.16$, $p \leq .05$), indicating that higher scores on these indicators were associated with a *decrease* in activity difficulty over time. When regressing the criterion on both these predictors simultaneously, only social support remained a significant predictor ($\beta = -.19$, $p \leq .05$).

To conclude, baseline resources, accommodative and assimilative coping styles, and life investment continued to be positively associated with indicators of successful adaptation after surgery, beyond health status, subjective impairment through vision problems and health strain, and the change in visual acuity. The amount of unique variance contributions to general well-being and depressive symptoms was lowest after one week, pointing to a somewhat decreased efficacy of the resources shortly after surgery (Figure 5.24). Criteria of functional adaptation shared an increasing amount of variance with the vision and health indicators, but even here the resources accounted for additional variance.

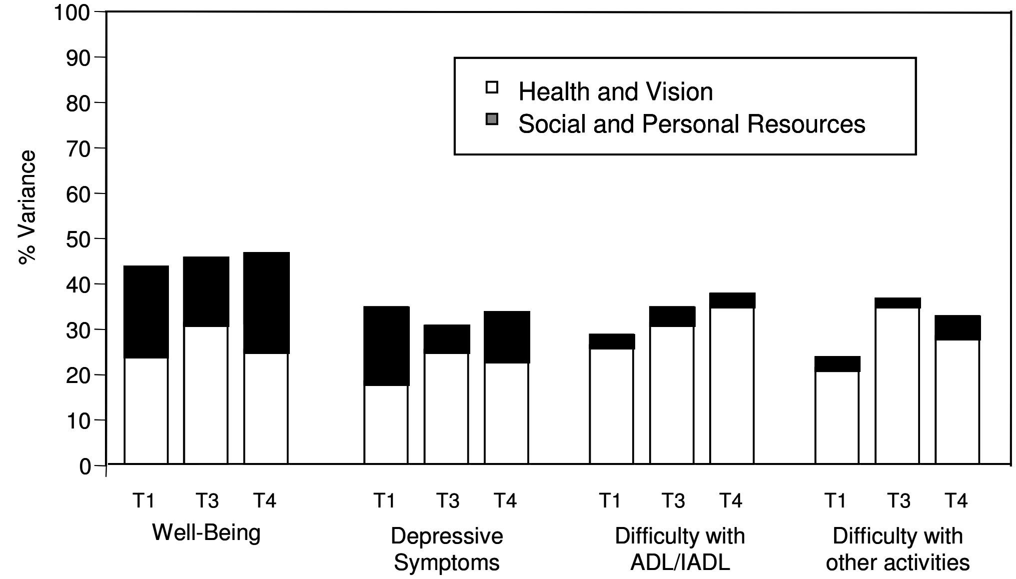

Figure 5.24 *Prediction of the criteria of adaptation prior to (T1) and one (T3) and six weeks (T4) after surgery: unique variance components of the social and personal resources (including life investment) above and beyond the amount of variance explained by objective and subjective vision and health indicators (age and sex partialled out)*

Note: Health and vision predictors include all baseline and post-surgery indicators (either T3 or T4), as well as change in vision from T1 to the respective post-surgical occasion

