

4 METHOD

4.1. Selection Criteria for the Study Sample

The aim of the present study was to examine correlates of resilience and adaptation in middle-aged and elderly persons facing age-associated and an acute stressor. For reasons discussed in Chapter 2, cataract patients scheduled for surgery were chosen as the population of interest. Inclusion criteria were determined by methodological and ethical considerations as well as the choice of the data assessment procedure (questionnaires and oral interview). Sufficient comprehension of the German language, being able to read large font letters (Arial 15) and to conduct a telephone interview were essential criteria for study participation. Therefore, patients with severe visual and hearing problems were excluded. Patients suffering from severe dementia or other impairments causing severe cognitive deficits were also excluded by medical history taking¹⁴.

It was further decided to keep the number of factors directly associated with surgery that might produce variation in adaptational efforts and outcomes as small as possible, because these factors were not in the centre of interest. As was noted earlier, cataract surgery is a highly standardized procedure, so that prior experience seemed to be the only crucial variable to control for. Previous studies have shown that patients undergoing cataract surgery for the second time report significantly less pre-surgical anxiety (Rybarczyk & Auerebach, 1990; Fagerström, 1993). Because the expected sample size in this study was rather small, it was decided to deal with this difference by including "first eye" patients only rather than controlling for patient status in the analyses.

4.2. Data Collection and Recruitment of Patients

Data were collected using questionnaires at three measurement points during a six-week period around surgery (one pre- and two post-surgery occasions, see 4.3). Additionally, a short interview on the day prior to and a telephone interview two days after surgery were conducted with each participant to assess pre- and post-surgical affect and coping strategies in dealing with the event of surgery.

¹⁴ The validity of the dementia diagnosis was not assessed in this study. Nevertheless, the length and complexity of the questionnaires suggest that patients who completed them without any obvious response bias did not suffer from severe cognitive deficits.

To meet the special needs of visually impaired people, a large font was chosen (Arial 15) for the print of the questionnaires. Information on pre- and postoperative vision was obtained from the hospitals` medical records.

Patients were recruited from the ophthalmology unit of a general hospital in Berlin and an ophthalmologic hospital in Kiel. Due to differences in the internal organization of patient admission, the recruitment procedure was different in the two sites. In Berlin, patients were admitted to the hospital on the day prior to surgery. Since it was not possible to contact them prior to admission, the recruitment took place during that first day in hospital. Brochures containing detailed information about the study were handed out to each patient scheduled for first eye surgery except those with severe cognitive or hearing impairment (as indicated in the medical record). Patients who were interested in participating after reading the brochure were again contacted by one of the investigators who obtained informed consent and conducted a short interview. They were then handed out the first questionnaire and instructed to complete it on the same day and hand it over to nursing staff.

In Kiel, patients were admitted to the hospital on the same day as surgery took place. Therefore, the information brochure together with an answering card was mailed to them by the clinical staff approximately four weeks prior to surgery. Patients who were interested in participating sent the answering card with their address and telephone number to the investigators. They were then sent the first questionnaire one week prior to surgery with the instruction to complete and send it back before going to the hospital. On the day before surgery, they were called at home for a short interview.

In both Berlin and Kiel, after surgery, patients stayed in the hospital overnight and were discharged the next day. Post-surgery measurement occasions were thus the same for participants in both sites (see next section). Data were collected by telephone interview and questionnaires that were sent by mail. Patients received 50,- DM for their participation, independent of completion of the study.

4.3. Design

The study setting (cataract surgery) is characterized by three different situations that require adaptation: (1) visual impairment due to cataract that is characterized by slow progression rather than abrupt incidence, (2) the surgery itself that has been shown to be a stressful event for many people (e.g., Fagerström, 1993; Knoll, 2002), and (3) the post-surgical change in visual acuity, that in most cases is expected to be positive. To capture the impact of each of

these situations and analyse the adaptivity of adaptational efforts and resources, a perioperative design was chosen with two pre-operative¹⁵ and three post-operative measurement occasions. Figure 4.1 gives an overview of the study design. Resources and self-regulation strategies were assessed at baseline prior to surgery. Due to the above mentioned differences in the hospitals` organisation, this assessment took place either during the week before surgery (patients from Kiel) or on the day prior to it (patients in Berlin).

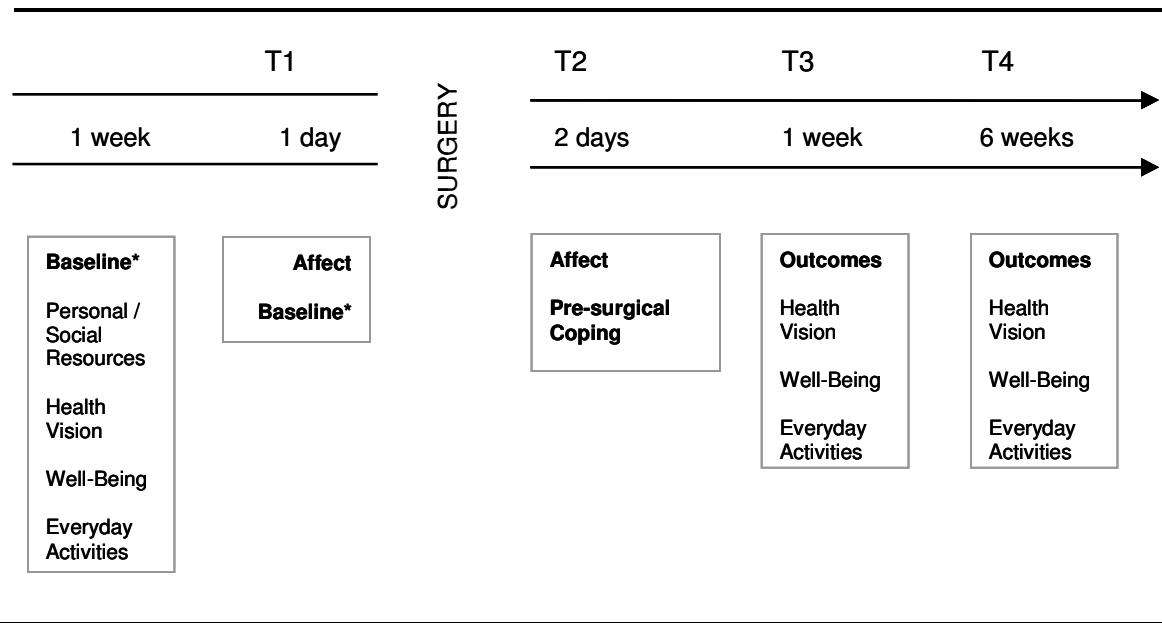


Figure 4.1 Design

Note: * Occasion of baseline assessment differed for the two study sites (see text in 4.2)

Objective and subjective indicators of functional and physical health as well as indicators of adaptation (well-being and everyday functioning) were measured at baseline and at both one and six weeks post-surgery. Additionally, a short interview assessing pre-surgery affect was conducted on the day before surgery for all patients, either face to face (Berlin), or by telephone (Kiel).

