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RESEARCH PAPER

Sense of Coherence, Time Perspective and Positive Aging

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Abstract Recent gerontological research has identified the sense of coherence as a crucial resilience factor which develops over time and evolves from experiences across the life-span. Time perspective is the process by which life experiences are assigned to temporal categories which give coherence to these experiences. In the present study, we tested the salutogenic hypothesis that time perspective reflects a psychological resource that shapes the sense of coherence, and that both are important predictors of positive aging as indicated by subjective well-being and psychological health. We examined 210 individuals (60.5% women) at the mean age of 70.4 years using the Zimbardo Time Perspective Inventory, a questionnaire measuring five time perspective dimensions and a balanced time perspective. We found that (a) two time perspectives—a lack of concentration on the negative past and a high future orientation—predicted the sense of coherence, and that (b) the sense of coherence was a mediator of the time perspective dimensions–positive aging relationship. An exploratory path analytical model fitted our data well. Furthermore, (c) a balanced time perspective was associated with both the sense of coherence and positive aging, disclosing partial mediation of the sense of coherence. With regards to our analytical model, the sense of coherence and—to a lesser degree—time perspective dimensions and a balanced temporal perspective are important correlates of positive aging. In line with recent salutogenic research, our findings suggest that the sense of coherence represents a higher-order concept which pools psychological resource influences on positive aging.

Keywords Time perspectives · Sense of coherence · Well-being · Positive aging

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1 Introduction

Positive, or successful, aging is one of the prominent topics in psychogerontology (e.g., Fries 2002; Fernández-Ballesteros 2011; Rowe and Kahn 2015). This branch of positive psychology explores how individuals get along with the inevitability of bio-psycho-social losses and manage to preserve their psychological well-being in later life (Hill and Smith 2015). For example, susceptibility to disease is an important issue. Recently, it has been shown that multimorbidity, defined as the presence of two or more chronic disorders, is very common in primary care populations aged 55+ years (e.g., Sinnige et al. 2015). Although multimorbidity is generally connected with poor health-related quality of life (Marengoni et al. 2011), adaptation to such conditions and stabilization of health are realistic options in human development (Scholz et al. 2015). In this paper, we examine positive aging from the perspective of salutogenic theory (Antonovsky 1987), which is an interdisciplinary and bio-psycho-social approach to illuminate human health and well-being.

1.1 The Salutogenic Model

The salutogenic point of departure is sociological. The individual is growing up and living in a given socio-cultural setting, which delivers potentials, but also impediments for his or her health and well-being. In effect, salutogenic theory is based on the pessimistic view that life in itself is stressful and dangerous. "In the very nature of human existence, stressors are omnipresent. Yet many people, though far from most, even with a high stressor load, survive and do well. … *This is the mystery the salutogenic orientation seeks to unravel*" (Antonovsky 1987, p. xii). Antonovsky was interested in those factors that make an individual "resistant" against stressors, which he termed generalized resistance resources (GRRs). A GRR is a phenomenon that is effective in avoiding and/or combating stressors, because it affords life experiences that are characterized by consistency, participation, and a balance between overload and underload (e.g., self-esteem, social support, cultural stability). In contrast, stressors (e.g., multimorbidity, interpersonal conflicts, neuroticism) are understood as generalized resistance deficits (GRD) which create life experiences "characterized by inconsistency, under- or overload, and exclusion from participation in decision making" (Antonovsky 1987, p. 28). Antonovsky speaks of a GRR-RD-continuum, on which an individual can be located, as one unified concept. Over the life span, GRR qualities strengthen and GRD qualities weaken the sense of coherence. In salutogenic theory, the sense of coherence is a very major determinant of an individual's health and well-being.

> The sense of coherence is a global orientation that expresses the extent to which one has a pervasive, enduring though dynamic feeling of confidence that (1) the stimuli deriving from one's internal and external environments in the course of living are structured, predictable, and explicable; (2) the resources are available to one to meet the demands posed by these stimuli; and (3) these demands are challenges, worthy of investment and engagement (Antonovsky 1987, p. 19, italics in original).

The sense of coherence is an individual difference variable and represents a habitual life orientation towards stressors comprising three inter-related components. Understanding one's situation as *comprehensible* (perceiving the world as cognitively clear and structured, not as puzzling), *manageable* (feeling that adequate assets are available—either for oneself

or for legitimate others—so that troubles can be dealt with), and *meaningful* (feeling that life makes emotionally sense) enables an individual to use adequate coping strategies when confronted with (potential) stressors and to resolve tension. Generally, the sense of coherence represents an individual's self-creating, self-organizing, and self-preserving competence (Wiesmann and Hannich 2008), and can be conceived as a source of life strengths and resilience (Fry and Debats 2010).