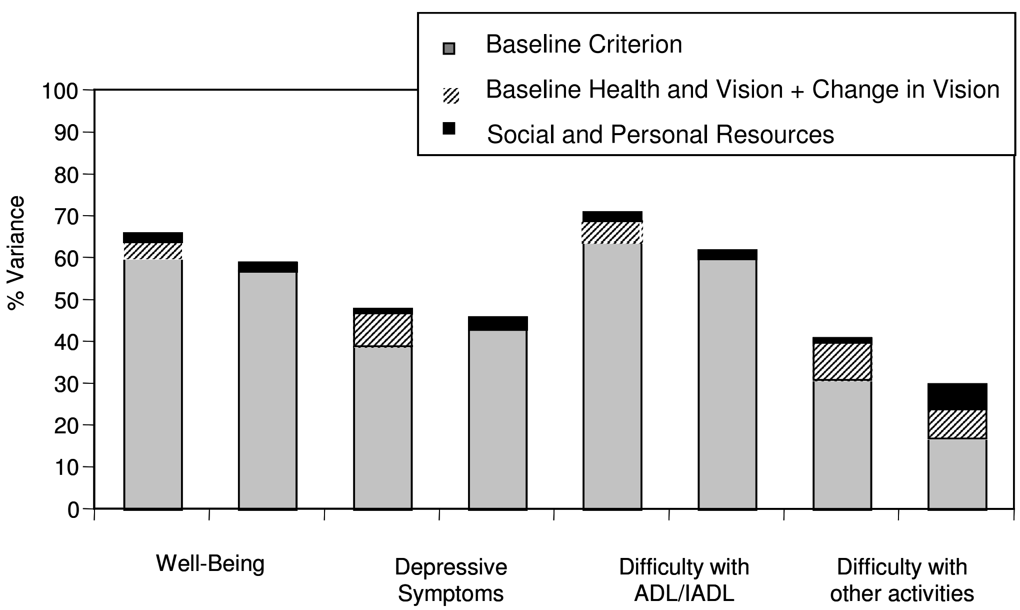

Figure 5.25 *Prediction of residualized criteria of adaptation one (T3) and six weeks (T4) after surgery: unique variance components of vision and health status at baseline, change in visual acuity and the social and personal resources (including life investment; all effects are age and sex partialled)*

Figure 5.25 displays the proportions of the (baseline-) residualized criteria variance one and six weeks after surgery that could be explained by the baseline predictors and change in vision. As expected, variance in post-surgical adaptation was predicted by baseline adaptation to a large extent. Beyond that, subjective impairment through vision problems at baseline and multimorbidity appeared to be significant predictors one week after surgery.

Change in vision was associated with a decrease in depressive symptoms only. Flexible goal adjustment, social support, optimism and external control beliefs accounted for small proportions of change variance that was not explained by the health and vision indicators.

5.22. Activity Indicators as Mediators in the Associations between Health and Vision and General Well-Being

Prior to surgery, multimorbidity was consistently related to negative adaptation, but none of the objective vision indicators. Looking at post-surgical adaptation (Table 5.27), the associations with multimorbidity remained the same and in addition, some small but significant associations with objective vision indicators (status) emerged (Table 5.27). Again, it was hypothesized that these were at least partly mediated by the experience of activity difficulties. The prerequisites for testing this mediator hypothesis were given here: multimorbidity and vision indicators were associated both with the criterion (well-being) as well as the potential mediators (activity difficulties), and the mediators in turn were also significantly related to the criterion (see 5.8 and Table 5.27). This was the case for both post-surgical measurement occasions. Thus, two mediator models were specified.

The procedure for testing the mediator hypothesis was the same as in the cross-sectional analysis (see 5.13): using structural equation modeling, well-being was first regressed on the predictors alone, and then the potential mediators were entered (controlling for age at all steps). Again, indicators for well-being were the three subscales of the PGCMS. For the activity variables, items were randomly assigned to two parcels indicating ADL / IADL difficulty, and three parcels indicating difficulty with other activities. From the vision indicators, better eye vision at the respective measurement occasion was chosen as predictor. This was decided to account for the closest proxy to "real" vision, and bivariate correlations with the criteria - that were generally higher than those with the operative eye - support this decision. In addition, change in operative eye from baseline to the respective occasion was included. For this indicator, a direct effect on well-being rather than one that was mediated through the experience of activity difficulties had been expected[49]. For complete models see Appendix E).

First, the results for the prediction of well-being one week after surgery are reported. Regressing well-being one week after surgery on the vision and health predictors alone whilst controlling for age yielded a regression weight of -.39 ($p \leq .01$) for multimorbidity, .08 for vision in better eye (n.s.) and .16 for change in vision ($p \leq .10$.).