Two days after surgery a telephone interview was conducted to assess post-surgery affect and pre-surgery coping. Coping was assessed retrospectively for two reasons. In an earlier version of the design, it was planned to assess coping efforts in the week prior to surgery.

However, this was not possible for the patients from the Berlin hospital, since they could only be contacted upon their admission to hospital. On that day, reading the information

¹⁵ In the Berlin sample, the baseline assessment (questionnaire) and the affect assessment (interview) took place

brochure, the interview and the completion of the first questionnaire already took the patients at least 1½ hours, which was considered the maximum amount of time. It thus seemed reasonable not to add another interview. The second reason was to avoid any methodological differences in the assessment of coping (face to face vs. telephone interview) in the two study sites. There are so far no studies on possible differences in response effects on coping scales produced by these two assessment techniques. Still, since coping is an important measure in the study, it was decided to avoid any variation and assess it retrospectively in the telephone interview that was conducted with all participants. A detailed description of the selected items and scales together with an overview of their measurement occasion is provided in the next section.

4.4. Measures

In order to be able to compare the results with previous research and thus have an empirical frame for interpretation, instruments were chosen that are well-established and widely used in gerontological research. The following tables give an overview of the measures for coping and the personal and social resources (Table 4.1), the health and vision variables (Table 4.2) and the selected indicators of adaptation (Table 4.3). Unless otherwise indicated, the original version of the scales is in German. Response formats for the continuous variables were either a 4-point or 5-point likert scale, ranging from disagreement to acceptance. The only exception was the CES-D; participants were asked to rate the frequency of occurrence of depressive symptoms during the past week (less than a day - most of the time). The German items of the measures that are not described in detail in this section can be found in Appendix H. Personal resources measured on a dispositional level were not included in the T3 and T4 questionnaires (see Table 4.1), otherwise, these questionnaires did not differ from the first.

on the same day. Therefore, both assessments are generally referred to as baseline or T1.

Table 4.1*Coping, self-regulation, and personal and social resources*

Construct	Instrument / Items	Source	Measurement Occassion			
			T1	T2	T3	T4
Coping	Brief-COPE	Carver (1997); German translation by Knoll & Schwarzer (2000)			x	
Dispositional Coping Styles	Flexible Goal Adjustment / Tenacious Goal Pursuit	Brandtstädtter & Renner, 1992		x		
Dispositional Optimism	LOT-R	Scheier & Carver (1985)		x		
Generalized Self-Efficacy Belief	General Perceived Self-Efficacy Scale	Jerusalem & Schwarzer (1992)		x		
Control Beliefs	MHLC (subscale "Powerful Others")	Wallston et al. (1978); German translation by Muthny & Tausch (1994)		x		
Life Investment	Personal Life Investment	Staudinger & Fleson, 1996	x		x	x
Social Support						
Perceived availability of instrumental and emotional support	3 items each, e.g.: "There are people whom I can rely on when I need help"	Own Items		x		x
Seeking instrumental support Receiving emotional support	Two items each, part of the Brief-COPE	Carver (1997); German translation by Knoll & Schwarzer (2000)			x	

Table 4.2
Vision and health variables

Construct	Indicators	Assessment	Measurement Occassion			
			T1	T2	T3	T4
<i>Vision</i>						
Objective	Best corrected distance vision (in Snellen decimals) for both eyes separately	Medical record of ophthalmologic assessment	x			
	Best corrected distance vision (in Snellen decimals) for both eyes separately	Self-report of ophthalmologic assessment		x		x
Subjective	Self-rated impairment by vision problems	Single item "Currently, my vision problems impair my life ..." (4-point likert scale rating from not at all - very much)	x	x	x	x
<i>Duration of vision problems</i>						
	Duration of subjective impairment	Single items	x			
	Distance to diagnosis		x			
	Distance to recommendation of surgery		x			
<i>Physical Health</i>						
Objective	Additional medical diagnoses	Medical record + List of frequent chronic diseases in older age (self-report)	x			
Subjective	Self-rated strain caused by diseases	Separate rating for each reported diagnosis	x	x	x	x

Table 4.3
Indicators of adaptation and other variables

Construct	Instrument	Source	Measurement Occassion			
			T1	T2	T3	T4
<i>Subjective Well-Being</i>						
General Well-Being	PGCMS (Philadelphia Geriatric Center Morale-Scale)	Lawton (1975); German translation by Smith et al. (1996)	x		x	x
Depressive Symptoms	CES-D (Center of Epidemiological Studies Depression Scale)	Radloff (1977); German translation by Hautzinger (1988)	x		x	x
<i>Functional Status in Everyday Life</i>	List of Activities of Daily Living (ADL), Instrumental Activities of Daily Living (IADL), and activities in the domains of leisure, work, hobbies and physical exercise; ratings of - frequency of activities - perceived difficulty with activities	Extended list of ADL and IADL, after Lawton & Brody (1969)	x		x	x
<i>Other Variables</i>						
Affect	PANAS (Positive and Negative Affect Schedule)	Watson, Tellegen, & Clark (19)	x	x		
Demographic variables			x			

Below, the measures are described in detail. As has been noted earlier, most of the scales are widely used and their psychometric properties well documented. It was not the purpose of this study to confirm the structural relations of the single items within one construct. Therefore, factor analyses were not conducted. Cronbach's α was computed to determine the internal consistencies of the theoretically proposed scales and subscales at all measurement occasions. All negatively formulated items were first recoded so that low scores generally indicate rejection, disagreement or a low tendency on the respective construct, and high scores indicate agreement or a high tendency. Mean scores were computed averaging across all items belonging to a scale or subscale. A variable was assumed to be normally distributed when the absolute ratios of skewness and kurtosis to their respective standard errors were smaller than two (Tabachnick & Fidell, 1996). The basic descriptors of the constructs (mean, standard deviation, range, skewness and kurtosis) can be found in Appendix A. The reported descriptives are based on the full sample ($N = 136$) after missings had been estimated using a regression approach (explained in more detail in 4.6.1). On variables with more than 7% cases missing, a dummy variable was computed with one category for all cases with missing data on the respective variable and another for cases with values. The two groups were then compared with respect to central variables in the study in order to identify potentially meaningful influences on missing values.

4.4.1. Generalized Expectations

Generalized expectations were assessed using three instruments that are widespread in both health and developmental psychology. All scales were presented with the same response format, ranging from 1 (not at all) to 4 (very much). Items with negative wording were recoded so that high values generally imply high self-efficacy, optimism or a strong belief in powerful others.

General Self-Efficacy

A general sense of self-efficacy pertains to a "*broad and stable sense of personal competence to deal efficiently with a variety of stressful situations*" (Schwarzer, 2001 (Internet)). The 10 item General Self-Efficacy Scale (Jerusalem & Schwarzer, 1992; Schwarzer, 1993) was used here. The scale is conceptualized as unidimensional (Scholz et al., 2002). Internal consistency in the present sample was high (Cronbach's $\alpha = .91$).