Recent psychogerontological studies showed that the sense of coherence is a resilience factor which correlates positively with different indicators of positive aging, such as subjective well-being (Wiesmann and Hannich 2008, 2014), health-related quality of life (Drageset et al. 2008; Norekval et al. 2010), general life satisfaction and satisfaction with health (Wiesmann and Hannich 2013), psychological health (Wiesmann and Hannich 2014; Wiesmann et al. 2009), and physical health (Wiesmann and Hannich 2014; Wiesmann et al. 2009). In contrast, the sense of coherence is negatively associated with symptom reporting (Wiesmann et al. 2009), depressive feelings (Dezutter et al. 2013; Wiesmann and Hannich 2011a; Wiesmann et al. 2009) and pain experience (Wiesmann et al. 2014).

Moreover, the sense of coherence has been shown to be significantly associated with a wide range of older individuals' resistance resources, such as education, financial situation, chronological age, subjective age, self-esteem, optimism, self-efficacy, psychological control, social support (Wiesmann et al. 2009; Wiesmann and Hannich 2010, 2013). However, as Antonovsky puts it, the sense of coherence is "not just another variable that contributes to an explanation on the same level as self-esteem, social supports, high social class, or cultural stability. I see such variables as generalized resistance resources" (Antonovsky 1992, p. 36). In other words, the sense of coherence represents a higher-order concept. Accordingly, the sense of coherence has been shown to be a mediator variable which pools resistance resources influences on positive aging (e.g., Wiesmann and Hannich 2008, 2013, 2014; Wiesmann et al. 2009).

1.2 The Sense of Coherence and Time

The sense of coherence develops over *time*, evolving from life experiences across the life-span. More specifically, Antonovsky (1987) assumed that it is shaped by the end of the third decade of life and is steady from then on. However, this stability proposition applies to persons with a strong sense of coherence. The young adult with a moderate level is at risk to move to a lower level over time, and for young adults with a weak sense of coherence, "life becomes a vicious circle" (Antonovsky 1987, p. 122). Thus, an older individual's current sense of coherence should be largely determined by evaluations of his or her past (Rennemark and Hagberg 1997). But it is also reasonable to assume that evaluations of present experiences and future expectations may have an impact, that is, that the sense of coherence is changeable in older age. For example, Antonovsky and Sagy (1990) concede that its re-evaluation is a crucial developmental task in the retirement transition, because major shifts in life experiences do arise in this period, such as decline in functional health, loss of job roles, or the death of significant others at the same or older age. Correspondingly, negative evaluations of present critical life events and associated future fears weakened this *world outlook* (Lövheim et al. 2013), and positive experiences strengthened it (Drageset et al. 2014; Wiesmann et al. 2006). Our point is that in order to better understand an older individual's current sense of coherence, it is important to consider his or her *time perspective*, that is, how he or she is looking at his or her past, present, and expected future experiences.

To date, there has been little empirical research on the relationship between the sense of coherence and time perspective and their common significance for positive aging. To the best of our knowledge, there is only one study demonstrating an overall association between a positive perceived life history and the sense of coherence in 71-year-old Swedish persons (Rennemark and Hagberg 1997). This finding corroborates the salutogenic proposition that positive past experiences shape the sense of coherence.

1.3 The Concept of Time Perspective

The concept of *time perspective* can be traced back to the pioneering work of Kurt Lewin (1951) who argued that an individual's life space includes the impact of both the past and the future on current behavior. He defined time perspective as "the totality of the individual's view on his psychological future and psychological past, existing at a given time" (Lewin 1951, p. 75), emphasizing an integrative view of all three time frames (past, present, future) to understand an individual's psychological situation. A short time ago, Zimbardo and Boyd (1999) advanced the Lewinian conceptualization of time perspective, which they comprehend as "the often nonconscious process whereby the continual flows of personal and social experiences are assigned to temporal categories, or time frames, that help to give order, coherence, and meaning to those events" (p. 1271).

As people grow older, the subjective sense of time becomes more and more salient, because time horizons shrink and people begin to realize that time ultimately runs out (Carstensen 2006). As senescence is in progress, issues of vulnerability to illness and health maintenance become more personally relevant, as morbidity and mortality levels in one's age group begin to increase considerably: "One's own death becomes quite conceivable, no longer in the abstract, intellectual sense that, at a younger age, one knows that one is mortal" (Antonovsky and Sagy 1990, p. 365). As a consequence, older persons would be well advised to focus more on the present and less on the future to accomplish a good life (Carstensen et al. 2003). In the light of life's finitude, reviewing one's past constructively—reminiscing positive experiences and resources as well as re-evaluating past failures and conflicts—has been shown to contribute to positive aging (Westerhof et al. 2010; Westerhof and Bohlmeijer 2014). Likewise, life review interventions have been shown to be effective in alleviating depressive symptoms and promoting different forms of well-being (Pinquart and Forstmeier 2012). To date, there is little empirical research concerning an integrative view of all three time frames in old age.