When entering the activity indicators in the model, allowing for direct and indirect effects of the vision and health predictors on well-being (see Figure 5.26), the regression coefficient of multimorbidity dropped to -.16 ($p \leq .10$). Coefficients for better eye and vision change were not significant. This, however, was not the result of a mediational effect of activity difficulties, but rather the joint consideration of the four predictors.

Goodness of fit indices were acceptable for the model (see Figure 5.26). Not specifying the direct path from the multimorbidity to well-being yielded a marginally significant worse fit ($\Delta\chi^2 = 3.27$, $p = .07$). It can thus be concluded that the negative relationship between multimorbidity and well-being one week after surgery could only *in part* be attributed to increased activity difficulties in patients with high multimorbidity.

Did ADL / IADL difficulty alone account for the mediational effect? When specifying the same mediator model without ADL / IADL difficulty, the regression weight of multimorbidity remained significant (-.24, $p \leq .01$). This indicated that the average difficulty with activities other than ADL / IADL did not mediate the association between multimorbidity and well-being one week after surgery.

As reported in 5.21.1, multimorbidity was also negatively associated with *changes* in well-being after one week. Thus, a second mediator model was specified predicting baseline-residualized well-being. Here, the regression coefficient of multimorbidity was -.17 ($p \leq .05$) before, and -.10 (n.s.) after entering the (T3) difficulty indicators. Again, the mediator effect was due to ADL / IADL difficulty, which remained a (marginally) significant predictor for residualized well-being (-.17, $p \leq .10$; see Appendix E for complete model).

For the prediction of well-being after six weeks, age-partialled regression weights were -.24 ($p \leq .01$) for multimorbidity, .08 for vision in better eye (n.s.) and .20 for change in vision ($p \leq .05$.) when entering these predictors jointly. Adding the activity indicators once again led to a significant reduction of the regression coefficient for multimorbidity (-.04), indicating a

[49] The lack of significant associations between change in vision and activity difficulties already support this notion, however, there were small trends towards experiencing less difficulty with higher change. Thus, it was decided to include change in vision in the models.

mediational effect of activity difficulties (see Figure 5.27). Notably, on this occasion, both ADL / IADL difficulty as well as average difficulty with other activities, contributed unique variance to well-being, despite their high intercorrelation. Moreover, both seemed to independently mediate the association between multimorbidity and well-being. In addition, both age and change in visual acuity were positively associated with well-being.