Dispositional Optimism

Optimism was assessed with the revised version of the Life Orientation Test (LOT-R; Scheier, Carver, & Bridges, 1994). This has frequently been used as a unidimensional measure of optimistic orientation. It contains three positively and three negatively worded items, and four filler items. In the present sample, Cronbach's α was .63 for the entire scale (negative items recoded), .71 for optimism, and .68 for pessimism. Although internal consistency was slightly better for the two subscales, the overall mean score across all six items was favoured here. This was done because no hypotheses had been formulated for pessimism-specific relations, and when screening the relations with other constructs in the study, no meaningful distinct pattern of relations emerged.

Belief in Powerful Others

The external control dimension *belief in powerful others* was assessed using a subscale of the Multidimensional Health Locus of Control Scales developed by Wallston, Wallston and DeVellis (1978; German adaptation by Muthny & Tausch, 1994). This is a measure of health-related control beliefs that consists of three independent subscales: internal control belief, chance, and belief in powerful others. The latter assesses the degree to which individuals believe in the benefit of delegating part of the control over their health status to powerful others (i.e., a physician). Internal consistency of the four-item scale was satisfactory here too, (Cronbach's $\alpha = .78$).

4.4.2. Social Support

Social support is one of the key constructs that has frequently been related to positive adaptation under adverse circumstances. However, there is no widespread, standard instrument for the assessment of the subjective experience of support. Thus, a small set of new items was constructed.

Functional Aspects of Social Support

For the assessment of perceived availability of support, six items were constructed, of which three were designed to capture the availability of *emotional* support, and three the availability of *instrumental* support. Obviously, this distinction could not be successfully captured, as indicated by the high inter-item correlations (see Table 4.4).

Because of their high intercorrelation, the two subscales were collapsed into a single indicator *perceived availability of social support* (average score across all items). This was highly consistent (Cronbach's $\alpha = .78$).

Table 4.4
Intercorrelations between the items assessing perceived availability of support

	1	2	3	4	5	6	7
1 Es gibt Menschen, auf die ich mich immer verlassen kann, wenn ich einmal Hilfe brauche (There are people who I can rely on when I need help)	--						
2 Wenn ich einmal Trost und Zuspruch brauche, ist jemand für mich da (Someone is always there when I need comfort)		.51**	--				
3 Wenn ich ein Problem habe, gibt es jemanden, mit dem ich mich aussprechen kann. (When I have a problem, I can talk to someone)			.48**	.78**	--		
4 Wenn ich Sorgen habe, gibt es jemanden, der mir hilft. (When I have problems, there is someone who will help me)				.42**	.80**	.85**	--
5 Es gibt Menschen, die mir ihre Hilfe anbieten, wenn ich sie brauche. (There are people who offer me their help when I need it)					.51**	.64**	.60**
6 Wenn es viel zu erledigen gibt, helfen mir andere. (When there are a lot of things going on in my life, others help me)						.61**	--
7 Subscale emotional support (1-3)							.75**
8 Subscale instrumental support (4-6)							.81**
							.91**
							.93**
							.66**
							.57**
							--
							.56**
							.85**
							.73**
							.77**
							.85**
							.80**

** $p \leq .01$

Structural Aspects of Social Support

Partnership was chosen to represent a structural aspect of social support. This information was taken from participants demographic report (see table Table 4.13). The variable marital status (with the response categories single, married / partnership, divorced and widowed) was recoded into a new variable *partnership* with a value of 0 assigned to everyone currently living without partner (including the categories single, divorced and widowed) and a value of 1 assigned to those with partner. Three participants had not reported their precise marital status, but from other demographic information it could be concluded whether they were

living alone or not¹⁶. Based on this new variable, $\underline{N} = 66$, (49%) had a partner and $\underline{N} = 70$ (51%) had none.

4.4.3. Personal Life Investment

Staudinger and Fleeson's (1996) personal life investment scale was selected to assess the degree of energy - both on a cognitive and a behavioral level - that participants invested in important life domains. Specifically, they were asked to rate how much they think about, or take action in, each of the following ten life domains: health, well-being of close relatives, mental performance, relationships with friends and acquaintances, thinking about life, hobbies and other interests, independence, death and dying, occupational and comparable activities, and sexuality. Response options ranged from 0 (not at all) to 4 (very much).

Three scores were derived. First, an *average life investment* score was computed across all ten ratings as a general measure of the intensity of an individual's life investment. Second, *investment selectivity* was build from the number of domains with low and very low investment (as indicated by a score of 0 or 1; Staudinger et al., 1999). A third variable, *investment variability*, was derived by computing the intraindividual variance of scores across the ten domains (for a graphical presentation of patterns of life investment in participants exhibiting low vs. high variability see Figure A1, Appendix A).

4.4.4. Coping

Coping was assessed on a dispositional level as well as on a situation-specific, state level. Dispositional coping was part of the baseline assessment at T1 and the situation-specific coping was assessed via telephone interview two days after the surgery (see 4.3).

Assimilative and Accommodative Coping Styles

The dispositional tendencies to flexibly adjust one's goals (accommodative coping style) and tenaciously pursue one's goals (assimilative coping style) were assessed in a measure developed by Brandstädter and Renner (1990). It consists of a 15-item scale that is designed to measure *Tenacious Goal Pursuit* (TGP), and a 15-items scale that assesses *Flexible Goal Adjustment* (FGA).

¹⁶They were asked if, and what kind of employment their partners had; this variable was not analysed in detail but served to identify partnership in the three participants with missing data

The response format used here was a 5-point scale ranging from 0 (not at all true) to 4 (very true). For scale aggregations, negatively formulated items were recoded first and mean scores were then computed across the 15 respective items. The mean scores of the two scales were normally distributed. Cronbach's α was .65 for TGP and .77 for FGA.

According to an additional conceptual distinction of the accommodative goal adjustment strategies, the FGA scale can be further divided into two subscales (Wentura, unpublished manuscript). One comprises strategies that are targeted at the cognitive *reframing* of goals (FGA-R), and the second subscale entails the *orientation towards new goals* when current goals are blocked (FGA-N).

The two FGA subscales were also normally distributed. Cronbach's α was .68 for TGP-R and .64 for FGA-N. The intercorrelations of the four coping styles are displayed in Table 4.4. TGP and FGA are positively correlated here, but only share a very small amount of variance (less than 4%), indicating that they should still be viewed as distinct tendencies. The conceptual distinction of the two FGA subscales can also be justified in face of their only moderate correlation.

In all analyses, FGA-R and FGA-N will be used instead of the total FGA score, because differential relations with outcomes were expected for the two facets of flexibility in goal adjustment.

Table 4.5

Intercorrelations between dispositional coping styles

	1	2	3
1 Tenacious Goal Pursuit (TGP)	—		
2 Flexible Goal Adjustment (FGA)	.19*	—	
3 FGA-Reframing (FGA-R)	.20**	.81**	—
4 FGA-Orientation towards new things (FGA-N)	.08	.81**	.36**

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

Coping Strategies in Dealing with Cataract Surgery

In Chapter 2, several attempts to reduce the many possible idiosyncratic coping strategies to a comprised and theoretically meaningful set of dimensions have been introduced. There is empirical support for the usefulness of each of these dichotomies. Still, these broad distinctions, such as problem-solving versus emotion-focused, or active versus avoidant, have only limited utility for understanding coping efforts in stressful situations. They comprise a

variety of very specific coping strategies that appear to be very distinct from one another in their adaptivity, depending on contextual factors. There are many ways to try to regulate emotions and many ways to try to actively change a situation, yet all of these are not equally successful.

