Social Indicators Research (2005) 74: 159–189
DOI 10.1007/s11205-005-6522-3

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VISUAL CAPACITY, OUT-OF-HOME ACTIVITIES AND EMOTIONAL WELL-BEING IN OLD AGE: BASIC RELATIONS AND CONTEXTUAL VARIATION

ABSTRACT. This work examined the role of visual capacity in connection with psychological, social network related, and socio-structural predictors of out-of-home everyday functioning and emotional well-being. The results are based on a sample of 1519 community dwelling elderly (55–98 years; mean age 70.8 years), 757 of them were living in urban, and 762 were living in rural regions, half-and-half from East and West Germany. Structural equation modeling supported the hypothesis of robust relations among age, vision, intellectual functioning, out-of-home everyday functioning, and emotional well-being that are largely independent of the regional and societal macro context. In detail, vision mediated the effect of age on out-of-home activities of daily living (ADL/IADL) and leisure activities, while intellectual functioning mediated the effect of vision on out-of-home leisure activities. All effects on emotional well-being were mediated by out-of-home leisure activities. Enriching the micro level model with psycho-social variables (i.e., outdoor motivation and social resources) and an indication of the socio-economic situation (i.e., financial resources) revealed some contextual variations: At this meso level of analysis, social resources contributed less and outdoor motivation contributed more to out-of-home leisure activities in the urban than in the rural sample. Second, outdoor motivation was significantly related to social resources in the urban, but not in the rural sample. Third, financial resources contributed modestly but significantly to out-of-home leisure activities in the East German, but not in the West German urban and rural samples. It is concluded that visual capacity plays a substantial role in a robust micro level model able to predict everyday functioning and well-being. If additional resources adding to the prediction of these outcomes are also taken into consideration in a meso level analysis model, the whole variable interplay becomes more strongly affected by macro contextual variation.

This work contributes to research on the role of visual capacity and various other resources for major ageing outcomes, primarily out-of-home everyday functioning but also emotional well-being. Out-of-home activities will be focussed because they are fundamental for maintaining an independent lifestyle and, in a sense, also for social participation in societies at large. Out-of-home activities can be also regarded as a prerequisite for quality of life (e.g., Farquhar, 1995). Moreover, out-of-home activities depend highly on a functioning visual system. It is worth mentioning in this context that visual decline is a common condition in the older population. Epidemiological data show that about 20% of those 65 years and older and about 25% of those 75 years and older suffer from severe vision loss (e.g., Lighthouse Research Institute, 1995). An essential question here is to what extent and by which means the risk of losing autonomy in private and public life might be counteracted in the case of declining visual functioning. This challenge presumes however detailed and evidence-based knowledge on the network of resources important to maintain the highest possible autonomy and well-being as people age and suffer from various age-related chronic losses including vision impairment. Seen within a broadly framed perspective such as Sen's approach (e.g., Sen, 1999), the issue of how a person's capabilities or freedom to achieve appreciated states of being and doing (e.g., performing chosen out-of-home activities) might be maintained in the light of a declining capacity becomes central to the paper. More specific, we ask in this research to what extent psychological, social and economic resources are able to contribute to a better understanding of out-of-home activities and emotional well-being and what impact the remaining (or lost) visual functioning has in this complex interplay of resources.

As done in our earlier work (Wahl et al., 2002), we will distinguish between obligatory or basic out-of-home activities such as climbing stairs or doing shopping and more discretionary or optional out-of-home activities such as going to a café. This distinction refers to the concept of Activities of Daily Living (ADL/IADL) that comprises basic (ADL; e.g., eating) and more complex (IADL; e.g., preparing a meal)

day-to-day activities necessary for maintaining a basic level of autonomy (Lawton and Brody, 1969) as opposed to the concept of leisure and lifestyle activities. A similar distinction has been made in a model of everyday competence by M. Baltes and co-workers (Baltes et al., 1993a,b, 1999; Marsiske et al., 1997) by using the terms basic and expanded competencies (BaCo and ExCo). Also, this accords well with Sen's (1999) recommendation to look at capabilities in terms of basic vs. higher-order needs.

RESEARCH BACKGROUND

Empirical research on visual impairment has consistently shown that low vision is significantly related to lowered ADL/IADL functioning and limited mobility (e.g., Marron and Bailey, 1982; Horowitz, 1994; Rubin et al., 1994; Ramrattan et al., 2001; Wahl et al., 1999a, b; for a recent review of this research see also Burmedi et al., 2002a, b). Furthermore, a number of studies supports the notion that low vision is related to a reduction in leisure activities such as visiting friends or simply going out for a stroll (e.g., Wahl et al. 1999a; Heyl and Wahl, 2001; Ramrattan et al., 2001). In addition, Marsiske et al. (1997) found in one of their analyses that all of the age-related variance in BaCo and ExCo was explained by sensory variables, suggesting that visual and auditory acuity may serve as indicators of general ageing phenomena (e.g., Lindenberger and Baltes, 1994). Finally, the results of a substantial number of studies show that low vision is significantly related to lowered well-being (e.g., Gillman et al., 1986; Wahl et al., 1999a; Bazargan et al., 2001).

It is important to note that most of this research has focussed on the direct relationships between vision, everyday functioning and well-being, that is, the consideration of potentially mediating psychological, psycho-social, and socio-structural variables has mostly been neglected. However, there are at least two exceptions to this rule. First, in accordance with predictions derived from the everyday competence model by Baltes et al. (1999), the study by Marsiske et al. (1997) revealed that

sensorimotor variables such as vision and balance were relatively more important for the prediction of BaCo, while psychological variables such as cognitive performance and depression were more critical for the prediction of ExCo. Moreover, a strong connection between vision and intelligence emerged, as has been found in other studies on sensory and cognitive development (Lindenberger and Baltes, 1994).

Second, in the context of a multi-dimensional model considering age, socioeconomic status, sensorimotor and psychological variables, Wahl et al. (2002) found that vision was directly related to out-of-home ADL/IADL, while the relationship between vision and out-of-home leisure activities was mediated by outdoor motivation, a variable newly introduced in this research. Moreover, the connection between vision and well-being turned out to be indirect, mediated by outdoor motivation, motility, and out-of-home activities. Wahl et al.'s (2002) study was limited, however, because all participants lived in rural regions. In addition, important variables such as intellectual functioning and social resources were not available in the data set.