1.3.1 The Zimbardo Time Perspective Inventory

In their seminal work, Zimbardo and Boyd (1999) elaborated five dimensions that constitute the Zimbardo Time Perspective Inventory (ZTPI). The first Past-Negative factor reveals a generally negative and pessimistic view of the past. This attitude is associated with depression, low self-esteem and anxiety. The second Present Hedonistic factor reflects a hedonistic and pleasure-oriented attitude towards life, with high impulsivity and risk-taking and little concern for future sanctions. This scale correlates with novelty seeking and sensation seeking. The third Future factor implies a general future orientation, striving for future goals and rewards. This attitude is associated with conscientiousness and

consideration of future consequences. The fourth Past-Positive factor implies a warm, sentimental attitude toward the past. This dimension was found to correlate negatively with anxiety and depression. The fifth Present-Fatalistic factor relates to a fatalistic attitude towards present and future life, describing an orientation of hopelessness, helplessness, and loss of control.

These five time perspectives are regarded as individual difference variables that represent automatically and unconsciously operating dispositional cognitive styles, or profiles, by which individuals recall and interpret past events, anticipate future events and evaluate current experiences. People are hardly aware of its pervasive influence on self-image, view of the world, interpersonal relations and health issues. Studies exploring young and middle-aged adults found that time perspectives are strongly associated with various measures of subjective well-being (Boniwell et al. 2010; Stolarski et al. 2014; Zhang et al. 2013; Zhang and Howell 2011). With respect to positive aging, Kazakina (1999, unpublished dissertation, cited in Boniwell and Zimbardo 2004) reported positive associations between a positive present orientation and positive affect and between a past positive orientation and life satisfaction in a sample of 65–91 years old persons. In a study analyzing data from individuals aged 16–83 years, happiness was positively associated with Past-Positive and negatively associated with Past-Negative and Present-Hedonistic attitudes (Drake et al. 2008). Desmyter and De Raedt (2012) reported the results of four multiple linear regressions using the five ZTPI factors as independent variables in a sample of 65–96 year old individuals. In that study, low Past-Negative, Present-Hedonistic and Future orientations predicted positive affect. Furthermore, a negative affect was predicted by Past-Negative attitudes only. Satisfaction with life was explained by both Past-Negative and low Past-Positive orientation. Depression was predicted by Past-Negative and Present-Fatalistic time perspectives. Sobol-Kwapinska and Jankowski (2015) found respective associations between time perspectives and satisfaction with life, except for Present-Hedonistic attitudes, in individuals aged 15–82 years.

1.3.2 A Balanced Time Perspective

In the context of research using the ZTPI, it has been shown that most individuals are biased towards one time perspective at the expense of the others. For example, some people may be extensively occupied with negative experiences from the past while blocking out present issues and future aspirations. Such an imbalanced style might turn out to be maladaptive in the long run. As a consequence, a balanced time perspective (BTP) is supposed to be the ideal optimal temporal perspective and the key to a good life. In a BTP, attitudes to the past, present and future are flexibly interlocked depending on situational needs, values and demands (Boniwell and Zimbardo 2004). For example, although family conflicts from the past might be unresolved and be troubling at certain times (Past-Negative), the individual is able to enjoy meeting his friends going on excursion (Present Hedonistic) and making plans for the next gathering (Future). According to Zimbardo and Boyd (2008), a BTP profile is defined as showing low scores on the Past-Negative and Present-Fatalistic as well as moderate to high scores on the Past-Positive, Present-Hedonistic, and Future time perspectives. It has been demonstrated that a BTP is associated with subjective well-being (Boniwell et al. 2010; Drake et al. 2008; Zhang et al. 2013). In their study including older respondents, Drake et al. (2008) found that the minority of individuals showing a BTP profile were significantly happier than the "unbalanced" majority.

2 Objectives of This Study

This study is the first to examine the relative importance of the sense of coherence and time perspectives and a BTP, respectively, for the prediction of positive aging and to explore a theoretically derived chain of relations between these variables. With respect to our salutogenic framework, we assume that time perspective is a psychological resistance resource that predicts both the sense of coherence and positive aging. We test the salutogenic proposition that the sense of coherence mediates the relationship between (a balanced) time perspective and positive aging.

We assessed two different aspects of positive aging as our criterion variable. The first, subjective well-being, "is a broad concept that includes experiencing high levels of pleasant emotions and moods, low levels of negative emotions and moods, and high life satisfaction" (Diener et al. 2009, p. 187). We applied Lawton's (1975) Philadelphia Geriatric Center Morale Scale as a standard overall well-being measure. The second, psychological health, represents assessments of emotional role limitations, social functioning, vitality and mental health. These dimensions are aggregated in the mental component summary scale of the SF-36 (Ware et al. 1994). We tested the following hypotheses:

Hypothesis 1 Past-Positive, Present-Hedonistic and Future dimensions are positively related, and Past-Negative and Present-Fatalistic dimensions are negatively related to the sense of coherence.

Hypothesis 2 Time perspectives and the sense of coherence predict positive aging. Specifically: (a) The more respondents are Past-Positive, Present-Hedonistic and Future-oriented, the greater their positive aging, and the more they are Past-Negative and Present-Fatalistic-oriented, the less their positive aging. (b) The sense of coherence is a mediator of the relationship between time perspectives and positive aging.