The importance of assessing coping on a more specific level is widely accepted and has led to the development of numerous instruments. Here, a short version of the COPE was used, the Brief-COPE (Carver, 1997). It consists of 28 items representing 14 coping strategies: self-distraction, active coping, denial, substance use, use of emotional support, use of instrumental support, behavioural disengagement, venting, positive reframing, planning, humour, acceptance, religion, and self-blame.

It should be noted that in the view of the author of this dissertation, the subscale use of emotional support is not considered a genuine coping strategy. A closer look at the two items reveals that here the underlying construct is "received" support rather than the activation of it. Thus, it should rather be seen as an antecedent, correlate or consequence of what is usually conceptualised as coping behaviour, namely the individual's attempts to deal with a stressor. These attempts do not necessarily have to be conscious, nor do they exclude a dyadic component, such as the seeking of support. But the distinction between the individual's actions and thoughts and the environmental input in these processes should not be given up. Therefore, the original labelling "use of emotional support" is replaced here by the term "receiving emotional support". Because the two items representing this scale have been part of the Brief-Cope interview, all statistics pertaining to this scale will be reported together with the coping strategies.

The COPE can be administered in a trait or state form. For the present study, a state version was adopted where participants were asked to rate the extent to which they used each coping strategy in the week prior to surgery. The instruction was: "In the week prior to surgery, how much did you think or do one of the following?" Ratings were made on a 4-point Likert-scale that ranged from 1 (not at all) to 4 (very much).

Of the 14 Brief-COPE subscales only 9 were used in the analyses. The scales behavioural disengagement, venting and planning were eliminated because the two items representing each scale were unrelated in this sample ($r_{diseng} = -.03$, n.s.; $r_{vent} = .11$, n.s.; $r_{plan} = .13$, n.s.). Thus, the intended meaning of these items was obviously not shared by the participants. Furthermore, only 17 participants reported thoughts of self-blame and only 6 said that they had used substances to calm themselves, therefore these two scales were also not used.

Table 4.6 displays the intercorrelations of the pairs of items that were a priori assigned to the coping dimensions.

Table 4.6

Coping strategies in dealing with surgery: Intercorrelations of each pair of the Brief-Cope items^a belonging to the same coping dimension

		$r_{1,2}$
Acceptance		
1 I've been accepting the reality of the fact that it has happened.		
2 I've been learning to live with it.	.26**	
Reframing		
1 I've been trying to see it in a different light, to make it seem more positive.		
2 I've been looking for something good in what is happening.	.19*	
Humor		
1 I've been making jokes about it.		
2 I've been making fun of the situation.	.20*	
Instrumental support seeking		
1 I've been getting help and advice from other people.		
2 I've been trying to get advice or help from other people about what to do.	.52**	
Receiving emotional support		
1 I've been getting emotional support from others.		
2 I've been getting comfort and understanding from someone.	.42**	
Religion		
1 I've been trying to find comfort in my religion or spiritual beliefs.		
2 I've been praying or meditating.	.65**	
Active		
1 I've been concentrating my efforts on doing something about the situation I'm in.		
2 I've been taking action to try to make the situation better.	.28**	
Distraction		
1 I've been turning to work or other activities to take my mind off things.		
2 I've been doing something to think about it less, such as going to movies, watching TV, reading, daydreaming, sleeping, or shopping.	.38**	
Denial		
1 I've been saying to myself "this isn't real."		
2 I've been refusing to believe that it has happened.	.20*	

^a For the German translation of the items see Appendix H

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

Carver (1997) recommends to either use these first order dimensions or to further determine the composition of the higher-order factors within the study sample at hand. He argues that different samples exhibit different patterns of relations. Since the intercorrelations of the item pairs turned out to be only small to moderate in this sample, it was decided not to

further combine the scales into second order factors. Rather, it was attempted to capture the meaning of the different coping strategies in this particular setting by examining their interrelations and their differential relations to other resources and adaptational outcomes.

The intercorrelations of the coping strategies are reported in Table 4.7. Only small to moderate correlations emerged, the highest being that between the two support-related strategies. Acceptance appeared to be a fairly distinct strategy here, whereas active coping was positively related to almost all strategies.

Table 4.7

Intercorrelations between the surgery-related coping strategies

	1	2	3	4	5	6	7	8
1 Acceptance	-							
2 Reframing	.14	-						
3 Humour	.07	.29*	-					
4 Support Seeking	.07	.08	.09	-				
5 Receiving Support	.13	.16	.06	.37**	-			
6 Religion	.02	.07	-.15	-.03	.03	-		
7 Active	.00	.29*	.14	.20*	.15	.18*	-	
8 Distraction	.07	.12	-.03	.30*	.15	.19*	.26*	-
9 Denial	.02	.02	.09	.12	.01	.16	.20*	.12

* p ≤ .05; ** p ≤ .01

4.4.5. Vision

Vision is an important part of a person's functional health. Several indicators of performance can be assessed; the most common is the *acuity* in recognizing objects at various distances (near, intermediate, distant). Acuity measures are considered objective indicators of vision here. In addition, the patients' *subjective* impairment caused by vision problems was assessed, as well as three indicators of the duration of vision problems.

Visual Acuity

According to the "International Classification of Functioning, Disability and Health" of the World Health Organization (WHO, 1980), monocular acuity of distance vision refers to "distance seeing functions of sensing size, form and contour, using either right or left eye alone, for objects distant from the eye". In this study, monocular visual acuity (distance vision, in Snellen-Decimals, ranging from 0 to 1,0) was assessed in both eyes separately. With patients' consent, pre-surgical visual acuity information was obtained from the medical

records in the hospital. One and six weeks after surgery, patients were asked to report acuity measures as assessed by their private ophthalmologists, these reports were checked for plausibility by comparing them to the post-surgical assessment of the hospitals (again, this information was obtained from the medical records).

For subsequent analyses, two variables were used: visual acuity in the eye operated on (*operative eye*) and visual acuity in the *better eye*. It was reasoned that the better eye is the closest proxy to "real" acuity performance. In addition, vision in the operative eye and especially the *change* in the operative eye were assumed to be important correlates of emotional adaptation.

What was the degree of impairment in the present sample prior to surgery? In the "International Classification of Impairments, Disabilities and Handicaps" of the World Health Organization (WHO, 1980), the best-corrected distance vision as measured across both eyes (binocular vision) is classified into four degrees of impairment: no impairment ($> 0,8$ Snellen-Decimals), mild impairment (0,3 - 0,8), moderate impairment (0,12 - 0,3) and severe impairment ($< 0,12$). In this study, monocular instead of binocular vision was assessed. Still, following the rationale that binocular vision cannot be worse than vision in the worse eye, and not better than vision in the better eye, some conclusions regarding the degree of impairment within the present sample can be drawn. Prior to surgery, only one participant had severe impairment (as indicated by Snellen-Decimals of 0,12 in both eyes), and one participant had no impairment (as indicated by Snellen-Decimals of greater 0,8 in both eyes). All other participants had moderate or mild impairment at T1¹⁷.