To sum up, there are three shortcomings in the existing literature that will be addressed in the present paper: (1) Work on age-related visual impairment has to consider psychological resources such as intellectual functioning that are likely mediators of the relationship between vision and outcomes such as everyday functioning. (2) Work on age-related visual impairment demands enrichment by psychological variables such as outdoor motivation as well as socio-structural variables such as financial resources in order to achieve a more comprehensive perspective on autonomy and well-being. (3) Work on age-related visual impairment has tended to neglect the large-scale socio-environmental context (e.g., urban vs. rural regions) in which important resources of everyday functioning and well-being do operate.

Research Questions, Levels of Analysis, and Hypotheses

Against what has been concluded with respect to the state of art of vision and quality of life literature concerning old age,

the present study is driven by two fundamental research questions: (1) Are there robust basic relations among age, vision, intellectual functioning, out-of-home everyday functioning, and emotional well-being that are mostly independent of large-scale environmental variations? (2) What kind of differentiation comes into play when such basic mechanisms are framed within a broader psycho-socio-economic perspective? Both questions will be investigated by drawing from a comparison of urban vs. rural regions and by including an additional differentiation in terms of two formerly different societies unified since 1990 (East and West Germany).

Corresponding to the three research shortcomings mentioned above, we have chosen three levels of analysis representing different constraints and opportunities: *Level I of constraints and opportunities related to everyday functioning and well-being (micro level)*: At this level vision will be considered only against one additional constraint/opportunity, i.e., intellectual functioning. *Level II of constraints and opportunities related to everyday functioning and well-being (meso level)*: At this level psycho-socio-economic resources (outdoor motivation, social and financial resources) will be additionally considered. *Level III of constraints and opportunities related to everyday functioning and well-being (macro level)*: This level focuses on the role of different regional contexts, i.e., urban vs. rural regions, for everyday functioning and well-being of the elderly. Hence, in all of the analyses at levels I and II, we will contrast participants from urban and rural regions because urban and rural regions provide different socio-structural conditions for older adults which may impact on autonomy and well-being (e.g., Golant, 2004, for a recent review). Additionally, a distinction will be made by contrasting participants from East and West Germany. Because of different traditions and living conditions that were operative for decades in East and West Germany and partially still are (Mollenkopf et al., in press), from a large-scale socio-environmental perspective, constraints and opportunities related to societal affiliation should be also important for everyday functioning and well-being.

The following hypotheses will be investigated by combining research questions and levels of analysis: In our first hypothesis we refer to basic mechanisms at the micro level against the background of the macro level (Levels I and III): (a) Based on the consistent finding of a strong connection between age, vision, and intellectual functioning in the existing literature, basic and similar links are assumed between age, vision, intellectual functioning, out-of-home everyday functioning, and well-being in both regions as well as East and West Germany. (b) In detail, it is expected that vision mediates the effect of age on out-of-home ADL/IADL and leisure activities, that (c) intellectual functioning mediates the effect of vision on out-of-home leisure activities, and that (d) all effects on emotional well-being are mediated by out-of-home leisure activities.

In our second hypothesis we refer to contextual variations at the meso level against the background of the macro level (Levels II and III): (a) Since psychological variables have turned out to be more important for leisure activities than for ADL/IADL (Marsiske et al., 1997; Wahl et al., 2002), it is expected that psycho-socio-economic variables such as outdoor motivation and social and financial resources impact on out-of-home leisure activities, while out-of-home ADL/IADL should depend largely on vision. (b) As in our earlier work (Wahl et al., 2002), it is assumed that financial resources contribute to vision and outdoor motivation. (c) Moreover, it is expected that outdoor motivation is related to social resources. (d) It is also expected that psycho-socio-economic resources impact differently on out-of-home leisure activities in urban vs. rural contexts. (e) It will be explored whether further differentiation by societal affiliation (East vs. West Germany) reveals additional effects. (f) Also, while it is assumed that the most basic relations between age, vision, and intellectual functioning as shown in Figure 1 remain unchanged, it will be explored whether the other connections from the micro level model (particularly the connections between out-of-home ADL/IADL and out-of-home leisure activities and between intellectual functioning and out-of-home leisure activities) are altered by the inclusion of psycho-socio-economic resources at the meso level of analysis.

METHOD

Sample

This study is based on the German sub-sample (n = 1519) of the project MOBILATE (Mollenkopf et al., in press) that included a total of 3950 community dwelling individuals, disproportionately stratified by age (55–74 and 75+ years) and gender, and additionally differentiated according to region (urban and rural) and country (Finland, East Germany, West Germany, Hungary, Italy, and the Netherlands). Older individuals and men were over-sampled in order to achieve comparable data strength in younger and older age groups as well as in men and women. The German sub-samples in the urban areas of Chemnitz (East Germany, n = 389) and Mannheim (West Germany, n = 368) were drawn from the population registers of the Municipality Registration Offices. Subjects in the rural regions were identified in a random route procedure in villages with less than 5000 inhabitants. In the East German rural region (district of Jerichow), interviews were conducted in 58 different villages; in the West German rural region (district of Vogelsberg), individuals from 39 different villages were interviewed. Data-collection was conducted by a commercial research institute (USUMA, Berlin) after their interviewers had received an intensive training in data-collection skills provided by the MOBILATE research team. From the contacted eligible individuals (n = 2648), about 57% were actually interviewed. Since collecting data from those refusing to participate is prohibited by the German law, no hard data on selective sampling are available. The main subjectively given reasons for not participating in the study were (a) refusal of the interview, (b) problems in arranging an interview due to time constraints, and (c) problems in reaching the participants. Only about 4.4% of those living in rural regions and about 5.9% of those living in urban regions refused to participate because of health problems. This is a very low rate in surveys of older adults. Therefore, there is some reason to believe that the sample comprises also individuals with health problems, i.e., it should not be strongly biased towards very healthy respondents.

Table I provides a detailed sample description in terms of basic demographic variables.

A series of analyses of variance were run, contrasting participants from East German urban, East German rural, West German urban and West German rural regions. Years of education were significantly different between groups. Specifically, participants from urban regions were generally more educated than their counterparts. There were also significant differences in income between participants from urban and rural regions and this applied to East as well as West Germany. The highest income-per-head was reported in the West German urban region and differed significantly from that in the East German urban region. There were no significant differences between the rural regions in East and West Germany. Regarding marital status, the chi-square statistic indicates different frequency distributions among the groups. Most notably, compared to the other regions, in the West German urban region less participants were married, while more participants were widowed.

Measures

Data was collected by employing a comprehensive survey questionnaire consisting of objective screening tools, self-rating scales, standardized measures, and a diary measure to document all trips that were made during two days (Mollenkopf et al., in press). In the following, only those measures relevant for the present study are described in further detail.