Hypothesis 3 A balanced time perspective and the sense of coherence predict positive aging. Specifically: (a) A BTP is positively related to the sense of coherence and positive aging. (b) The sense of coherence is a mediator of the relationship between a BTP and positive aging.

3 Methods

3.1 Participants

The sample comprised 210 community-dwelling participants (60.5% women) living in a rural region (Annaberger Land, Erzgebirge) in south-east Germany. Overall 300 questionnaires were distributed mainly by word of mouth (response rate: 70%). The proportion of women was slightly higher than in the population of Germans aged 60 years and older in 2011 (56.1%, Gerostat 2014). Ages ranged from 60 to 91 years ($M_{age} = 70.38$, $SD = 7.39$, $Median = 70$ years); 27% were between 60 and 64 years old, 44% were between 65 and 74 years old, and 29% were 75+ years old. The proportions in the population were 22, 41 and 37%, respectively (Gerostat 2014). Thus, very old people were under-represented in our sample. The correlation between sex and age was marginally significant, $r_{pbis} = .13$, $p = .06$, $N = 210$, indicating that women tended to be older.

With respect to highest educational achievement, 14.8% had a university entrance diploma, 28.4% had a General Certificate of Secondary Education, 56.3% had a Certificate of Secondary Education, and .5% had no school leaving certificate. The majority (75.2%) was living in a relationship; 24.8% were single.

Our participants suffered from the following medically diagnosed chronic conditions: rheumatism/arthritis/dysfunctions of the motor system (39.0%), heart disease/stroke/high blood pressure (36.7%), vision disorders (23.8%), diabetes mellitus (21.4%), sleep disorders (19.0%), urological diseases (13%), respiratory diseases (11.0%), dermatological diseases (8.6%), digestive diseases (5.2%), cancer (6.7%), mental disorders (4.3%), and addictive disorders (1.0%). These chronic conditions are common among older persons which often cause bothersome symptoms and impair activities of daily living. The mean number of chronic conditions was $M = 1.90$ ($SD = 1.45$, $Md = 2$, $Min = 0$, $Max = 7$).

3.2 Procedure

Participants were recruited within a time span of 7 weeks through sports clubs and social clubs for older people, and through two doctor's practices and a law office in a rural area in southeast Germany. Data were collected by a survey that could be completed in writing. Altogether 300 questionnaires entitled "Impact of time and life orientations on subjective health in older age" were distributed, and 227 returned (response rate: 74.5%). Seventeen respondents had to be excluded because of missing data (final response rate: 70%). Our participants were invited to give personal information on time perspective and health issues voluntarily and anonymously. All information was confidential to the researchers, and individually identifiable data were not available. Participants could withdraw at any time if they wished to. Older persons suffering from dementia or other geriatric cognitive disorders, and critically or terminally ill patients (e.g., persons undergoing hospital treatment) were not included in our study. Our volunteers were not paid.

3.3 Measures

3.3.1 Demographic Variables

We assessed sex (male, female) and chronological age (number of years).

3.3.2 Time Perspectives

We used the Zimbardo Time Perspective Inventory (ZTPI) developed by Zimbardo and Boyd (1999, 2008). The ZTPI is a 56-item questionnaire which assesses five time perspectives using a 5-point scale (1 = very untrue of me, 5 = very true of me). Ten items capture Past-Negative attitudes ("I often think of what I should have done differently in my life"). Nine items assess Past-Positive attitudes ("Familiar childhood sights, sounds, smells often bring back a flood of wonderful memories."). Fifteen items capture Present-Hedonistic attitudes ("I believe that getting together with one's friend to party is one of life's important pleasures"). Nine items assess Present-Fatalistic attitudes ("Fate determines much in my life"). Thirteen items capture Future attitudes ("When I want to achieve something, I set goals and consider specific means for reaching those goals"). The average sum score is used as an index of a respective time perspective.

We further assessed the individual's balanced time perspective according to Zimbardo and Boyd (2008). This is a measure of fit between subjective appraisals of the five time

perspectives and the optimal time perspective profile as suggested by Zimbardo and Boyd (2008). The optimal time perspective profile was defined as follows: a high score on Past-Positive (4.60), a moderately high score on Present-Hedonistic and Future (3.90 and 4.00, respectively), and a low score on Past-Negative and Present-Fatalistic (1.95 and 1.50, respectively). More specifically, we used the deviation from a balanced time perspective (DBTP) measure (see Stolarski et al. 2011, p. 354, for the formula), which is the best predictor (among different BTP measures) for subjective well-being (Zhang et al. 2013). A DBTP value close to zero indicates a perfectly balanced time perspective (the theoretical ideal), whereas a large value indicates a person's unbalanced time perspective.

3.3.3 Sense of Coherence

We used the Leipzig Sense of Coherence Short Scale (SOC-L9; Schumacher et al. 2000b) consisting of nine items to assess the extent of comprehensibility, manageability and meaningfulness on a 7-point bipolar scale. Item examples are: "Do you have very mixed-up feelings and ideas? Often vs. seldom or never", "When you do something that gives you a good feeling: it's certain that you'll go on feeling good vs. it's certain that something will happen to spoil the feeling", and "How often do you have feelings that there's little meaning in the things you do in your daily life? Often vs. seldom or never". The sum score was used as an index. A high score represents a strong sense of coherence.