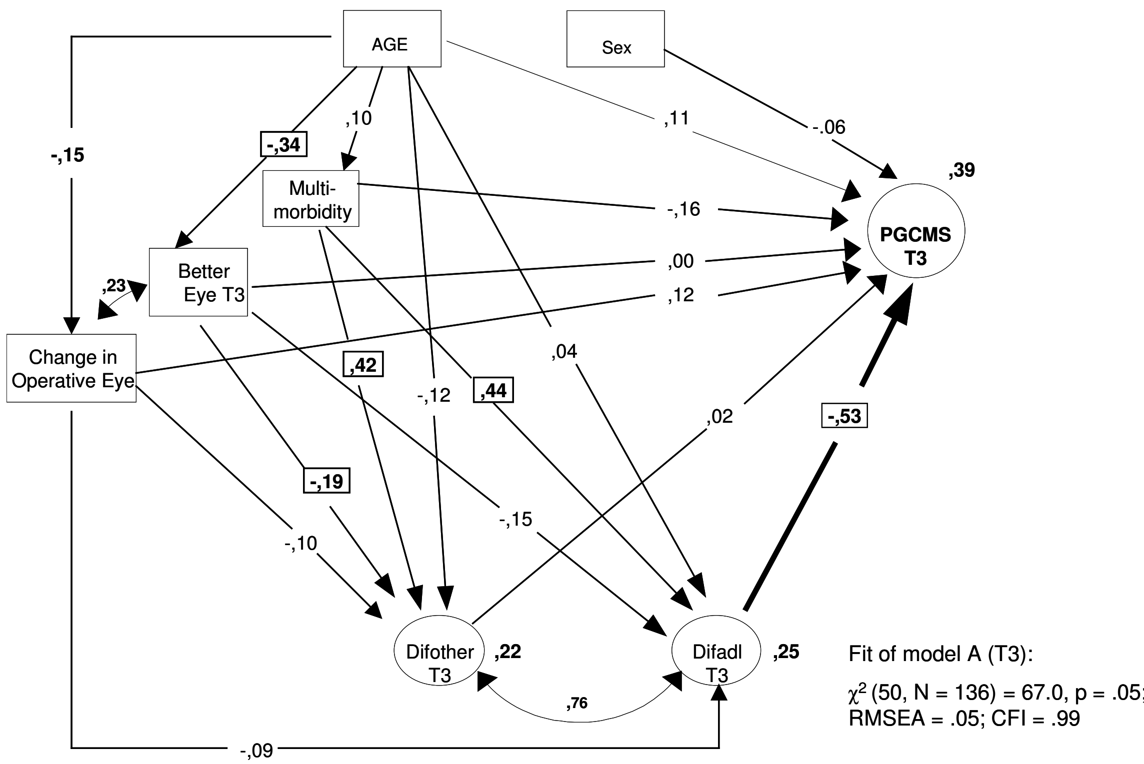

Figure 5.26 *Structural model of the relationship between age, objective vision and health indicators, activity difficulty and well-being one week after surgery (T3)*

Note: Displayed are standardized regression weights, significant coefficients ($p \leq .05$) are printed in rectangles. PGCMS = Philadelphia Geriatric Centre Morale Scale; Better Eye = visual acuity in better eye; Difother = average difficulty with activities other than ADL / IADL; Difadl = average difficulty with ADL / IADL; change in operative eye refers to changes from baseline to the respective measurement occasion

Goodness of fit indices were acceptable for this model also (see Figure 5.27). Not specifying the direct path from multimorbidity to well-being did not result in a significantly worse fit ($\Delta\chi^2 = .16$, $p = .69$).

Specifying the same mediator model with average difficulty with activities other than ADL / IADL as the only mediator, resulted in a non-significant regression weight of -.10 for multimorbidity. Thus, for the prediction of well-being six weeks after surgery, *both* activity indicators served a mediator status.

Since multimorbidity was not associated with *changes* in well-being from baseline to six weeks after surgery, no additional model was specified including baseline PGCMS.