Vision. Two indicators of visual functioning were assessed. Visual acuity was screened by using charts with "Pflüger-Haken" (E-shaped symbols) of various size (Sachsenweger, 1987; see also Reim, 1989) located at a standard distance of 1 m. The subject's task was to identify the open side of the E-shaped symbol. Both eyes were examined simultaneously under optimal light conditions, using the best correction available. This measure provides a quick screening of visual acuity ranging from 1.0 indicating normal (20/20) vision to 0.02 (20/1000) or less (functional blindness according to criteria of the German Ophthalmological Society). In our other studies (e.g., Wahl, 2004, unpublished

TABLE I

Sample description

Variable: M (SD)	East Germany		West Germany	
	Urban region (n = 389)	Rural region (n = 379)	Urban region (n = 368)	Rural region (n = 383)
Age	70.5 (9.6)	70.6 (8.4)	71.2 (9.0)	71.0 (8.8)
Years of education	12.5_A (2.9)	10.7_B (2.6)	11.6_C (2.7)	9.9_D (2.5)
Income-per-head[a]	932.6_A (253.8)	725.2_B (216.5)	1006.3_C (455.9)	769.1_B (307.2)
Marital Status				
Married	64.3%	65.4%	52.7%	60.1%
Widowed	27.5%	28.0%	37.0%	35.0%
Divorced	3.6%	4.2%	5.2%	2.4%
Never married	4.6%	2.4%	5.2%	2.6%

Note: Different subscripts indicate different means at the 0.05 level.
[a]Total of N = 1287 due to missing values; 100 DM equal approximately \$50.

data) this screening was highly correlated with other standard measures of visual acuity such as standardized letter charts used in clinical settings (about $r = 0.70$). In addition to objective visual acuity, subjective visual functioning was assessed by a self-evaluation rating based on a 5-point Likert-type scale ranging from ''very poor'' to ''very good''.

Intellectual functioning. Intellectual functioning was assessed by the digit–symbol-substitution test (Oswald and Fleischmann, 1995), which is generally regarded as a quite robust measure of speed of information processing. In this test, the subject's task is to complete a row of numbers with symbols that have been assigned to the respective numbers in an illustrative instruction. Time is constrained to 90 seconds. The test score is the number of correctly entered symbols (maximum 67).

Outdoor motivation. In our previous study, the motivation to go outside (indicated by the importance of being out-of-home and a self-assessment in terms of being an indoor/outdoor type of person) turned out to be an important predictor of out-of-home leisure activities (Wahl et al., 2002). Importance of being out-of-home was measured by a self-evaluation rating based on an 11-point Likert-type scale ranging from ''not important at all'' to ''very important''. Assessment of indoor/outdoor type was based on the question: ''What type of person are you? Are you a person who prefers to be at home or a person who prefers to be on the go?''. Participants had to evaluate themselves on an 11-point Likert-type scale ranging from ''If I had my choice, I'd always stay at home'' to ''If I had my choice, I'd always be on the go''.

Social resources. Three measures served as indicators of social resources. First, variety of out-of-home social network was assessed by asking about persons who are particularly important for emotional and personal reasons and who do not live in the respondent's household. After recording the two most important persons separately and in further detail, respondents were shown a list mentioning for example good friend, brother, sister and other possibly important persons and were asked

which persons out of this list are important to them. The number of important persons was summed up. Second, face-to-face contact frequency with the two most important persons was assessed separately for each important person. The answer possibilities were 1 = ''daily'', 2 = ''at least once a week'', 3 = ''once to three times a month'' and 4 = ''less than once a month''. Total face-to-face contact frequency with most important person(s) was aggregated by assigning values from 14 (respondent has two most important persons and daily face-to-face contact with both persons) to 0 (respondent has no important person at all) to all of the possible combinations resulting from the number of most important persons (0, 1 or 2) and face-to-face contact frequency (1–4). Third, in an analogous manner, total telephone contact frequency with most important person(s) was assessed from 0 to 14.

Financial resources. Financial resources were assessed in terms of income-per-head. The respondents were asked to indicate their household net income category. By dividing the center of this non-metric information by the number of household members, a pseudo-metric scale was generated.

Out-of-home ADL/IADL. Participants were asked to rate their ability to perform 5 ADLs (bending down, climbing stairs, going outdoors, carrying heavy bags or luggage, walking at least 2 km) and 1 IADL (shopping). The answer categories were 0 = ''unable to perform'', 1 = ''able to perform with difficulty'', and 2 = ''able to perform without difficulty''. The internal consistency (Cronbach's alpha) of this scale amounted to 0.93 in this study. As done in the work of Marsiske et al. (1997) and in our previous work (Wahl et al., 2002), items were ranked by difficulty and were then divided into two odd-even split halves (ADL/IADL 1 and ADL/IADL 2). This was done to obtain two equivalent indicators for the respective latent construct in the structural equation models reported later.

Out-of-home leisure activities. Participants were asked whether they take part in any of 18 leisure activities that usually are pursued outside the home (e.g., going to a café, restaurant or bar,

dancing, bowling). A ''Yes/No'' format was used to indicate participation in an activity, resulting in a sum score ranging from 0 to 18. The internal consistency (Cronbach's alpha) of this scale amounted to 0.68 in this study. In order to obtain two equivalent indicators for out-of-home leisure activities at the latent level, items were ranked by difficulty and were then divided into two odd–even split halves (leisure 1 and leisure 2).

Emotional well-being. Emotional well-being was assessed by the positive affect schedule from the Positive Affect Negative Affect Schedules (PANAS; Watson et al., 1988). The positive affect schedule consists of 10 positive emotion adjectives (e.g., interested, active, inspired). Participants were asked to indicate on a 5-point scale, ranging from 1 = ''very often'' to 5 = ''not at all'', how frequently they had experienced each emotion during the past year. The internal consistency (Cronbach's alpha) of this scale amounted to 0.91 in this study. For the structural equation analyses reported later, items were ranked by difficulty. Afterwards, they were divided into two odd-even split halves (positive affect 1 and positive affect 2).

Statistical Analyses

To test our hypotheses, we used structural equation modeling techniques. Model fit was assessed by the following statistics: χ^2 value with its associated degrees of freedom and probability of error, root mean squared error of approximation (RMSEA), Tucker–Lewis index (TLI), and comparative fit index (CFI). However, since χ^2 testing of model fit might be too sensitive (i.e., rejection of models that actually fit well) when the sample size is large (as in our study), fit evaluation was primarily based on RMSEA, TLI, and CFI (Browne and Cudeck, 1993; Hoyle and Panter, 1995). As a general rule, for a model to be evaluated as having a good fit, RMSEA should be ≤ 0.05, and TLI and CFI should be at least 0.95. A strategy of nested model comparisons was applied to choose among differentially restricted models. In pairwise comparisons the

more restricted (i.e., the more parsimonious) model was accepted when the model fit was not substantially reduced. Decisions were *not* based on the classical χ^2 difference test (e.g., Bollen, 1989), since it is associated with the same problems as the χ^2 testing of model fit (i.e., rejection of restrictions that virtually do not reduce model fit substantially). Rather, we accepted the more restricted model when the differences between the respective TLI, CFI and RMSEA values of the compared models were below 0.01 and the RMSEA 90% confidence intervals of the models did overlap (Schilling, 2004).

