3 RESEARCH QUESTIONS AND HYPOTHESES

This chapter summarizes the research questions and hypotheses that are addressed in the present study. The main objectives of the study were (1) to compare cognitive-emotional and functional adaptation in middle-aged, young old, and old adults who face comparable health stressors, and (2) to compare resilient to non-resilient adults, and to adults who show good adaptation under low risk. With respect to the age-group comparisons, hypotheses are based on the assumption that the *normativity* of the selected health stressors and *functional reserve capacities* are important determinants of adaptation (see 2.7.4). Furthermore, a person-centered approach to resilience was chosen to analyze whether the successful mastery of chronic stress experiences is associated with changes in self-regulation strategies that are not apparent when chronic stress is not present (see 2.1.4). The empirical and theoretical considerations that underlie the hypotheses were outlined in detail throughout Chapter 2.

The hypotheses are divided into three parts. Part (I) summarizes hypotheses pertaining to the impact of the setting (cataract surgery) on peri-operative changes in the selected health stressors and criteria of adaptation, and their interrelations. In part (II), predictions concerning correlates of pre- and post-surgical adaptation, and moderators and mediators in these associations are outlined. Both parts entail hypotheses pertaining to age-group differences.

Criteria of adaptation are well-being and depressive symptoms (cognitive-emotional adaptation), and perceived difficulties with activities (functional adaptation). With regard to the latter criterion, a distinction is made between (1) average difficulty in Activities of Daily Living and Instrumental Activities of Daily Living (ADL/IADL), and (2) average difficulty in work, social and leisure activities. The former group of activities is considered more or less crucial for the maintenance of an independent lifestyle, and represents basic, highly automatized activities such as bathing, dressing, and cooking (Lawton & Brody, 1969). The latter group comprises a broad range of activities that are assumed to reflect an individual's own choices and preferences to a greater extent than the ADL / IADL (e.g., religious activities, dancing, sports, voluntary work; for a detailed description see 4.4.8). In addition, the overall activity *range* is assessed as an indicator of functional adaptation.

Finally, part III outlines the research questions concerning comparisons between high-risk individuals with good adaptation (resilient) and poor adaptation (non-resilient), and low-risk individuals with good adaptation. As discussed in the previous chapter (2.7.4), high risk is defined here as moderate to severe health stress (high multimorbidity and low vision), and the single criterion for good adaptation is high well-being.

I IMPACT OF THE PRESENT STUDY SETTING

3.1. Health, Vision, and Criteria of Adaptation in the Present Study Setting

In the present study, objective health indicators are (1) the degree of visual acuity and (2) multimorbidity. Furthermore, the *subjective* impairment or strain experienced through the presence of these stressors (subjective health indicators) is assessed. As cataract surgery is a highly successful procedure, an average improvement in visual acuity is expected in all age groups, and this should be reflected in the level of subjective impairment. Generally, in line with other studies (see 2.4.3), worse vision and health, as well as higher levels of subjective impairment, are expected to be related to poorer adaptation. In addition, cumulative effects of both objective indicators are expected, both in relation to the subjective impairment in either domain, and in relation to cognitive-emotional and functional adaptation. The following predictions are made:

- Prior to surgery, subjective impairment through vision problems is significantly higher than one and six weeks post-surgery.

Concurrent associations:

- At all occasions, subjective health strain and subjective impairment through vision problems are positively related.
- At all occasions, visual acuity is negatively related to depressive symptoms, activity difficulties (both ADL/IADL and others), subjective impairment through vision problems and health strain, and positively related to well-being and activity range.
- At all occasions, multimorbidity is positively related to depressive symptoms, activity difficulties (both ADL/IADL and others), subjective impairment through vision problems and health strain, and negatively related to well-being and activity range.
- Visual acuity and multimorbidity contribute *independently* to cognitive-emotional and functional adaptation.
- The amount of criteria variance explained by the subjective health indicators is greater than the amount of variance explained by the objective criteria.