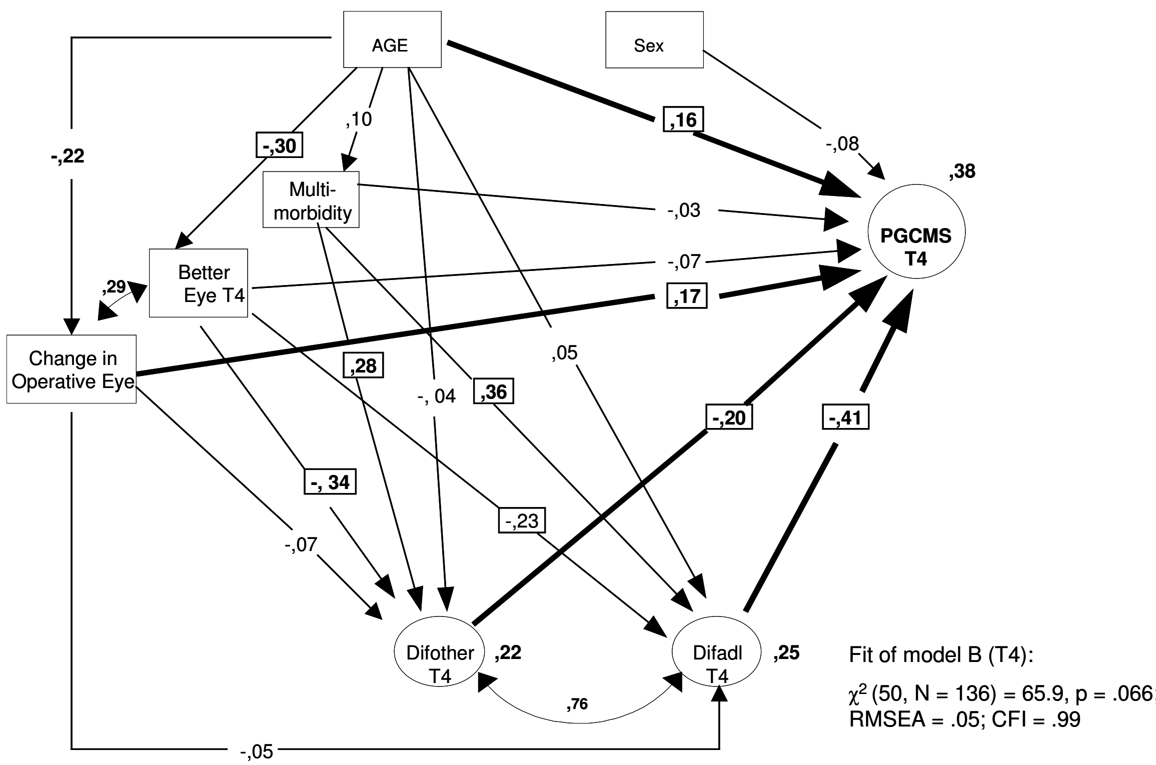

Figure 5.27 *Structural model of the relationship between age, objective vision and health indicators, activity difficulty and well-being six weeks after surgery (T4)*

*Note: Displayed are standardized regression weights, s*ignificant coefficients ($p \leq .05$) are printed in rectangles. PGCMS = Philadelphia Geriatric Centre Morale Scale; Better Eye = visual acuity in better eye; Difother = average difficulty with activities other than ADL / IADL; Difadl = average difficulty with ADL / IADL; change in operative eye refers to changes from baseline to the respective measurement occasion

5.23. Moderators in the Process of Post-Surgical Adaptation

It was hypothesized that individuals benefit from and adapt differentially to the results of cataract surgery. Age and multimorbidity were assumed to moderate the process of adaptation. Benefit was defined as an *increase in well-being* or *decrease in depressive symptoms* / *activity difficulty* from baseline to six weeks post surgery.

5.23.1. Multimorbidity as a Moderator for Differential Benefit from Change in Visual Acuity

It was reasoned that individuals with high multimorbidity at baseline should benefit more from positive changes in visual acuity than patients with low multimorbidity. Hierarchical regression analyses were conducted entering baseline well-being or depressive symptoms, age and sex in a first step, multimorbidity and change in visual acuity (T4 - T1) in a second step, and finally the cross-product term of the latter two predictors. Dependent variables were outcomes as measured at T4. Only one interaction reached significance: the interaction term change in visual acuity*multimorbidity in the prediction of well-being ($p \leq .05$; $\Delta R^2 = .01$).

To explore this interaction, a median split was performed on both multimorbidity and change in visual acuity[50]. Four groups of patients were compared: those with high multimorbidity and low vision change (N = 33), those with high multimorbidity and high vision change (N = 29), patients with low multimorbidity and low vision change (N = 35), and those with low multimorbidity and high vision change (N = 39). Changes in well-being across occasions in the four groups are displayed in Figure 5.28.