As rather common in empirical research, the income-per-head variable contained a substantial amount of missing data (15.3%), resulting in $N = 1287$ (see again Table I). Therefore, we used full information maximum likelihood estimation available in the AMOS 4 statistical program package (FIML; Arbuckle, 1996; Arbuckle and Wothke, 1999) which permits observations with partially missing data to remain in the data set.

RESULTS

Regional and Societal Differences at the Descriptive Level

Prior to the actual hypotheses testing, we examined mean level differences between the four subgroups that result from the differentiation by region and societal affiliation in all of the variables that will be used as indicators in the latent variable analyses. Table II shows the results of the analyses of variance.

There were no significant differences between the subgroups regarding visual acuity, subjective visual functioning, and out-of-home ADL/IADL. Regarding intellectual functioning, participants from the West German rural region scored significantly lower in the digit–symbol-substitution test than all of the other subgroups. This result corresponds to the fact that these individuals were also the least educated in terms of years of education (see again Table I). Outdoor motivation in terms of importance of being out-of-home and

indoor/outdoor type was higher in the East than in the West German subgroups and highest among participants from the East German rural region. Individuals from the West German urban region reported the slightest variety of out-of-home social network, but also the highest telephone contact frequency with most important person(s). Regarding face-to-face contact frequency with most important person(s), the rural subgroups had significantly more face-to-face contact than the urban subgroups. This might indicate that in rural regions visiting or meeting social partners is easier than in urban regions, presumably because of closer living distances. The West German subgroups were significantly more active in terms of out-of-home leisure activities than the East German subgroups, presumably because leisure activities are still more common and/or easier to afford in West Germany. Finally, participants from the East German urban region reported a significantly higher emotional well-being in terms of positive affect than all of the other subgroups, while participants from the West German rural region reported the least positive affect.

Model-Testing Results

Measurement model. The correlation matrices of all observed indicators used in the models are provided in Table IIIa, b. Generally, coefficients of 0.10 and above were statistically significant at the 0.05 level.

To test measurement model invariance across subgroups, an initial measurement model comprising the constructs of vision, outdoor motivation, social resources, out-of-home ADL/IADL, out-of-home leisure activities, and emotional well-being, and the observed variables age, financial resources, and intellectual functioning was simultaneously estimated for all of the subgroups (East German urban and rural regions, West German urban and rural regions) in a four-group model. This model specified unconstrained correlations among all of the latent constructs, age, financial resources, and intellectual functioning, but the measurement residuals and the unstandardized measurement weights

TABLE II

Descriptive results

Variable: M (SD)	East Germany		West Germany	
	Urban region (n = 389)	Rural region (n = 379)	Urban region (n = 368)	Rural region (n = 383)
Visual acuity	0.46 (0.27)	0.50 (0.25)	0.46 (0.27)	0.49 (0.23)
Subjective visual functioning	3.6 (0.7)	3.6 (0.8)	3.6 (0.8)	3.5 (0.8)
Intellectual functioning	32.3_{A} (14.9)	32.5_{A} (14.6)	32.4_{A} (15.6)	27.5_{B} (12.6)
Importance of being out-of-home	7.2_{A} (2.5)	8.0_{B} (2.3)	6.6_{C} (2.7)	7.3_{A} (2.7)
Indoor/Outdoor type	4.9_{AB} (2.2)	5.3_{A} (2.6)	4.6_{BC} (2.2)	4.1_{C} (2.5)
Social network	3.2_{AB} (2.8)	3.4_{A} (2.7)	2.7_{B} (2.6)	3.3_{A} (2.9)
Contact frequency				
Telephone	5.8_{A} (3.9)	5.4_{AB} (3.8)	6.2_{A} (3.9)	4.8_{B} (3.7)
Face-to-face	5.8_{A} (4.0)	7.1_{B} (4.5)	5.8_{A} (4.0)	7.5_{B} (4.9)
Out-of-home ADL/IADL	9.0 (3.6)	9.4 (3.2)	8.9 (3.6)	8.9 (3.3)
Out-of-home leisure activities	3.8_{AC} (2.6)	3.5_{C} (2.2)	4.3_{AB} (3.0)	4.7_{B} (2.7)
Emotional well-being	3.4_{A} (0.6)	3.1_{B} (0.7)	3.2_{B} (0.7)	2.9_{C} (0.9)

Note: Different subscripts indicate different means at the 0.05 level. Higher scores indicate a higher characteristic value and, in the case of indoor/outdoor type, a stronger tendency to be on the go.

(factor loadings) were required to be equal across subgroups. As expected, the χ^2-statistic was significantly above zero ($\chi^2 = 885.70$, df $= 344$, $p < 0.05$). However, this model fit well in terms of the other fit indices described in the method section (RMSEA = 0.032, TLI $= 0.984$, CFI $= 0.990$). When all of the estimated parameters were allowed to vary freely across groups, the model fit changed significantly in terms of χ^2 difference testing ($\chi^2 = 599.30$, df $= 285$, $p < 0.05$), but not in terms of the other fit indices (RMSEA $= 0.027$, TLI $= 0.989$, CFI $= 0.994$). Moreover, the RMSEA 90% confidence intervals of the models did overlap. Therefore, the more restricted initial measurement model was accepted. This model indicates invariant measurement models across groups. Table IV provides the standardized factor loadings of the measurement models for all of the subgroups.

Micro level analyses as seen against the macro level. In the next step, micro level models were specified according to the first hypothesis. These models were simultaneously estimated for all of the subgroups (East German urban and rural regions, West German urban and rural regions) in four-group models. In model MICRO 1 all of the estimated parameters were allowed to vary freely across subgroups. Although the χ^2-statistic was significantly above zero ($\chi^2 = 348.41$, df $= 124$, $p < 0.05$), the model fit well in terms of RMSEA (0.035), TLI (0.990), and CFI (0.994). To test the assumption of basic and similar links between age, vision, intellectual functioning, out-of-home everyday functioning, and emotional well-being in both regions and societies, in model MICRO 2 all estimated parameters were constrained to equality across subgroups. Model MICRO 2 differed significantly from model MICRO 1 in terms of χ^2 ($\chi^2 = 633.04$, df $= 196$, $p < 0.05$), but not in terms of the other, more relevant fit indices (RMSEA $= 0.038$, TLI $= 0.987$, CFI $= 0.989$). Moreover, the RMSEA 90% confidence intervals of the models did overlap. Therefore, the more restricted model MICRO 2 was accepted (see Figure 1). This four-group model indicates equal measurement and structural models across subgroups.