- Prior to surgery, there is a *cumulative stress effect* of visual acuity and multimorbidity: Individuals suffering from high levels of multimorbidity and low visual acuity report worse adaptation across all indicators than individuals suffering from high impairment in either domain, or low impairment in both domains.

3.2. Pre- and Post-Surgical Age-Group Differences in Multimorbidity and Visual Acuity

The following prediction is based on existing data suggesting that the onset of cataract in midlife is a marker for biological aging. (see 2.4.1).

- Middle-aged, young old, and old adults do not differ with respect to the mean number of medical diagnoses (multimorbidity).

Furthermore, studies with cataract patients have consistently reported poorer vision in very old patients, both pre- and post-surgery (see 2.7.3).

- At all occasions, old adults have lower visual acuity than the young old and middle-aged.
- Post-surgical changes in visual acuity are lowest in the old adults.

3.3. Age-Group Differences in Personal and Social Resources and Self-Regulation Strategies

The present study differs from previous studies comparing middle-aged and elderly adults in that here, middle-aged adults – on average – are expected to face comparable health stressors to young old and old adults. It is not yet clear whether in this highly selective group of middle-aged adults, these non-normative health changes are associated with changes in personal and social resources, goal regulation and situational coping strategies. Thus, no specific hypotheses pertaining to age group differences in these variables are formulated. Only partner status is expected to differ between groups, with the proportion of widowed individuals among the old adults being higher than in young old and middle-aged adults.

3.4. Pre- and Post-Surgical Age-Group Differences in Cognitive-Emotional and Functional Adaptation, and Changes in these Criteria

It has been outlined in the previous chapter that negative non-normative events are generally associated with greater adaptational problems than normative events (e.g., Dohrenwend & Dohrenwend, 1974; Filipp, 1990; see 2.3). This would speak for greater adaptational problems in the middle-aged as opposed to the young old and old, who might be better prepared for the situation. On the other hand, the particular stressors at hand have an impact on peoples' lives beyond their degree of normativity. Vision impairment as well as the conjoint occurrence of chronic illnesses and the resulting functional impairments are associated with functional disabilities in everyday life, or at least make the pursuit of daily activities more difficult (see 2.4.3). Again, in midlife, these difficulties might interfere with work and the pursuit of social activities that in this age group are generally expected to *not* be restricted. In contrast, for young old and old people, it is more normative to disengage from certain obligations and focus their energies on selected domains of interest, which are most likely the ones that they experience few difficulties in. These arguments would speak for greater difficulties in work, social and leisure activities in the middle-aged.

On the other hand, the social and biological resource status and reserve capacities are assumed to be greater in middle-aged and in young old individuals than in the old (e.g., they have larger social networks, and better sensori-motor functions). This speaks for a higher potential for compensation of health problems and their impact on the pursuit of basic everyday activities that require adequate motor skills and sensory functioning in the middle-aged and in young old. Restrictions in reserve capacity in the oldest patients are expected to become especially salient after surgery, since the process of adaptation to visual changes – that are not as high as in the younger groups (see 2.7.3) – is assumed to be more difficult.

Concurrent Associations:

- Prior to surgery, middle-aged adults report poorer adaptation than young old and old adults in the following domains: Well-being, depressive symptoms, subjective impairment through vision problems, and average difficulty in activities other than ADL/IADL.
- At all measurement occasions, old adults report a higher level of difficulty with ADL/IADL activities and a more restricted activity range than young old and middle-aged adults.

Pre-to Post- Surgical Changes in Cognitive-Emotional and Functional Adaptation:

- Both at one and six weeks after surgery, well-being is higher and depressive symptoms are lower than prior to surgery.
- The positive changes in cognitive-emotional adaptation after surgery do not differ between age groups.
- Middle-aged, but not young old and old adults experience a significant reduction in average difficulty with activities other than ADL/IADL from one to six weeks after surgery.
- All age groups experience a significant decrease in subjective impairment through vision problems after one and six weeks. This reduction in subjective impairment is highest for the middle-aged adults.
- Old adults, but not young old and middle-aged adults report a experience a temporary increase in ADL/IADL difficulty one week after surgery.