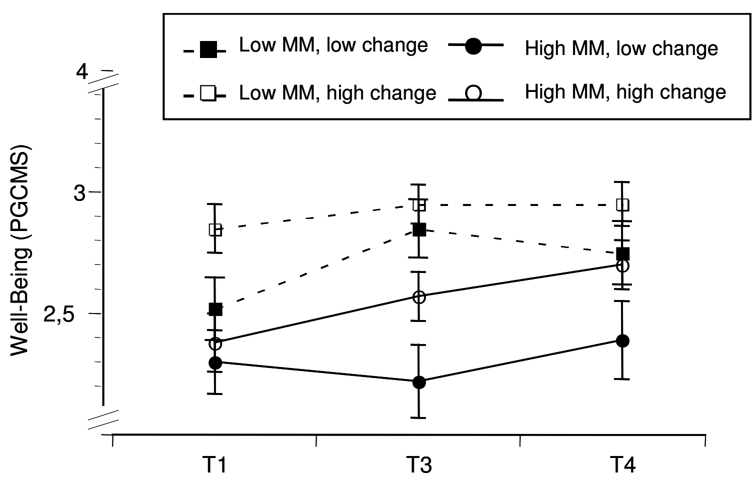

Figure 5.28 *Patients with no or low multimorbidity (0-2 diagnosis) and patients with high multimorbidity (> 2 diagnosis) differentially benefit from changes in visual acuity in the operative eye*

Note: Error bars represent one standard error of the mean; low = below median, high = above median

[50] Prior to this group splitting, patients with *negative* change in visual acuity in the operative eye at T4 (N = 9) were screened and compared to patients with no change and positive change on the well-being measures at all occasion. These comparisons yielded no consistent differences that would make it reasonable to treat the few negative change patients as a distinct group. Consequently, change in visual acuity was treated as a continuous variable, with negative scores being included in the group below the median on vision change (= low vision change).

Separate repeated measures analyses of variance with the between-subjects factor *change in visual acuity* (1 = below the median, 2 = above the median) were performed, first for all patients above the median on multimorbidity, and then for all patients below the median.

This yielded a marginally significant interaction occasion*change in visual acuity in the high multimorbidity group ($\underline{F}(2;120) = 2.82$, $p \leq .10$; $\underline{Eta}^2 = .05$). This was due to differential changes between T1 and T3 ($\underline{F}(1;60) = 4.06$, $p \leq .05$; $\underline{Eta}^2 = .06$) and T1 and T4 ($\underline{F}(1;60) = 3.18$, $p \leq .10$; $\underline{Eta}^2 = .05$). Patients with high vision change in this group experienced a significant increase in well-being both one ($\underline{F}(1;28) = 3.05$, $p \leq .10$; $\underline{Eta}^2 = .10$) and six weeks after surgery ($\underline{F}(1;28) = 11.62$, $p \leq .01$; $\underline{Eta}^2 = .29$), as opposed to patients with low acuity change, who had no changes in well-being across time.

In the low morbidity group, the interaction occasion*change in visual acuity was significant only for the comparison between T1 and T3 ($\underline{F}(1;72) = 5.20$, $p \leq .05$; $\underline{Eta}^2 = .07$). Here, only patients with low change in visual acuity experienced a significant increase in well-being ($\underline{F}(1;34) = 17.08$, $p \leq .01$; $\underline{Eta}^2 = .33$). Patients with high acuity change in this group had no increase in well-being, although their average scores were not even close to the ceiling of the PGCMS scale range (4).

It seems paradoxical that patients with low multimorbidity and low change in vision experienced an increase in well-being one week after surgery. However, in light of previous analyses that have shown that for some reasons, high visual acuity in the operative eye prior to surgery (that was naturally associated with less change) was related to less well-being in the oldest participants, leaves room for an alternative explanation. Rather than interpreting this result as a genuine *increase* in well-being, it seemed more likely to assume that this group of patients was especially stressed by the situation prior to surgery.

To conclude, the initial hypothesis, that patients with a low resource status at baseline (as indicated by high multimorbidity) should benefit more strongly from positive changes in visual acuity, as opposed to patients with a higher resources status, could be confirmed. This cannot be attributed to a ceiling effect for the latter group. In contrast, a decline in well-being for patients with low change in visual acuity was not observed.