3.3.4 Positive Aging

We used Lawton's (1975) Philadelphia Geriatric Centre Morale Scale as a measure of *subjective well-being*. Respondents had to rate on a 6-point scale (ranging from fully agree to fully disagree) their degree of agreement/disagreement to 15 statements that encompass both cognitive and affective components of well-being. Item examples are: "I have as much pep as I did last year", "I am as happy now as I was when I was younger", and "I sometimes feel that life isn't worth living". Negative items (such as the latter) were reverse-scored to make all the items measure a positive state of well-being.

We used the SF-36 Health Survey (Ware et al. 1994) to assess *psychological health*. Four subscales (Vitality, Social Functioning, Role Emotional, and Mental Health) form one dimension. Item examples are: "How much of the time during the past four weeks did you have a lot of energy?" and "How much of the time during the past four weeks have you felt calm and peaceful?" A higher score represents better psychological health.

3.3.5 Chronic Morbidity

Regarding present diseases, participants provided details concerning twelve categories of medically diagnosed chronic conditions specified in a list (yes vs. no; see Participants section for their prevalences in this sample). The number of chronic conditions was used as an index of *chronic morbidity*.

3.4 Data Analyses

For our hypothesis testings, we chose the conventional alpha-level of .05. We used multivariate analysis of variance to test differences between two groups and one-sample *t*-tests to test if our sample of older people is different from a reference sample. Pearson

correlations or point-biserial correlations were computed to test bivariate relationships. Hierarchical regression analyses tested relationships between multiple predictor variables and one criterion variable. Overall, our data did not manifest multicollinearity. Variance inflation factors and tolerance values were in the normal range, VIF < 1.74 and Tol $> .57$.

We used path analysis as a tool for examining the hypothesized indirect (mediation) effects of the sense of coherence in the relationship between time perspectives and positive aging (AMOS 21; Arbuckle 2012). As recommended by Shrout and Bolger (2002) and MacKinnon et al. (2004), we applied a maximum likelihood technique and a bootstrapping procedure, using listwise deletion. We used the following indexes to assess the adequacy of a model: Chi square, CFI, RMSEA and SRMR. According to Kline (2011), a CFI close to .95 or greater, a RMSEA close to .05 or less (at least lower than .10), and a SRMR close to .08 or less indicate good fit. We drew $k = 2.000$ bootstrap samples of $n = 209$ cases with replacement from the original sample. As recommended by Cheung and Lau (2008), we computed 95% bias-corrected percentile bootstrap confidence intervals. The null hypothesis (no indirect or direct effect) had to be rejected if a confidence interval did not include zero.

4 Results

4.1 Preliminary Analyses

In Table 1, descriptive statistics and Cronbach's alpha values are shown. Mean values disclosed a moderately positive evaluation of positive aging measures and the sense of coherence (cf. Wiesmann and Hannich 2008, 2014; Wiesmann et al. 2009). For example, our observed mean value of the sense of coherence was greater than the mean value in a large German representative sample (49.72 vs. 47.50, see Schumacher et al. 2000a, p. 477). Our mean values of time perspectives correspond to the sum scores that Desmyter and De Raedt (2012) report in their aging study. Among the variables listed in Table 1, women and men did not differ systematically, $F(11, 196) = 1.38$, $p = .19$, Wilks $\Lambda = .93$, partial $\eta^2 = .07$.

As displayed in Table 2, our continuous measures were significantly inter-correlated, except for Past-Positive and Present-Hedonistic dimensions. The absolute values of correlation coefficients ranged between .01 and .75. By the majority, the strength of relationship was moderate. Sense of coherence, subjective well-being and psychological health were significantly negatively correlated with Past-Negative, Present-Fatalistic and with DBTP. Future orientation was significantly positively associated with sense of coherence and psychological health, but not with subjective well-being.

In Fig. 1, the mean evaluations of time perspectives are shown in relation to reference and ideal values of the ZTPI (Zimbardo 2012).[1] After Bonferroni-correction regarding multiple testing ($\alpha = .05/10 = .005$), one-sample t-tests revealed that evaluations differed significantly from their reference values, $6.11 \leq |t(210)| \leq 29.09$, $ps < .0001$. Past-Negative and Present-Hedonistic orientations were significantly lower and Past-Positive, Present-Fatalistic and Future orientations were significantly higher in our sample. Effect sizes (Cohen's d) were .84, 4.02, 1.52, 17.30, and .96, respectively. The same could be found when comparing our time perspective evaluations with Zimbardo's (2012) ideal

[1] Unfortunately, Zimbardo gives no information on the sex and age composition of his data base encompassing over 12,000 respondents.