The unbalanced distribution of the participants according to the WHO impairment criteria made this classification variable inappropriate for group analyses in this study. Therefore, for heuristic purposes, participants were grouped along the variable "vision in the better eye"¹⁸ according to the following categories: mild or no impairment ($> 0,8$ Snellen-Decimals), moderate impairment (0,5 - 0,8) and severe impairment ($< 0,5$). The descriptives of all vision indicators are reported in the results section.

¹⁷ It should be noted that visual acuity is only one aspect of visual functioning and that other symptoms (e.g., glare, sensitivity to light) that were not assessed here contribute to vision impairment as well.

¹⁸ The better eye was chosen since it is assumed to represent the closest proxy to the "real" acuity performance.

Subjective Impairment through Vision Problems

At all three measurement occasions involving a questionnaire, participants were asked to rate the degree to which they currently felt *impaired* by their vision problems. Response options ranged from 1 (not at all impaired) to 4 (very much impaired).

It is important to note that this subjective measure as well as the one in the health domain (4.4.6) differ from typical measures of "subjective" vision / health in the literature, asking participants to give a subjective evaluation of their visual or health *status* (i.e., how good or bad they think their visual performance / health status is).

Duration of Vision Problems

The exact onset of a cataract is difficult to determine, since it is characterized by a *process* that slowly evolves over a time period of sometimes many years. It is not clear how far changes in the lens have proceeded before a patient subjectively experiences problems. It is unlikely that there even exists a linear relationship between objective lens changes and subjective experience. Despite these problems in determining the exact duration of visual problems due to cataract (or any other eye disease), it was assumed to be a critical variable for the status of adaptational outcomes. Three items were formulated that tap this variable from different perspectives. Patients were asked to indicate (a) when their doctor first told them that they had cataract (*distance to diagnosis*), (b) when their doctor first recommended cataract surgery (*distance to recommendation*) (c) since when they felt that their vision was impaired (*duration of subjective impairment*).

Response options were categorical. For items a) and b) the options were: *within the past four weeks* (1), *the past six months* (2), or *the past year* (3). An additional category (4) could be chosen to indicate a *longer distance* in years. For item c) a fifth response category, the *no impairment* option, was given ("I do not feel that my vision is impaired"), which was coded as 0. Although the response format was categorical and the distances between the categories were not equal, the three items are treated as continuous variables. The value 1 is then correspondingly interpreted as "few time elapsed" since diagnosis, recommendation or occurrence of subjective problems, value 4 as "much time elapsed".

Distance to diagnosis and recommendation were highly correlated ($r = .62$, $p \leq .01$). In contrast, the duration of subjective vision problems was only moderately associated with distance to diagnosis ($r = .31$, $p \leq .01$) and recommendation ($r = .26$, $p \leq .05$). Thus it can be concluded that onset of cataract and onset of subjective impairment did not necessarily coincide. Age and gender differences were not found. For subsequent analyses, only the

variable *duration of subjective vision impairment* was used. It was reasoned that the subjective experience of problems has a greater impact on adaptation than the diagnosis itself, which apparently allows no conclusion about the progression of the actual vision impairment.

4.4.6. Health

There is no general agreement of what factors constitute a person's general somatic health status. Commonly, a distinction between more "objective" indicators (e.g., cardiovascular reactivity, immune parameters) and the subjective rating of one's health is made. Often, functional capacity ratings (e.g. independence in everyday life, grip strength, auditory and visual acuity) are assessed also (e.g., Steinhagen-Thiessen & Borchelt, 1999; for a recent theoretical model on the relations between these factors see Verbrugge & Jette, 1994). For the present study, it was decided to concentrate on a specific feature of the health status that is common in old age: the simultaneous presence of several diseases (multimorbidity). Additionally, a subjective rating was included.

Multimorbidity

A list of 11 broad disease categories common in old age and with mostly chronic progression was given to patients who were asked to indicate for each disease whether they were currently suffering from it, or whether a physician had told them that they did (0 = not suffering from the disease, 1 = currently suffering from it).

Table 4.8

List of diseases

Arthritis
Gastrointestinal Diseases
Heart Diseases
Kidney Diseases
Circulation Problems
Metabolic Diseases
Diabetes
Osteoporosis
Parkinson
Problems following Stroke
Hip Problems

Optionally, they could report further diseases not in the list. Patients' reports were compared to information obtained from their medical records in hospital. Differences between the two sources of information were dealt with in such that all chronic diseases listed in the medical file were scored, even if patients had not reported them.

Diseases reported by patients that were not listed in the medical record were also scored, because the latter only contained information relevant for the time in hospital. A sum score was computed indicating the total number of diseases (degree of multimorbidity). The score was only once computed from baseline reports, since little or no changes occurred on this indicator during the study period.

Subjective Health Strain

For each of the diseases that participants reported to suffer from, they were asked to rate the degree to which they currently felt strained by it. These ratings were obtained at all measurement occasions. Response options ranged from 1 (not at all strained) to 4 (extremely strained). A mean score was computed across all ratings, indicating the average subjective strain attributed to health problems.

4.4.7. Indicators of Adaptation I: Well-Being

Well-being is one of the central outcome variables of the study. It was decided to assess general well-being with a global measure widely used in gerontological research. Depressive symptoms were also assessed to account for the negative pole of well-being, and because it was reasoned that these were more sensitive to changes around surgery. All measures were assessed at three occasions (at baseline, and one and six weeks after surgery).

General Well-Being

Subjective well-being was measured using the Philadelphia Geriatric Centre Morale Scale (PGCMS; Lawton, 1975; German translation by Smith et al., 1996). It captures cognitive as well as emotional components of well-being and comprises 15 items assigned to the subscales "life-satisfaction", "aging-satisfaction" and "non-agitation". Averaging across all 15 items yields a total score that indicates a person's general subjective well-being. This average score is mostly used in the literature and is favored here as well, since intercorrelations between the subscales were fairly high at all occasions (see Table B1, Appendix B).

Participants were asked to rate the degree to which each item was representative for their own cognitive or emotional state *in general* (not currently). Response options ranged from 0 (not at all true) to 4 (very true). Internal consistency for the general factor was satisfactory with Cronbach's $\alpha = .87$ at T1, and .91 at T3 and T4.

Depressive Symptoms

For the assessment of depressive symptoms the German version of the Center for Epidemiological Studies Depression Scale (CES-D; Hautzinger, 1988; Radloff, 1977) was used. The 20-items scale was established to comprise four subscales (depressive affect, lack of well-being, somatic problems and interpersonal problems). However, some studies have found all items to be best represented by a one-factor solution (e.g., Hautzinger, 1988). Apart from few subscale-specific analyses, the one factor solution was chosen here (for intercorrelations between the subscales see Table B2, Appendix B).

Participants were asked to rate the frequency of occurrence of the depressive symptoms during the past week, ranging from 0 = less than a day to 3 = most of the time (5-7 days).