5.23.2. Age as a Moderator in the Adaptational Process

Age was assumed to function as a moderator in post-surgical adaptation in two ways. With respect to associations between changes in visual acuity and well-being, it was assumed that middle-aged patients should have more problems (as expressed in a decrease in well-being and increase in depressive symptoms) in adapting to no or low changes in visual acuity, as opposed to the two other age groups. In contrast, all age groups should experience the same increase in well-being and decrease in depressive symptoms when change in visual acuity was high.

Hierarchical regression analyses were conducted entering baseline well-being or depressive symptoms and sex in a first step, age or age^2 and change in visual acuity (T4 - T1) in a second step, and finally the cross-product term of the latter two predictors[51]. The interaction term change in visual acuity*age reached significance only in the prediction of well-being ($p \leq .05$; $\Delta R^2 = .01$), and so did the interaction term change in visual acuity*age^2 ($p \leq .05$; $\Delta R^2 = .01$).

To explore this interaction, a median split was performed on change in visual acuity. Separate repeated measures analyses of variance with the between-subjects factor *age group* were performed for patients with high and patients with low change in visual acuity.

The main effect of measurement occasion on well-being was significant in the group with high change in visual acuity ($\underline{F}(2;130) = 6.73$, $p \leq .01$; $\underline{Eta}^2 = .09$; change from T1 to T2 : $\underline{F}(1;65) = 5.69$, $p \leq .05$; $\underline{Eta}^2 = .08$; change from T1 to T3 : $\underline{F}(1;65) = 11.69$, $p \leq .01$; $\underline{Eta}^2 = .15$). In contrast, there was no main effect in the group with low change in visual acuity.

In both groups, the interaction occasion*age group was not significant. This speaks against the hypothesis that low change in vision should result in differential changes in well-being in the age groups. However, the graphical representation of group means (Figure 5.29, left) reveals at least a trend: post-surgery, middle-aged patients with high and low change in visual acuity differed in well-being. In the two other age groups, patients with low change did not differ from patients with high change.

Secondly, age was assumed to moderate the associations between multimorbidity and the indicators of adaptation. Here, multimorbidity should be associated with an *increase in activity difficulty* in the oldest participants over time.

Thus, the significance of the interaction term age*multimorbidity was tested, using the same procedure as before (hierarchical regression analyses with baseline activity difficulty and sex in a first step, age or age^2 and multimorbidity in a second step, and finally the cross-product term of the latter two predictors).

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[51] Again, in all analyses that tested the moderator status of age, analyses were repeated using age^2 as a predictor to account for the possibility that relations differed across all three age groups. The first order term was not included then.