Table 1 Psychometric properties of continuous study variables

Variable	*M*	*SD*	α	Range		
				Potential	Actual	Skew
Sense of coherence	49.72	8.30	.84	9–63	21–63	−.53
Subjective well-being	65.13	12.79	.90	15–90	24–88	−.63
Psychological health	51.06	9.14	.74	0–100	25–67	−.74
Age	70.38	7.39	–	0–120	60–91	.43
Chronic morbidity	1.90	1.45	–	0–12	0–7	.93
Past-Negative	2.73	0.64	.77	1–5	1.20–4.70	.16
Past-Positive	3.60	0.50	.58	1–5	2.00–4.78	−.24
Present-Hedonistic	2.94	0.50	.75	1–5	1.67–4.67	.31
Present-Fatalistic	3.02	0.57	.65	1–5	1.56–4.67	.09
Future	3.57	0.39	.52	1–5	2.46–5.00	.35
DBTP	2.33	0.57	–	0–4.89	0.96–3.72	.11

$209 \leq n \leq 210$

α Cronbach's alpha, *DBTP* deviation from the balanced time perspective

profile, $4.49 \leq |t(209)| \leq 40.08$, $ps < .0001$, except for the Past-Positive dimension, $t(209) = -2.15$, $p = .033$, $d = .30$. Past-Negative and Present-Fatalistic orientations were significantly higher and Present-Hedonistic and Future orientations were significantly lower. Effect sizes (Cohen's *d*) were 1.95, 4.70, 5.64, and .62, respectively.

4.2 Primary Analyses

4.2.1 Time Perspectives and the Sense of Coherence

Table 3 shows the results of three stepwise hierarchical regression analyses. In the first regression analysis predicting the sense of coherence, we entered three control variables (sex, age and morbidity) in the first step (model 1) and the five time perspectives in the second step (model 2). In the second and third regression analysis predicting subjective well-being and psychological health, respectively, we additionally entered the sense of coherence in the last step (model 3).

Table 3 shows that morbidity and Past-Negative attitudes were significantly negatively and Future orientation was positively related to the sense of coherence (model 2). We found a large effect, $R^2 = .39$, the Past-Negative factor being the strongest predictor.

4.2.2 Time Perspectives, Sense of Coherence and Positive Aging

Table 3 shows that low Past-Negative, Present-Hedonistic, Present-Fatalistic, Future and morbidity were significant predictors of subjective well-being (model 2), manifesting a large effect size, $R^2 = .44$. Entering the sense of coherence accounted for additional 19.8% of the variance. The Past-Negative and Present-Hedonistic effects remained significant, but they were smaller, indicating partial mediation for these two variables. Moreover, the former significant effects of Present-Fatalistic and Future were reduced to insignificance,

Table 2 Correlations between study variables

	2	3	4	5	6	7	8	9	10	11	12
1 Sense of coherence	.75***	.60***	−.15*	−.07	−.25***	−.56***	.10	−.06	−.33***	.16*	−.42***
2 Subjective well-being	1	.68***	−.13	−.16*	−.32***	−.59***	.05	−.02	−.37***	.13	−.50***
3 Psychological health		1	−.08	−.16*	−.20*	−.39***	.04	−.02	−.28***	.19**	−.33***
4 Sex			1	.13	.02	.16*	.09	.17*	.18*	−.05	.08
5 Age				1	.18**	.18**	.09	−.03	.27***	.06	.26***
6 Chronic morbidity					1	.19**	.05	.03	.19**	−.04	.16*
7 Past-Negative						1	.03	.19**	.45***	.04	.61***
8 Past-Positive							1	.31***	.17*	.19**	−.36***
9 Present-Hedonistic								1	.39***	.01	−.12
10 Present-Fatalistic									1	−.16*	.68***
11 Future										1	−.04
12 DBTP											1

Pearson or point-biserial correlation coefficients are reported

$209 \leq n \leq 210$

DBTP deviation from the balanced time perspective

*** $p < .001$; ** $p < .01$; * $p < .05$

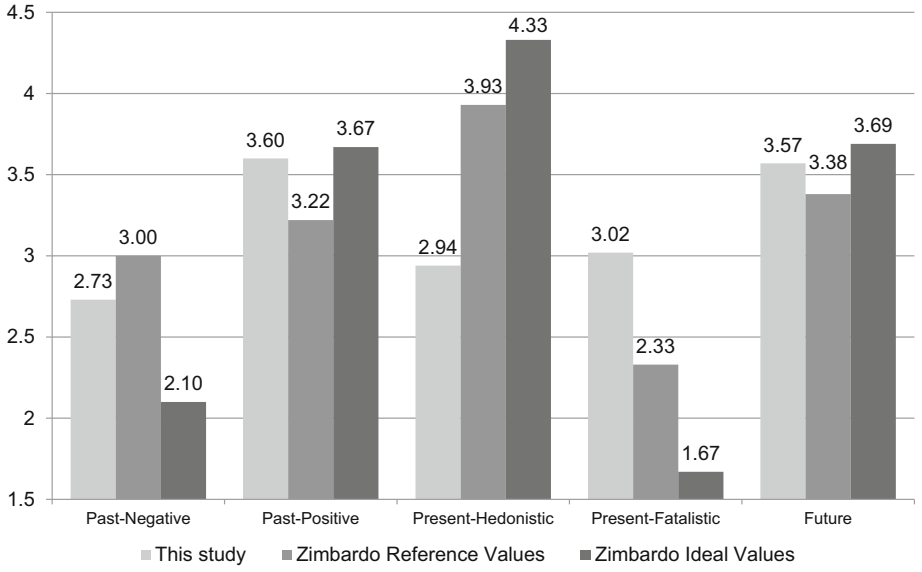

Fig. 1 Mean time perspectives values in relation to Zimbardo's (2012) mean reference and ideal values

indicating a full meditational influence of the sense of coherence with respect to these two predictors.