When summing up the scores of the entire scale (maximum score = 60), the CES-D can be used as a screening instrument for clinical depression (e.g. Weyerer et al. 1992). This was not the purpose of analysis here, thus the responses were used in a continuous form. Cronbach's α for the entire scale was .85 at all three occasions.

Two points are worth noting. First, there was a comparatively high number of people ($N = 7$; 9.5%) who did not respond to *any* of the items of the CES-D scale at the first measurement occasion (for the single items the number of missings ranged from 6 to 12 %). No other variables that were assessed could account for this, e.g., age, sex, overall life-satisfaction, negative affect and CES-D scores at T3 and T4 were all unrelated to the occurrence of these missings (t-test comparisons of participants with and participants without missings; all $p > .05$). At T3 and T4, the number of missings per item dropped to less than 5% and only two participants had missings on more than 80% of the items.

Apart from the unusual occurrence of missing, it should be noted that eight participants had a CES-D sum score of above 31 at T1, thus being outside two standard deviations above the sample mean ($M = 14$; $SD = 8.7$). Given that the two cut-offs proposed in the literature are 16 and 18 (Riediger, Linden, & Wilms, 1998), their scores seem critical in that the presence of clinically relevant depression is very likely. Therefore, this group was examined more closely in order to identify potentially meaningful outliers. It turned out that this small group did not differ from the rest of the sample with respect to age, gender, and measures of health and socio-economic status. Also, only three of the eight participants were still outside two standard deviations above the sample mean at T2 ($M = 13$; $SD = 8.0$), and at T3 ($M = 13$; $SD = 8.2$). The others had scores above 18 except for one person who dropped below a score of 16. Based on these findings it was decided that there was no good reason to generally treat these participants as outliers, they were, however, excluded from some of the regression

analyses because they were identified as multivariate outliers (as indicated in the respective results sections).

4.4.8. Indicators of Adaptation II: Functional Status in Everyday Life

Two indicators of adaptation in everyday life were chosen for this study: the subjective evaluation of difficulty in pursuing activities and the overall range of activities in the domains of leisure, physical exercise, hobbies, social activities and work.

Perceived Difficulties with Activities

It was the aim to assess the degree of subjective difficulty in two broad domains: (1) the so called Activities of Daily Living (ADL) and Instrumental Activities of Daily Living (IADL) that comprise a selection of activities that are more or less crucial for the maintenance of an independent lifestyle (Lawton & Brody, 1969), and (2) other activity domains that are assumed to reflect an individual's own choices and preferences to a greater extent than the ADL / IADL.

Table 4.9

Activity list

ADL / IADL

Getting up, dressing, toileting, bathing / showering, eating, climbing stairs, preparing meals / work in kitchen, cleaning, other housework, laundry, shopping, dealing with authorities, using public transportation, going for walks

Other activities

Leisure and hobbies

Watching television, reading, writing, creative activities, playing games, dancing, religious activities, attending cultural events, going to restaurants, excursions, travelling, other hobbies

Physical exercise

Sports

Work

Regular paid work (including other occupations and taking courses)

Social activities

Voluntary work, political activities, helping family members, helping other people, receiving visitors^a

^a there was a frequency but no difficulty rating for receiving visitors

For each domain, a list of activities was created, drawing from and extending previous activity lists created to assess a variety of functional status indicators (Mahoney & Barthel, 1965; Lawton & Brody, 1969; M.M. Baltes et al., 1996). Table 4.9 displays the list of the

chosen activities. It should be noted that the categorization of the activities other than ADL / IADL serves a descriptive purpose only, and is not based on any theoretical considerations. Factor analyses were not conducted, since only the distinction between the ADL / IADL domain and other activities is of primary interest here.

Difficulty ratings ranged from 0 (very easy) to 4 (very difficult). Also, for each activity, participants were given the alternative to indicate that they currently did not pursue it. Two mean scores were computed across all activities of the respective domains (14 ADL / IADL and 18 other activities), subsequently labelled *average difficulty with ADL / IADL* and *average difficulty with other activities*.

Activity Range

The second indicator of functional status in everyday life was the overall *range of activities other than ADL / IADL*. At baseline, participants were asked to rate how often they had engaged in each activity within the past six month. The total number of activities was 19 (one activity, receiving visitors, was added for these ratings, see Table 4.9). Response options were *not at all* (0), *every day* (1), *at least once per week* (2), *at least once within the past four weeks* (3), *at least once within the past six month* (4). Scores were recoded so that the category *not at all* was assigned 0, and all other responses were collapsed into a single category with a value of 1. These scores were summed up across all activities, resulting in the total number of different activities at least once pursued within the six month prior to surgery (= range of activities).

It should be noted again that this indicator was assumed to be associated with functional restrictions in the domains of health and vision on the one hand, and at the same time reflect people's active choices, thus serving both the status of a dependent variable and an independent variable (as a measure of selectivity in everyday life) in subsequent analyses.

4.4.9. Other Variables

Positive and Negative Affect

Cataract surgery has been shown to represent a moderately stressful event (Fagerström, 1993; Knoll, 2002). To validate the stressfulness of the surgery for the present sample, positive and negative affect were assessed in an interview one day prior to surgery (either telephone or face to face, see 4.2) and again in a telephone interview two days after surgery (T2). The Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988) was used. Positive and negative affect are generally shown to be independent dimensions, in this scale, each is

represented by a list of 10 adjectives (e.g., anxious, guilty, happy). Participants were asked to what degree each adjective represented how they felt on the respective day. Ratings ranged from 1 (not at all) to 4 (very much). Internal consistency in this sample was satisfactory with Cronbach's α of .79 for positive affect at T1, .85 at T2, and .74 for negative affect at T1 and .71 at T2.

4.5. Sample

Overall, 188 patients agreed to participate in the study. Of these, 136 patients (72%) completed and sent back questionnaires at all three measurement points. 38 patients were excluded from the analyses because they did not fill out or send back all three questionnaires. The rationale was that for most of these participants, no information on the reason for drop out or a missing questionnaire could be obtained. Therefore, it remained unclear whether there were medical reasons (complications related to surgery, other physical problems) that prevented the patients from filling out the questionnaires, whether they did not want to participate any more, or had other reasons.

It is often recommended to deal with the problem of missing data by replacing or "imputing" the missing values on the basis of existing data. One of these replacement techniques has been used to deal with the occurrence of missings *within* questionnaires and will be discussed later (see 4.6). However, in this peri-operative setting it seemed likely that the factors that prevented participants from completing and sending back the questionnaires (e.g., physical problems) would have influenced their responses in a systematic way. These considerations led to the decision that existing information from other measurement occasions would not be good predictors for the replacement of values on an occasion where no information was obtained.

Other reasons for drop out or post hoc exclusion were withdrawal of consent, an inconsistent response pattern within and across scales and too many missing values (less than 25% of a questionnaire completed). One participant was excluded because his medical record indicated that he had already undergone cataract surgery prior to his participation in the study. The distribution of reasons for exclusion is listed in Table 4.10.

Of the 52 patients who were excluded from further analyses, 40 had completed the Positive and Negative Affect Schedule (PANAS) interview on the day before surgery and 35 also completed the telephone interview two days after it. Information on visual status could be obtained for 29 of them.