TABLE IIIa

Correlations among indicators for East German urban and rural groups

Indicator	(SD_{eu}/SD_{er})	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Age	(9.59/8.39)	–	0.03	−0.35	−0.26	−0.42	−0.01	−0.07	−0.11	−0.12	−0.05	−0.40	−0.45	−0.25	−0.35	−0.23	−0.21
2. Income-per-head	(253.8/216.5)	0.17	–	0.18	0.09	0.07	0.02	0.06	0.18	0.13	0.20	0.09	0.13	0.16	0.09	0.21	0.19
3. Visual acuity	(0.27/0.25)	−0.53	−0.19	–	0.40	0.24	0.23	0.17	0.10	0.06	0.09	0.40	0.43	0.36	0.42	0.26	0.27
4. Subjective visual functioning	(0.70/0.84)	−0.23	0.02	0.26	–	0.22	0.22	0.13	0.01	0.03	0.01	0.38	0.42	0.24	0.24	0.24	0.22
5. Intellectual functioning	(14.86/14.59)	−0.27	0.17	0.17	0.25	–	0.06	−0.00	0.01	0.04	0.02	0.28	0.28	0.31	0.36	0.31	0.34
6. Importance of being out-of-home	(2.53/2.25)	−0.36	−0.06	0.41	0.19	0.18	–	0.44	−0.11	−0.03	−0.05	0.31	0.28	0.27	0.22	0.16	0.15
7. Indoor/ Outdoor type	(2.23/2.60)	−0.25	0.02	0.09	0.13	0.15	0.31	–	0.07	0.10	0.14	0.32	0.31	0.20	0.21	0.14	0.05
8. Social network	(2.75/2.72)	−00.10	0.08	0.34	0.17	0.13	0.15	0.08	–	0.50	0.51	0.08	0.13	0.20	0.18	0.16	0.12
9. Contact frequency telephone	(3.95/3.85)	−0.10	0.01	0.24	0.13	0.19	0.23	0.06	0.60	–	0.40	0.15	0.12	0.19	0.09	0.19	0.15
10. Contact frequency face-to-face	(4.04/4.47)	0.09	0.06	0.05	0.11	0.03	0.05	0.03	0.42	0.50	–	0.04	0.03	0.06	0.06	0.10	0.06
11. ADL/IADL 1	(1.82/1.58)	−0.52	−0.06	0.36	0.35	0.26	0.43	0.18	0.08	0.18	0.01	–	0.88	0.40	0.43	0.36	0.26
12. ADL/IADL 2	(1.86/1.76)	−0.58	−0.08	0.40	0.35	0.32	0.46	0.25	0.07	0.16	−0.03	0.91	–	0.40	0.46	0.40	0.27
13. Leisure 1	(1.34/1.25)	−0.34	0.07	0.30	0.29	0.38	0.41	0.22	0.11	0.16	0.06	0.51	0.56	–	0.51	0.45	0.41
14. Leisure 2	(1.58/1.28)	−0.41	0.02	0.39	0.22	0.35	0.44	0.21	0.11	0.16	0.03	0.49	0.54	0.64	–	0.31	0.32
15. Positive affect 1	(0.69/0.73)	−0.45	0.05	0.33	0.32	0.36	0.46	0.30	0.29	0.32	0.07	0.51	0.54	0.44	0.41	–	0.76
16. Positive affect 2	(0.64/0.70)	−0.40	0.07	0.29	0.31	0.37	0.42	0.29	0.25	0.30	0.12	0.48	0.51	0.45	0.44	0.82	–

Note: SD_{eu} = standard deviation for the East German urban group; SD_{er} = standard deviation for the East German rural group; values for the East German urban group are below the diagonal; values for the East German rural group are above the diagonal.

TABLE IIIb

Correlations among indicators for West German urban and rural groups

Indicator	(SD_{wu}/SD_{wr})	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Age	(9.03/8.85)	–	−0.15	−0.39	−0.32	−0.34	−0.13	−0.22	−0.10	−0.07	0.03	−0.45	−0.47	−0.23	−0.41	−0.30	−0.27
2. Income-per-head	(455.9/307.2)	−0.03	–	0.16	0.26	0.24	0.21	0.10	−0.03	0.08	−0.08	0.14	0.12	0.07	0.27	0.04	0.03
3. Visual acuity	(0.27/0.23)	−0.37	0.22	–	0.53	0.11	0.18	0.23	09.01	0.18	−0.02	0.49	0.43	0.23	0.32	0.18	0.11
4. Subjective visual functioning	(0.79/0.85)	−0.27	0.12	0.34	–	0.38	0.22	0.28	0.11	0.16	0.02	0.56	0.53	0.36	0.41	0.39	0.37
5. Intellectual functioning	(15.64/12.62)	−0.38	−0.07	0.14	0.20	–	0.20	0.15	−0.03	−.02	−0.14	0.35	0.40	0.23	0.39	0.35	0.35
6. Importance of being out	(2.72/2.68)	−0.29	0.16	0.35	0.25	0.26	–	0.27	−0.01	0.11	0.11	0.29	0.31	0.13	0.31	0.11	0.17
7. Indoor/Outdoor type	(2.18/2.46)	−0.26	−0.01	0.14	0.12	0.17	0.51	–	0.00	0.07	0.05	0.32	0.31	0.15	0.24	0.26	0.24
8. Social network	(2.57/2.87)	−0.07	−0.05	0.10	0.11	0.12	0.22	0.12	–	0.49	0.63	0.02	0.07	0.31	0.15	0.37	0.30
9. Contact frequency telephone	(3.88/3.75)	−0.02	0.12	0.09	−0.03	0.02	0.10	0.06	0.52	–	0.47	0.12	0.11	0.23	0.17	0.25	0.23
10. Contact frequency face-to-face	(3.98/4.92)	0.07	−0.08	−0.02	0.02	0.04	0.09	0.05	0.50	0.59	–	0.01	0.03	0.17	0.05	0.22	0.19
11. ADL/IADL 1	(1.80/1.69)	−0.48	0.13	0.38	0.39	0.35	0.50	0.40	0.09	−0.00	−0.08	–	0.88	0.34	0.47	0.33	0.28
12. ADL/IADL 2	(1.86/1.72)	−0.48	0.11	0.39	0.40	0.33	0.47	0.40	0.08	−0.01	−0.07	0.91	–	0.38	0.48	0.39	0.35
13. Leisure 1	(1.56/1.62)	−0.26	0.07	0.21	0.23	0.31	0.41	0.28	0.26	0.16	0.17	0.43	0.40	–	0.49	0.52	0.47
14. Leisure 2	(1.70/1.50)	−0.37	0.12	0.30	0.28	0.38	0.51	0.40	0.27	0.16	0.10	0.50	0.46	0.65	–	0.43	0.40
15. Positive affect 1	(0.76/0.88)	−0.27	0.16	0.32	0.33	0.32	0.50	0.36	0.27	0.19	0.13	0.53	0.47	0.45	0.57	–	0.89
16. Positive affect 2	(0.74/0.91)	−0.24	0.10	0.28	0.26	0.28	0.41	0.36	0.24	0.15	0.11	0.45	0.42	0.38	0.50	0.84	–