II Pre-and Post-Surgical Adaptation: Main Effects, Moderators, and Mediators

3.5. Correlates of Cognitive-Emotional and Functional Adaptation

Based on previous findings and theoretical considerations (see 2.5 and 2.6), it is expected that the selected personal as well as social resources and goal-regulation strategies are associated with cognitive-emotional indicators of adaptation (well-being and depressive symptoms) *above and beyond* patients` visual acuity and health status. Since the resources and strategies have been shown to share common variance (see 2.5 and 2.6), it is of special interest here to exploratively assess their *independent* contributions to the criteria, when controlling for vision and health.

- The following resources and strategies are positively associated with well-being, and negatively associated with depressive symptoms at all occasions: tenacious goal pursuit, flexible goal adjustment, optimism, general self-efficacy, belief in powerful others, perceived availability of support, and having a partner.
- These associations remain significant after controlling for health and vision indicators.

For life investment, no specific predictions are made. Furthermore, no assumptions about main effects of resources and goal-regulation on activity difficulties are formulated. Associations with activity range are analyzed exploratively for all resources and goal-regulation strategies.

3.6. Moderators in the Adaptational Process prior to Surgery

3.6.1. Age

Based on the assumption that vision problems and multimorbidity are non-normative events in midlife, the following is predicted:

- Multimorbidity and visual acuity are more strongly associated with well-being and depressive symptoms in middle-aged as opposed to young old and old adults.

Following the notion that self-regulatory skills might be especially important for successful adaptation when the encountered stressors are non-normative (Wrosch & Freund, 2001, see 2.3), the following is predicted:

- Flexibility in goal adjustment is more strongly associated with well-being and depressive symptoms in middle-aged as opposed to young old and old adults.

The absence of a partner is assumed to be another non-normative situation in midlife, but not in the young old and old adults. Thus, the following is expected:

- Partner status is more strongly associated with well-being and depressive symptoms in middle-aged as opposed to young old and old adults.

3.6.2. Severity of Health Constraints: Buffering Effects of Resources and Self-Regulation Strategies

The following hypotheses are based on the assumption that – on a mean level – moderate to severe visual impairment as well as high multimorbidity set the individual at higher risk for

poorer cognitive-emotional and functional adaptation than lower levels of vision impairment and multimorbidity (see 3.1).

It is assumed that 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 associations between psychosocial resources and cognitive-emotional adaptation should be stronger than in patients with less severe health constraints (see 2.5). Furthermore, buffering effects of generalized expectations and social support indicators are expected for activity difficulties. In addition, being *selective* in pursuing goals and activities, as defined by (1) a high number of life domains with low or very low investment, and (2) a lower range of activities, is assumed to be a protective mechanism under moderate to severe health constraints (low visual acuity and high multimorbidity), but not when vision impairment is weak and multimorbidity low (see 2.6).

- The role of the resources in the adaptational process is moderated by the severity of health constraints.
  a) associations between the personal and social resources and well-being / depressive symptoms are significantly stronger when visual acuity is low, or multimorbidity is high.
  b) generalized expectations and social resources are associated with less activity difficulties *only* when visual acuity is low, or multimorbidity is high.

3.6.3. Duration of Vision Problems

Another moderating factor in the process of adjustment to vision impairment might be the *duration* of the impairment. Given that both behavioral and cognitive adjustment processes require time and experience, this is likely a crucial variable for overt interindividual differences. Moreover, the impact of personal and social resources and self-regulation strategies on adaptation might differ depending on the stage of a chronic condition (e.g., new onset, directly after a diagnosis, or month into a disease process; cf. Auerbach, 1989; Filipp, 1990). In the adaptation to vision impairment due to cataract, this has not been studied so far. For cataract, as for most eye conditions, there are no objective criteria to define its onset. The *subjective* experience of impairment is assumed to be based on both objective visual acuity, and the degree to which functional limitations are experienced in everyday life. A longer duration of vision problems in cataract patients might reflect individual differences in the threshold for seeking professional eye care, but also be a function of different attitudes in the

primary care providers, both of which is not assessed here. In the present study, the duration of subjective vision impairment is assessed to explore the following questions:

- Is a longer duration of subjective vision impairment associated with poorer adaptation (as indicated by higher levels of current subjective vision impairment and perceived difficulty with activities, more depressive symptoms, and less well-being)?
- Does the duration of vision problems moderate the associations between individual characteristics (resources and dispositional coping strategies), and criteria of adaptation?