Table 4.10*Reasons for drop out or post hoc exclusion of participants*

	N	%
Withdrawal of consent	6	3.2
T1 questionnaire missing	14	7.5
T2 questionnaire missing or received late	4	2.1
T3 questionnaire missing or received late	5	2.7
T2 and T3 questionnaire missing	15	8.0
Inconsistent responses	1	0.5
Too many missing values	6	3.2
Other	1	0.5
Total	52	27.7

Comparisons of means between these patients and the patients who were not excluded from analyses revealed that the excluded participants had significantly lower vision in the better eye prior to surgery and reported less positive affect after the surgery (see Table 4.11). They also tended to be older. However, this difference was not significant.

Table 4.11*Comparison of participants excluded from analyses with study sample*

Characteristic	Participants excluded (29 ≤ N ≥ 47) ^a		Sample for analyses (N = 136)		Sig.-Test ^b
	M	SD	M	SD	
Age	74.1	9.2	71.6	9.5	2.4
Positive affect T1 ^c	2.1	0.4	2.1	0.5	0.2
Negative affect T1	1.4	0.4	1.3	0.3	0.7
Positive affect T2	2.0	0.7	2.3	0.7	6.0*
Negative affect T2	1.2	0.3	1.2	0.3	0.1
Vision in operative eye (T1) ^d	0.40	0.2	0.44	0.2	1.4
Vision in better eye (T1) ^d	0.55	0.1	0.71	0.2	14.1**

^a 5 of the 52 patients excluded withdrew their consent for any use of their data^b F-tests are reported with 1 degree of freedom.^c Scale range for all affect mean scores from 1 (not at all) to 4 (very much)^d In Snellen Decimals (0 - 1.0)

* p ≤ .05; ** p ≤ .01

Of the 136 patients who were finally included in the analyses, 52 were recruited from the clinic in Kiel, 84 from the Berlin hospital. Because of the slightly different design (see 4.2), it was tested whether the two groups differed with respect to all variables relevant in the study.

Patients from Berlin reported more additional medical diagnoses ($F(1;134) = 4.1$, $p \leq .05$; $\text{Eta}^2 = .03$), however, they did not report more physical strain. Also, they had a better visual acuity in the operative eye at T1 ($F(1;134) = 4.0$, $p \leq .05$; $\text{Eta}^2 = .03$). and fewer of them had a partner ($\chi^2(1;134) = 6.4$, $p \leq .05$; $\text{Eta}^2 = .02$).

For measures of well-being, the difference in the date of baseline assessment was expected to be especially critical, since it might have been influenced by the distance to the day of surgery. Notably, this was only the case for one indicator of well-being: on the mean level, patients from the clinic in Berlin had higher scores for negative affect prior to surgery. This difference can be explained by the fact that the patients were already in hospital when they were interviewed, as opposed to the patients in Kiel who were still at home. All other measures of well-being did not differ in the two sites.

Apart from negative affect, there was no reason to assume that the above mentioned sample differences in health, vision and family status were in any way related to the different occasion of baseline assessment. Since no other differences in the central variables emerged, the sample description below and all subsequent analyses were performed with both samples combined.

4.5.1. Sample Description

136 patients aged between 38 and 92 years ($M = 71.6$; $SD = 9.5$) completed and sent back questionnaires at all three measurement points. About two thirds of them were female. Male participants were significantly older than female participants (see Table 4.12).

Table 4.12

Age distribution in the total sample and in male and female participants

Characteristic		Total Sample (N=136)	Females (N=94)	Males (N=42)	Sig.-Test
Age	Mean	71.6	70.6	74.1	$F_{(1,134)} = 4.0^*$
	SD	9.5	10.4	6.6	
	Min	38	38	56	
	Max	92	92	92	

* $p \leq .05$

In addition, the total age range was more restricted in this sub sample. More than two thirds of the male participants (76 %, $N = 31$) were between 70 and 80 years old as opposed to less than half of the women (45%, $N = 42$).

Gender differences were also found with respect to marital and household status (see Table 4.13): significantly more men had a partner and shared their household with at least one other person. The majority (85%) of all participants had at least one child.

Table 4.13

Socio-economic characteristics of the total sample and differences between male and female participants

Characteristic	Total Sample (N=136)		Females (N=94)		Males (N=42)		Sig.-Test ^a		
	N	(%) ^b	N	(%)	N	(%)			
Marital status									
Single	6	(4.5)	6	(6.5)	--	--			
Married / Partner	65	(48.9)	36	(39.1)	29	(70.7)			
Divorced	9	(6.8)	8	(8.7)	1	(2.4)			
Widowed	53	(39.8)	42	(45.7)	11	(26.8)	12.6**		
Children	112	(84.8)	75	(82.4)	37	(90.2)	1.4		
Living alone	58	(43.9)	49	(53.3)	9	(22.5)	10.7**		
Living in institutions	4	(3.0)	4	(4.3)	--	--	1.8		
Currently employed	11	(8.2)	9	(9.7)	2	(4.9)	0.8		
Years of education in school	M	SD	9.3	1.7	9.5	1.7	9.1	1.7	1.7

^a Chi-square tests are reported with 1-3 degrees of freedom. F-tests are reported with 1 degree of freedom.

^b Valid percent are reported because N is reduced due to 3 cases with missing values.

* p ≤ .05; ** p ≤ .01

A major focus of this thesis is on the comparison of the adaptivity of resources and coping efforts in midlife and older age. As discussed earlier (XX), middle adulthood was defined as age 40 to 65¹⁹. The older participants were again split into two groups: the young old (66 - 75 years) and the old (> 75 years).

When comparing the three age groups with respect to their socio-economic characteristics, significant differences in the distribution of gender, marital status, household situation and employment status became apparent (Table 4.14). The middle-aged sample consisted mostly of females, whereas in the other two sub samples the gender ratio was more balanced. Also, about one third of the middle-aged participants were employed at the time of the study as opposed to only one participant amongst all elderly participants. The oldest group differed

¹⁹ There was one 38 year old female participant who is considered "middle aged" as well. This decision was "post hoc" supported by the fact that the participant's mean scores on all of the scales proved to be within the range of 95% of others in that age group.

from the two others in that they had the highest proportion of widowed and single-household participants.

Table 4.14

Socio-economic characteristics of three age groups

Characteristic	N (%)	Age group			Sig.-Test ^a
		≤ 65 years (N=32)	66 - 75 years (N=51)	> 75 years (N=53)	
Female	N (%)	28 (87.5)	30 (58.8)	36 (67.9)	7.6*
Marital status					
Single	N (%) ^b	1 (3.3)	--	5 (9.6)	
Married / Partnership		20 (66.7)	31 (60.8)	14 (26.9)	
Divorced		4 (13.3)	5 (9.8)	- -	
Widowed		5 (16.7)	15 (29.4)	33 (63.5)	32.8**
Children	N (%)	27 (93.1)	39 (76.5)	46 (88.5)	4.9
Living alone	N (%)	6 (20.7)	19 (37.3)	33 (63.5)	15.3**
Living in institutions	N (%)	-- --	2 (3.9)	2 (3.8)	2.9
Currently employed	N (%)	10 (31.3)	1 (2.0)	-- --	29.8**
Years of education in school	M SD	9.3 1.6	9.3 1.8	9.4 1.7	0.6

^a Chi-square tests are reported with 2-6 degrees of freedom. F-tests are reported with 2 degrees of freedom.