Table 3 reveals that Past-Negative and Future were significant predictors of psychological health (model 2), disclosing a medium effect size, $R^2 = .22$. Entering the sense of coherence (model 3) accounted for additional 16.6% of the variance. Sense of coherence was the only significant predictor, and the former Past-Negative and Future effects were reduced to insignificance.

4.2.3 Exploratory Mediation Models

In order to further clarify the mediating role of the sense of coherence, we compared three exploratory salutogenic mediation models that were derived from our regression results. Our first full mediation model consisted of five exogenous variables (Past-Negative, Past-Positive, Present-Hedonistic, Present-Fatalistic and Future), the sense of coherence as a mediator and two criterion variables (subjective well-being and psychological health). In our second model, Past-Negative was allowed to have an additional direct effect on subjective well-being (see our regression results reported in Table 3). As chronic morbidity turned out to be a significant control variable, our third model included chronic morbidity as an additional exogeneous variable, assuming direct effects on sense of coherence, subjective well-being, and psychological health (see Table 3), and assuming that morbidity would be uncorrelated with past positive, present hedonistic and future attitudes (see the bivariate correlations in Table 2).

Our first model did not fit our data, $\chi^2(10, n = 208) = 33.87$, $p = .19$, RMSEA = .11 (90% CI [.07, .15]), SRMR = .04, and CFI = .95. Our second model, which additionally included a direct path between Past-Negative and subjective well-being, fitted our data well, $\chi^2(9, n = 208) = 12.37$, $p = .19$, RMSEA = .04 (90% CI [.00, .09]), SRMR = .03, and CFI = .99.

Table 3 Summary of stepwise regression analyses for control variables, time perspectives predicting the sense of coherence (N = 210) and for control variables, time perspectives and sense of coherence predicting subjective well-being (n = 209) and psychological health (n = 209)

Variable	Sense of coherence		Subjective well-being			Psychological health		
	Model 1 β	Model 2 β	Model 1 β	Model 2 β	Model 3 β	Model 1 β	Model 2 β	Model 3 β
Control variables								
Sex	−.14*	−.06	−.11	−.04	.00	−.06	−.00	.03
Age	−.01	.07	−.09	−.00	−.04	−.12	−.07	−.11
Chronic morbidity	−.24***	−.14*	−.30***	−.19**	−.11*	−.17*	−.10	−.02
Time perspectives								
PN		−.51***		−.53***	−.24***		−.34***	−.07
PP		.09		.03	−.02		.02	−.03
PH		.07		.15*	.10*		.08	.04
PF		−.04		−.13*	−.08		−.09	−.03
F		.14*		.12*	.04		.19**	.11
Sense of coherence	–	–			.57***			.52***
R^2	.08	.39	.12	.44	.64	.06	.22	.38
F	5.97**	15.77***	9.43***	19.66***	39.00***	4.22**	7.10***	13.98***
ΔR^2		.31		.32	.20		.16	.17
ΔF		19.99***		22.79***	108.86***		8.37***	54.01***

PN Past-Negative, *PP* Past-Positive, *PH* Present-Hedonistic, *PF* Present-Fatalistic, *F* Future

* $p < .05$; ** $p < .01$; *** $p < .001$

Our third model, which in addition to our second model included morbidity as an exogeneous variable, fitted our data equally well, $\chi^2(12, n = 208) = 12.20$, $p = .43$, RMSEA = .01 (90% CI [.00, .07]), SRMR = .03, and CFI = .99. Hence, we preferred our more parsimonious second model to our third model (Kline 2011).[2]

In Fig. 2, the second path model with its standardized parameter estimates is presented. Table 4 shows the bootstrapped standardized parameter estimates along with bias-corrected (BC) 95% confidence intervals (CI) and standard errors, and significance tests for the BC 95% CI. Five out of eight presumed direct effects and four out of ten presumed indirect effects were significant, the CIs did not include zero. With respect to the latter, Past-Negative and Future orientations affected positive aging via the sense of coherence.

4.2.4 A Balanced Time Perspective and Its Relevance for Sense of Coherence and Positive Aging

Table 5 shows that morbidity and a balanced time perspective were significant predictors of the sense of coherence (model 2). Being close to a balanced time perspective was associated

[2] As our data are cross-sectional, we are not able to draw conclusion on presumed cause-effect relations in our mediation analyses. Therefore, we additionally tested five alternative mediational chains of time perspectives, sense of coherence and positive aging. None of these alternative models fitted our data.