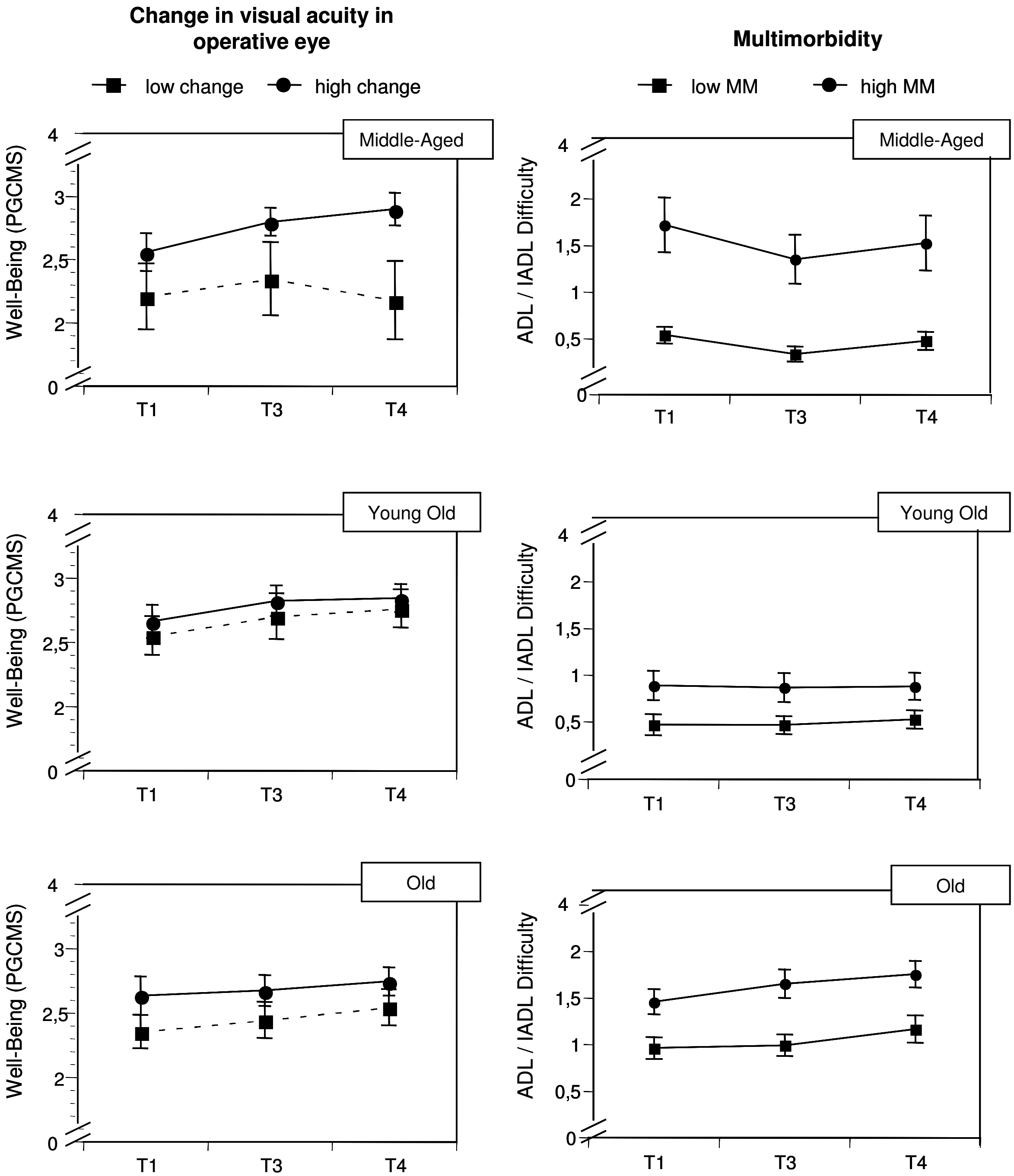

Figure 5.29 *Age-group differential changes in well-being and ADL / IADL difficulty as functions of change in visual acuity (left side) and multimorbidity (right side)*

Note: Error bars represent one standard error of the mean

The interaction term multimorbidity*age was not significant, but the interaction term multimorbidity*age^2 was significant in the prediction of ADL / IADL difficulty ($p \leq .01$; $\Delta R^2 = .02$), and in the prediction of average difficulty with other activities ($p \leq .10$; $\Delta R^2 = .02$). When comparing patients with low (below median) and high (above median) multimorbidity in the three a priori defined age groups with respect to changes in activity difficulty over time, time effects were not significant. This indicates that the differential changes within the groups would only become apparent when age group cut-offs were set at different ages. However, age-differential *trends* can be observed here for patients with high levels of multimorbidity (Figure 5.29, right): a decrease in ADL / IADL difficulty in the middle-aged, and an increase in the old[52]. The same trends could be observed for average difficulty with other activities.

[52] Note that multimorbidity was also more strongly associated with ADL / IADL difficulty in middle-aged adults, in comparison to the two other age groups. However, this was only a trend and was not reflected in the interaction age*multimorbidity, which was nonsignificant at all occasions.