^b Valid percent are reported because N is reduced due to 3 cases with missing values.

* p ≤ .05; ** p ≤ .01

4.6. General Statistical Procedures

Statistical analyses were conducted using SPSS for Windows 10.0 and AMOS for windows 4.0 (Arbuckle, 1999). In the following, some basic steps and decisions in the handling of data analyses are outlined.

4.6.1. Missing Values, Deviations from Normality and Outliers

So far, there are no guidelines for how much missing data can be tolerated for a sample of any given size (Tabachnick & Fidell, 1996). It is generally agreed upon that a careful analysis of the pattern of missing data is important (Roth, 1994). Systematic non-responses may occur

that affect the generalizability of the results. The first step, therefore, was to analyse whether data were missing randomly or nonrandomly. For each aggregated scale as well as the single items the amount of missings was identified. Analyses on potentially meaningful influences on missing values were performed only when the amount of missings exceeded 7% and have already been reported in 4.4.

It was decided to use a regression estimation approach for the estimation of the missing values. This decision was based on the assumption that all of the missing data points in the data set were missing at random (MAR), meaning that they might depend on other variables in the data set, but not on the data that were actually missing²⁰. Under this assumption, regression methods are considered to outperform common incomplete data handling strategies (listwise / pairwise deletion, mean substitution) that depend on the assumption that the pattern of missing values does not depend on any of the data values (Rubin, 1976; Little & Rubin, 1987; Roth, 1994). Regression estimation was performed using the SPSS Missing Values Analysis (MVA) module. Missing values on single items were estimated by regressing age and gender. Missing values on items belonging to a theoretical scale were estimated by using age, gender, and all other items of the respective scale as predictors in the regression. This was done *within* each measurement occasion, no item was estimated on the basis of items from previous or subsequent time points. For the estimation of missings on the vision and health variables, objective and subjective indicators (see 4.4.5 and 4.4.6) were treated as separate constructs. Consequently, missing values on the objective indicators were estimated on the basis of other objective indicators only, in addition to age and gender. The same procedure was applied for the subjective indicators.

With respect to outliers, only multivariate outliers were identified on the basis of Mahalanobis distance indices in regression analyses and excluded from the particular analysis. Univariate outliers and deviations from normality in the distribution of variables were tolerated, no transformations were performed. First of all, not transforming variables usually results in a more conservative testing of hypotheses. And secondly, strong deviations only occurred in variables where skewness to either side was assumed to reflect "real" distributions, such as in the vision variables.

²⁰ This assumption can actually never be verified from data at hand, since that would require knowledge of the missing values themselves. Still, in this study there is no good reason to assume a relation between the variables of interest and their missings.

4.6.2. Multiple Group Comparisons

Whenever multiple tests involving the same independent variable were performed (e.g., comparisons between the three age groups), the alpha-level was adjusted to reduce type I error inflation (experimentwise alpha). This was done by dividing the alpha-levels (.05 and .01) by the number of tests that were performed. The empirical alphas were then evaluated against the resulting values (Bonferroni adjustment). Since this is considered a very conservative method (Jaccard & Wan, 1996), the adjustment was conducted separately for each domain of interest (health, vision, personal and social resources, coping, well being, activities and control variables), thus reducing the number of comparisons. This is indicated in the respective Tables in Appendix A, where age-group comparisons are reported, and in the respective results sections.

Since the sample sizes for the three a priori defined age groups were unequal, in all comparisons, homogeneity of variance and variance-covariance matrices were screened. In univariate analyses, Levine's test for homogeneity of variances was used and in cases of indication of unequal variances, Tamhane's conservative pairwise comparison test was applied for post-hoc comparisons between groups. In multivariate analyses and repeated measures analyses including a between-subjects comparison, Box's *M* tests were used to assess homogeneity of variance-covariance matrices. Violation of homogeneity was assumed when this conservative test was significant at $p < .001$ (Tabachnik & Fidell, 1996). Whenever that was the case and in addition, the group with the smallest sample size (e.g., the middle-aged) produced larger variances than the groups with larger sample sizes, Pillai's criterion instead of Wilk's Lambda was used to evaluate multivariate significance. In repeated measures analyses, sphericity was assessed also and in cases of violation, F-tests for within-subjects comparisons were adjusted according to the Greenhouse-Geisser estimation of sphericity.

4.6.3. Regression Analyses

Hierarchical regression analyses were performed to combine multiple variables in the prediction of the criteria both cross-sectionally and longitudinally, and to analyse hypotheses on potential moderators (interactions). The procedure of entering predictors in a regression equation varied, depending on the hypotheses or research questions (see respective results sections).

To avoid the problem of multicollinearity in regression equations when entering a cross-product (interaction) term, z-scores of the predictor variables and the criteria variable were

computed (Friedrich, 1982). To test for interactions of two or three variables, their cross-product term was formed using their z-scores. In analyses involving interactions, the unstandardized coefficient (B) is thus reported instead of the standardized coefficient (β).

To test whether a specific variable functions as a mediator between a predictor variable and a criterion, a procedure proposed by Baron and Kenny (1986) was applied. The prerequisites for this procedure are that a) the predictor is significantly associated with the criterion, b) the predictor is significantly associated with the potential mediator and c) the mediator is significantly associated with the criterion. When these bivariate relations were given, the criterion was first regressed on the predictor alone, controlling for potential covariates, and in a second step, the potential mediator was entered in the equation. When the beta-weight of the predictor dropped below significance or was at least substantially reduced in step two, a mediating mechanism was assumed. There are no specifications of a “substantial” reduction in the regression weight in the literature, so the interpretation of what constitutes a partial mediation remains quite arbitrary.

4.6.4. Structural Equation Modelling

The mediator hypotheses were tested using structural equation modelling (SEM). It should be noted that SEM is not necessary to apply the procedure just described. However, it was chosen because both the associations between the predictors and the outcome as well as the interrelations amongst the predictors and several potential mediators can be represented in one model, with the opportunity to assess the overall fit of the entire model (Klem, 2000).

Since SEM includes not only a structural model, but also the specification of a measurement model, estimation of the regression weights of latent constructs (factors) differed from the regression weights of the respective measures in ordinary multiple regression analysis. This divergence was not considered a problem, since the absolute effect sizes were not of interest here.

Latent constructs were indicated by subscales or *parcels* rather than items, in order to enhance reliability and reduce the influence of response biases and distribution problems of single items (Kishton & Weidman, 1994, McCallum & Austin, 2000). Overall model fit was assumed to be satisfactory when the chi-square value divided by its associated degrees of freedom was smaller than 2, the root-mean-square error of approximation (RMSEA) was below .05, and the comparative fit index (CFI) was close to 1 (Hu & Bentler, 1998).