3.7. ADL/IADL Difficulty as a Mediator in the Relation between Objective Health and Vision and Well-Being

In line with other research on the impact of chronic health stressors (e.g., Williamson, 1998, see 2.4.3), the following hypothesis is formulated:

- At all measurement occasions, the associations between multimorbidity and well-being, and visual acuity and well-being, are at least partly mediated by the concurrent subjective experience of difficulty with ADL/IADL and other activities.

A mediating status is assumed for both ADL/IADL difficulty and average difficulty with other activities, as impairment in both domains is assumed to threaten either the pursuit of an autonomous lifestyle or important personal goals, or both. These mediator hypotheses are tested for well-being as a criterion only. Depressive symptoms are assumed to have a more complex, reciprocal, association with activity difficulties, which cannot be disentangled in this particular study setting.

3.8. Correlates of Change in the Criteria of Adaptation

The next set of hypotheses deals with the question of how the pre-surgical resource status as well as changes in visual acuity due to cataract surgery are associated with post-surgical adaptation. Here, the focus is on pre-to post-surgical *changes* in the cognitive-emotional and functional criteria.

3.8.1. Post-Surgical Change in Visual Acuity: A Resource Gain with Consequences for Well-Being and Depressive Symptoms?

Health and sensory functioning can be considered as highly valued resources in people's lives (see 2.3 and 2.5.3). The present study setting is characterized by previous losses in these domains (as indicated by multimorbidity and vision impairment prior to surgery), but also a *gain* situation (improvement in visual acuity after cataract surgery). It is predicted that this gain has positive consequences for cognitive-emotional adaptation after surgery. More specifically, it is assumed that gain in visual acuity is linearly associated with increases in well-being and decreases in depressive symptoms, because the pre-post *difference* in visual acuity is more important for the cognitive evaluation of *gain* than the actual visual acuity status. In other words, a patient with very low initial acuity and high changes (not necessarily full restoration of vision) should benefit more in terms of well-being and depressive symptoms than a person with high initial visual acuity and less subsequent change.

- Beyond patients' multimorbidity and concurrent visual acuity, the amount of *change in visual acuity* through surgery is positively associated with post-surgical well-being, and negatively with depressive symptoms.

3.8.2. Pre-Surgical Resources and Goal-Regulation Strategies and Post-Surgical Adaptation

- The following pre-surgical personal and social resources are associated with positive changes in well-being and negative changes in depressive symptoms (from pre- to post-surgery): tenacious goal pursuit, flexible goal adjustment, optimism, general self-efficacy, belief in powerful others, perceived availability of support, and having a partner.
- These associations remain significant after controlling for multimorbidity, concurrent visual acuity, and change in vision.

Again, here, the *independent* contributions of the resources and strategies are explored when jointly considering them in the prediction of the criteria.

It is assumed that even in patients whose vision is fully restored after cataract surgery, these changes are not immediately associated with best subjective vision in everyday life, but require some adaptational process. Thus, person characteristics are assumed to make a

difference in the changes in activity difficulties that patients report. Specifically, the following is predicted:

- The following pre-surgical personal and social resources are associated with negative changes in activity difficulties (from pre- to post-surgery): flexible goal adjustment, optimism, general self-efficacy, belief in powerful others, perceived availability of support, and having a partner.

3.9. Moderators in the Process of Post-Surgical Adaptation

3.9.1. Age

Age is assumed to function as a moderator in post-surgical adaptation in two ways. With respect to associations between changes in visual acuity and cognitive-emotional adaptation, it is 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. This is again based on the assumption that vision problems in midlife are non-normative events (see 2.3). In contrast, all age groups should experience the same increase in well-being and decrease in depressive symptoms when change in visual acuity is high.