Note: SD_{wu} = standard deviation for the West German urban group; SD_{wr} = standard deviation for the West German rural group; values for the West German urban group are below the diagonal; values for the West German rural group are above the diagonal.

TABLE IV

Standardized factor loadings of the measurement models for all subgroups

	East Germany		West Germany	
	Urban (n = 389)	Rural (n = 379)	Urban (n = 368)	Rural (n = 383)
Vision → Visual acuity	0.45	0.58	0.56	0.62
Vision → Subjective visual functioning	0.48	0.61	0.59	0.65
Outdoor motivation → Importance of being out	0.72	0.71	0.78	0.75
Outdoor motivation → Indoor/Outdoor type	0.48	0.47	0.55	0.52
Social resources → Social network	0.78	0.78	0.77	0.81
Social resources → Contact freq. telephone	0.68	0.67	0.66	0.71
Social resources → Contact freq. face-to-face	0.67	0.66	0.65	0.70
ADL/IADL_OUT → ADL/IADL 1	0.94	0.93	0.94	0.93
ADL/IADL_OUT → ADL/IADL 2	0.97	0.96	0.97	0.96
LA_OUT → Leisure 1	0.73	0.63	0.78	0.73
LA_OUT → Leisure 2	0.80	0.70	0.83	0.80
Emotional well-being → Positive affect 1	0.89	0.89	0.90	0.93
Emotional well-being → Positive affect 2	0.79	0.80	0.81	0.86

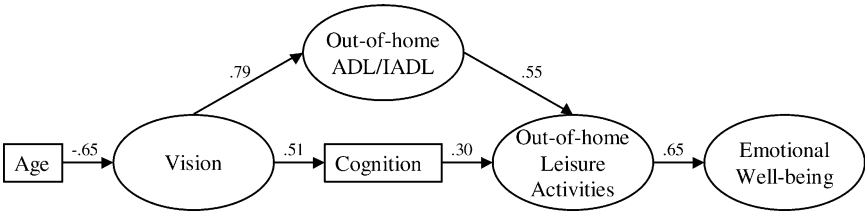

Figure 1. Empirical four-group model at the micro level of analysis (model MICRO 2) for East and West German urban and rural subgroups (restricted to absolute identity across subgroups).

Meso level analyses as seen against the macro level. Meso level models were specified according to our second hypothesis. In the first step, these models were simultaneously estimated for the urban and rural groups in two-group models. In model MESO 1 all of the estimated parameters were allowed to vary freely across groups. This model fit well in terms of RMSEA, TLI, and CFI (see Table V).

Subsequent models deleted paths on the basis of inspection of path significance. As can be seen in Table V, the most restricted model MESO 4 did not differ significantly from model MESO 1, neither in terms of χ^2 difference, nor in terms of the other fit indices. Therefore, model MESO 4 was accepted as the final two-group model at the meso level of analysis. Model MESO 4 indicates that there is no significant association between financial resources and outdoor motivation in both groups. Further, it indicates a very modest but significant negative correlation between age and financial resources in the rural but not in the urban group, and a significant link between outdoor motivation and social resources in the urban but not in the rural group. Finally, it shows that social resources contribute relatively less and outdoor motivation contributes relatively more to out-of-home leisure activities in the urban than in the rural sample. Model MESO 4 is illustrated in Figure 2.

In the second step, four-group models differentiating East German urban and rural and West German urban and rural subgroups were specified according to the second hypothesis. Again, the first model allowed for free variation of the esti-

TABLE V

Fit indices for the two-group models at the meso level of analysis

Model	χ^2	df	TLI	CFI	RMSEA
MESO 1: Hypothesized structural model	608.08*	186	0.989	0.992	0.039
MESO 2: Drop correlation between age and income in the urban group	609.39*	187	0.989	0.992	0.039
MESO 3: Drop path from income to outdoor motivation in both groups	610.03*	189	0.989	0.992	0.038
MESO 4: Drop path from outdoor motivation to social resources in the rural group	613.80*	190	0.989	0.992	0.038

*$p < 0.05$; df = degrees of freedom; TLI = Tucker-Lewis index; CFI = comparative fit index; RMSEA = root mean squared error of approximation. The hypothesized structural model is described in the text. The models do not differ from each other in terms of χ^2-difference test.

mated parameters across groups and subsequent models deleted paths on the basis of inspection of path significance. The finally accepted model (shown in Figure 3a, b) had a quite good model fit in terms of the crucial fit indices: $\chi^2 = 933.14$, df = 385, $p < 0.05$, RMSEA = 0.031, TLI = 0.986, CFI = 0.990. Compared to the four-group model at the micro level of analysis, the explained variance of out-of-home leisure activities (i.e., the construct that is directly affected by the inclusion of the psycho-socio-economic variables) increased from 0.52 to values from 0.63 up to 0.81 for the different subgroups. The final four-group model generally confirmed the results from the two-group model, but also revealed some further effects (see Figure 3a, b). First, it became apparent that age and financial resources were negatively correlated in the West German rural subgroup, but positively in the East German urban sample, and completely uncorrelated in both of the other groups. These differential relations have been already observed at the bivariate level (see again Table IIIa, b). Second, differential relations between financial resources and out-of-home leisure activities