- Middle-aged patients have more problems (a higher decrease in well-being and higher increase in depressive symptoms) in adapting to no or low changes in visual acuity than young old and old adults.

Secondly, age is assumed to moderate the associations between multimorbidity and functional adaptation. Here, the assumption is that in old age, reserve capacities for functional adaptation are very low. Changes in vision after cataract surgery are assumed to represent a new challenge for pursuing everyday activities. When multimorbidity is present, functional difficulties are assumed to accumulate. Hence, the following is predicted:

- In old adults, but not in middle-aged and young old adults, multimorbidity is associated with an *increase in activity difficulty* across occasions.

3.9.2. Multimorbidity

It has been hypothesized that a gain in resources (such as visual acuity in this context) might be especially salient and thus be beneficial for cognitive-emotional adaptation when the general resource situation is poor (see 2.5.3).

- Patients with high multimorbidity and positive changes in visual acuity experience higher levels of positive changes in well-being and negative changes in depressive symptoms than patients with low multimorbidity and positive changes in visual acuity.

III A PERSON-CENTERED APPROACH TO RESILIENCE

It has been hypothesized that the personal and social resources and dispositional coping strategies are positively associated with more positive cognitive-emotional adaptation, and that the protective functions of these factors are especially pronounced in individuals who face high levels of health stress and vision impairment (see 3.5 and 3.6.2). This means that resilient individuals (those with high multimorbidity and vision impairment who at the same time report *high* levels of well-being) are expected to have higher levels of resources and accommodative and assimilative coping tendencies as opposed to non-resilient individuals (those with high multimorbidity and vision impairment who at the same time report *low* levels of well-being). Also, it means that in individuals showing "normal" adaptation (i.e., those with high well-being and low multimorbidity and vision impairment), the resources and self-regulation strategies are expected to explain less variance in the criteria of adaptation than in the resilient individuals. However, it does not mean that the latter two groups *differ* in the level of their resources and strategies. As has been explicated in 2.1.5, this is a different research question. Taking on a developmental perspective, it was argued that having to deal with chronic stress (as in this case multimorbidity and vision impairment) could be associated with shifts in coping styles, and other self-regulation strategies. Indirect evidence for this notion comes from studies showing age-related shifts towards more accommodative goal-regulation (see Brandtstaedter, 1992), and increases in the use of goal selectivity (Freund & Baltes, 2002). In so far as age is seen as a *proxy* for decline and losses across several domains of functioning, it can be argued that these might be the triggers for such shifts in self-regulatory mechanisms. However, in this study a more direct approach is attempted by cross-sectionally comparing high-risk individuals with good adaptation to those under low risk.

In the case of situational coping strategies, it has been suggested that individuals are most likely to engage in *emotion-focused strategies* when important resources are depleted (Hobfoll, Freedy, Green, & Solomon, 1996). Moreover, these strategies are assumed to be associated with more positive adjustment in response to events that are perceived as unchangeable and beyond personal control (Weisz et al., 1994). This points to the possibility that in the daily encounter with stress through multiple chronic diseases and vision impairment (e.g., pain, activity difficulties, having to rely on others for basic and extended everyday tasks), which has little control potential, a shift towards more emotion-focused strategies in dealing with stressors in general might occur, which is not observed when there is little or no chronic stress.

With respect to personal and social resources, evidence for age-related changes is rather mixed, and it is not yet clear whether resilience in adulthood is associated with changes in these (e.g., higher optimism, stronger beliefs in the benefit of delegating control to others, or the establishment of high functioning social networks). In sum, the following is predicted:

- In comparison to those patients with positive adaptation under low health stress and vision impairment ("normal" group), patients with positive adaptation facing high multimorbidity and vision impairment ("resilient" group) report a higher level of flexibility in adjusting their goals, and a higher level of selectivity in life investment and activity range.
- In comparison to the "normal" group, patients in the "resilient" group report a higher level of positive reframing and acceptance in dealing with cataract surgery.

Furthermore, it is explored whether resilient individuals report a higher level of personal and social resources than patients with good adaptation under low health stress.