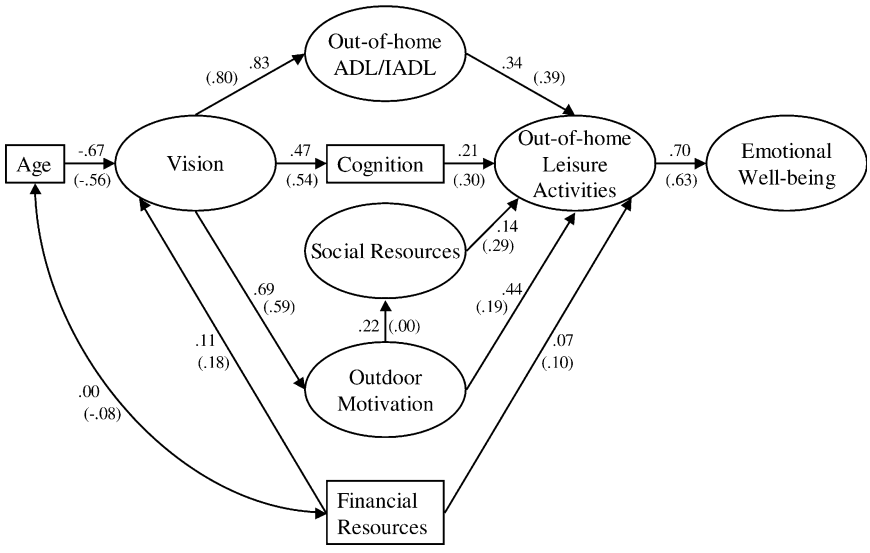

Figure 2. Empirical two-group model at the meso level of analysis (model MESO 4) for urban and rural groups. Note that the numbers in brackets refer to the rural group. For all paths and correlations that are greater than zero $p < 0.05$.

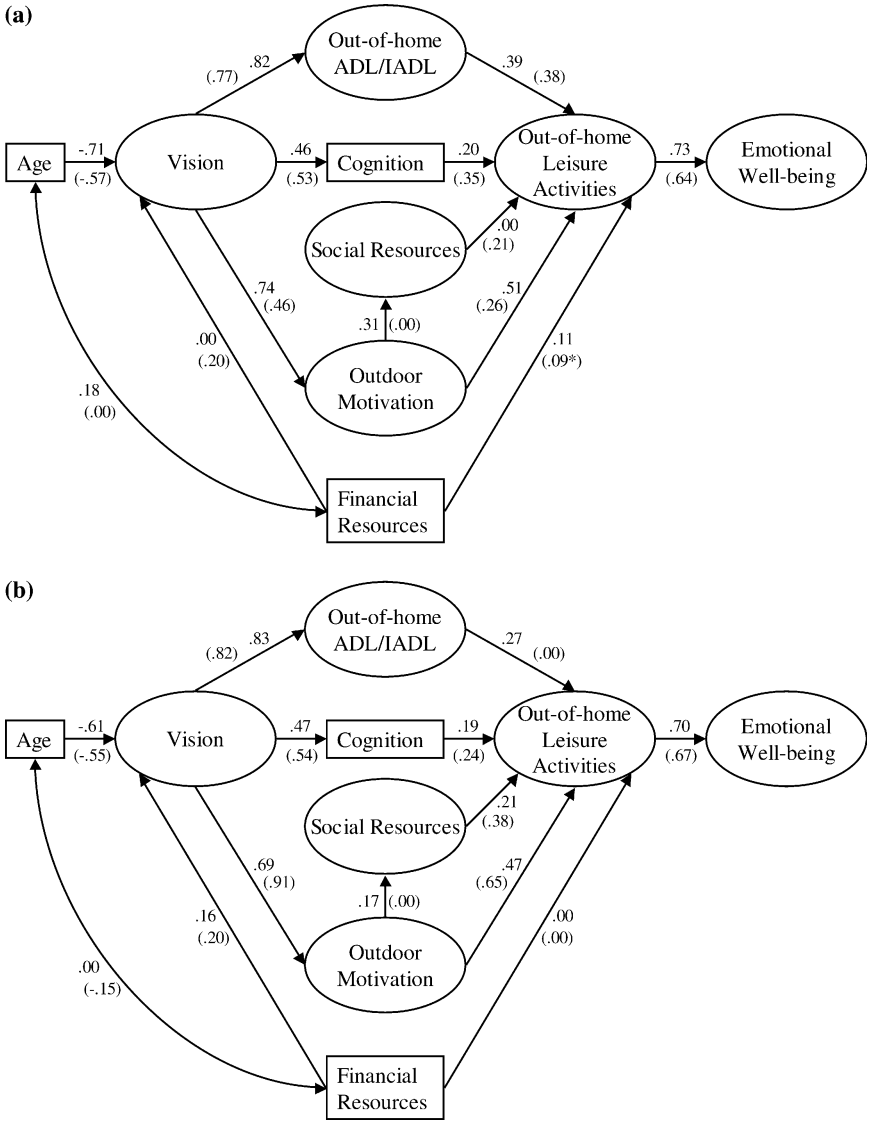

Figure 3. (a) Empirical four-group model at the meso level of analysis part 1 (for East German urban and rural subgroups). Note that the numbers in brackets refer to the East German rural subgroup. $p < 0.10$; for all other paths and correlations that are greater than zero $p < 0.05$. (b) Empirical four-group model at the meso level of analysis part 2 (for West German urban and rural subgroups). Note that the numbers in brackets refer to the West German rural subgroup. For all paths and correlations that are greater than zero $p < 0.05$.

emerged. While financial resources contributed modestly but significantly to out-of-home leisure activities in the East German subgroups, no significant associations could be observed in the West German subgroups. Third, compared to model MICRO 2 (see Figure 1), the consideration of the psycho-socio-economic variables brought about a weakening of the connection between out-of-home ADL/IADL and out-of-home leisure activities.

DISCUSSION

This work was driven by two fundamental research questions and respective hypotheses referring to basic relations and contextual variation with regard to visual capacity, psychological, social network related, and economical resources, as well as major ageing outcomes such as out-of-home everyday functioning and emotional well-being. Data strongly support our first hypothesis in which we expected a robust relation between age, vision, intellectual functioning, out-of-home everyday functioning, and emotional well-being (micro level analysis) that should be largely unaffected by contextual variation at the macro level. Contextual variation was operationalized by taking advantage of the East and West German subsamples in the study, with additional urban and rural subgroups respectively. In detail, vision mediated the effect of age on out-of-home ADL/IADL and leisure activities, while intellectual functioning mediated the effect of vision on out-of-home leisure activities. All effects on emotional well-being were mediated by out-of-home leisure activities. Most important with regard to this robust dynamic identified in our data is that the effect of chronological age on everyday functioning is completely mediated by vision and cognition. However, it also seems to be the case that vision, our main target variable on the side of resources, does only indirectly relate to out-of-home leisure and well-being, because no direct path was necessary in order to achieve a good model fit. This set of findings replicates – based on a broad age range of a diverse sample of community dwelling

elders – what already has been reported in similarly framed earlier work (Marsiske et al., 1997). It extends foregoing research in showing the independence of what we described as a robust correlative pattern of predictors related to out-of-home activities and well-being from external influences at the macro level, although differences between subgroups did exist at the mean level in some of the variables.

However, as expected in our second hypothesis, framing these basic mechanisms within a broader perspective by considering additional variables of potential importance for out-of-home activities and well-being such as outdoor motivation social resources, and financial situation (meso level analysis), revealed substantial variation regarding the interplay of resources according to differences at the macro level. Social resources turned out to contribute less and outdoor motivation turned out to contribute more to out-of-home leisure activities in the urban than in the rural sample. This findings seem to echo classic urban-rural cultural differences, first, in that social resources and social control are expected to be stronger in the rural context, and second, in that the more numerous activity offers for older adults in urban compared to rural settings have to fit subjective needs and motivations (Golant, 2004). However, further qualification is in place: As was also found, outdoor motivation was significantly associated with social resources in the urban, but not in the rural sample. Since we have assessed social resources in terms of out-of-home social network and contact frequency, this finding might be related to the greater geographical distances to most important persons in the urban regions under investigation (Mollenkopf et al., 2004; Baas et al., in press). That is, in the urban regions one might have to be motivated to go out to maintain social resources, since these resources were generally farther away than in the rural areas. However, since the direction of the path is not meaningful in this cross-sectional analysis, it might also be that in the urban regions social resources enhanced outdoor motivation because social contacts with others living farther away might be an important reason to go out.

Based on the significant association between outdoor motivation and social resources, social resources were also indirectly connected to visual capacity in the urban group. There was no link between vision and social resources in the rural group. That is, a reduced outdoor motivation (that was related to reduced visual capacity) was not connected to social resources in rural regions, but was associated with reduced social resources in urban regions. Social resources, in turn, were less powerful in predicting out-of-home leisure activities in the urban compared to the rural groups, as already mentioned above. Hence, it seems that social resources are most effective in enhancing out-of-home leisure activities in environmental contexts where they are unrelated to visual capacity. Generally, since vision loss leads to impairments in person-environment interaction primarily with respect to the spatial-physical and not the social environment (e.g., Burmedi et al., 2002a, b), the social network might be an important resource especially for visually impaired individuals – provided that this resource is easily accessible in terms of spatial distances (as in rural regions).

However, in this context it is important to note that, since we have analyzed cross-sectional data, caution is advised with respect to causal connections between, for example, outdoor motivation and social resources. On the basis of the present study, it is an open question whether a reduced outdoor motivation reduces social resources or whether reduced social resources reduce outdoor motivation. Though we have decided to model the path from outdoor motivation to social resources, it has to be pointed out that none of the paths in the model prove causal relations (except for some face validity causal relations, e.g., chronological age might influence vision, but vision would not influence chronological age).

In some contrast to the results of our previous work (Wahl et al., 2002), no relationship could be found between our socio-economic indication (i.e., financial situation) and outdoor motivation. However, in our previous work we had employed income-per-head *and* years of education to assess socioeconomic status (that turned out to be related to outdoor motivation), while this study has focussed only on the income-per-head variable. The major reason for this was to avoid

confounding between years of education and the measure of intellectual functioning, a classic in the psychometric intelligence literature (e.g., Schaie, 1996). It could well be that it is rather the educational than the financial component of socioeconomic status that is related to outdoor motivation. But financial resources were not simply unimportant. Specifically important with respect to the outcomes considered in this study, financial resources contributed modestly but significantly to out-of-home leisure activities in the East German, but not in the West German urban and rural samples. That is, while in West Germany out-of-home leisure activities seem to be within everyone's means (since they are independent from financial resources), in East Germany they tend to be left up to those with a relatively higher income.

Going further, the weakened connection between out-of-home ADL/IADL and out-of-home leisure activities in the meso level model compared to the micro level model indicates that impairments in basic out-of-home competencies do not lead to reductions in out-of-home leisure activities to an extent that would be inferred from the micro level model. Rather, psychological (i.e., outdoor motivation), social, and financial resources intervene substantially and reduce the (previously overestimated) effect from out-of-home ADL/IADL on out-of-home leisure activities. However, the other basic relations modeled at the micro level are scarcely affected by inclusion of the meso level variables. Particularly the link between intellectual functioning and out-of-home leisure activities remains at its medium size, varying between about 0.20 and about 0.30 in the different subgroups. This connection appears to be accurately estimated and therefore will be hardly altered by inclusion of other important variables.

Finally, as in our earlier study (see Wahl et al., 2002) out-of-home leisure activities again emerged as a strong predictor of subjective well-being that mediates all of the other potential effects in the model. It should be emphasized here that the present work has focussed on emotional well-being that primarily comprises the affective component of well-being, while the more cognitively framed satisfaction component was not considered (Diener, 1994). Since the

present study was planned predominantly against a psychological research background, employing a more psychological (affective) measure of well-being appears to be justified. It remains thus to be seen whether our findings in terms of robust basic relations and contextual variation also apply to a more cognitively oriented well-being measure.

We started this work with the fundamental question how a person's capability or effective freedom to achieve various appreciated states of being and doing (Sen, 1999; e.g., performing chosen out-of-home activities) might be maintained in the light of a declining capacity such as age-related visual decline. Transposing the findings of our study into such a more broadly framed avenue and thus generalizing from the level of detailed and specific relations to societal ageing at large, the results of this study show that vision per se is an important resource for major ageing outcomes such as out-of-home everyday functioning and emotional well-being (micro level of analysis). However, results do also support the notion that the negative effects of lowered vision can be counteracted by effective psycho-socio-economic resources (meso level of analysis). Moreover, they show that the effectiveness of these resources partially depends on the macro context and thus also on societal planning processes and policy consideration and impact. Hence, our distinction between micro, meso, and macro level of analysis turned out to be very useful since it revealed a number of important differentiations. In different regional and societal contexts different resources are able to enhance the older individual's capability and visual capacity plays a considerable though not decisive role within his/her network of resources.

The major limitation of the current work in theoretical as well as practical terms is that it relies on cross-sectional data. Therefore, drawing conclusions on causal relations on the basis of the estimated models is not justified, although some causal interpretations (e.g., regarding the relationship between vision and out-of-home ADL/IADL) seem to be reasonable. Hence, the frequently given suggestion in the empirical literature to proceed with longitudinal data is clearly also a must in this area of inquiry.

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