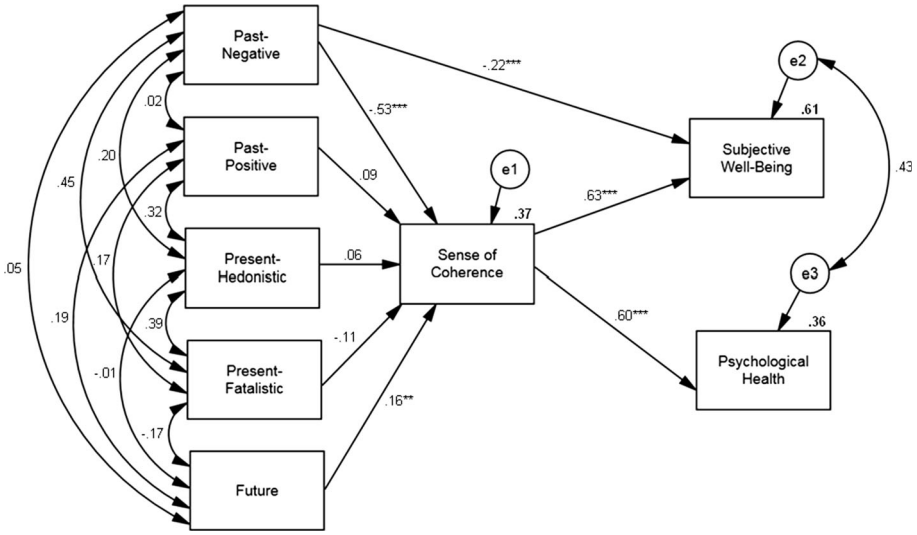

Fig. 2 Salutogenic mediation model: influence of time perspectives and sense of coherence on positive aging. The values above the right upper corner of the rectangles represent squared multiple correlations. Estimated standardized path coefficients are provided. $*p < .05$; $**p < .01$; $***p < .001$

with a strong sense of coherence, and morbidity was related to a weak sense of coherence. The regression analysis in Table 3 accounted for more variance ($R^2 = .39$ vs. .23).

Table 5 also shows that morbidity, DBTP and the sense of coherence predicted subjective well-being. Entering the sense of coherence in the last step (model 3) weakened the significant effects of morbidity and DBTP as shown in model 2. This pattern implies that the sense of coherence is a partial mediator. Finally, the sense of coherence was the only significant predictor of psychological health (model 3). The former significant effects of morbidity and DBTP (model 2) were reduced to zero. This pattern suggests that the sense of coherence is a full mediator.

5 Discussion

This salutogenic study is the first to explore relations among time perspective (and a BTP, respectively), the sense of coherence and positive aging, that is, subjective well-being and psychological health. In particular, it investigates if the sense of coherence is a mediator of the relationship between time perspective (conceptualized as GRRs) and positive aging.

Our participants suffered from common age-associated chronic conditions, in particular rheumatism (including arthritis and other dysfunctions of the motor system), heart disease/stroke, vision disorders and diabetes being the most frequent disease categories. In accordance with other convenience samples of older individuals, they reported about two medically diagnosed chronic conditions on average, reflecting a multimorbid somatic condition (Wiesmann and Hannich 2011b, 2013). From a salutogenic view, individuals suffering from this biological resistance deficit run the risk of losing their view of the world as comprehensible, manageable, and meaningful (Wiesmann and Hannich 2014). Correspondingly, morbidity and sense of coherence were negatively related. Nevertheless, we found our respondents' sense of coherence to be rather strong.

Table 4 Bootstrapped standardized maximum likelihood estimates for a salutogenic mediator path model predicting positive aging

Parameter	Est	BC 95% CI	*SE*	*p*
Direct effects				
PN → SOC	−.53	[−.62, −.44]	.05	.001
PP → SOC	.09	[−.02, .19]	.06	.194
PH → SOC	.06	[−.03, .17]	.06	.277
PF → SOC	−.11	[−.22, .01]	.07	.153
F → SOC	.16	[.07, .24]	.07	.007
PN → Subjective well-being	−.22	[−.32, −.13]	.05	.001
SOC → Subjective well-being	.63	[.55, .71]	.05	.001
SOC → Psychological health	.60	[.50, .67]	.05	.002
Indirect effects				
PN → SOC → Subjective well-being	−.34	[−.41, −.27]	.04	.001
PN → SOC → Psychological health	−.32	[−.39, −.25]	.04	.001
PP → SOC → Subjective well-being	.05	[−.01, .12]	.04	.190
PP → SOC → Psychological health	.05	[−.01, .12]	.04	.187
PH → SOC → Subjective well-being	.04	[−.02, .11]	.04	.277
PH → SOC → Psychological health	.04	[−.02, .11]	.04	.289
PF → SOC → Subjective well-being	−.07	[−.15, .01]	.05	.157
PF → SOC → Psychological health	−.06	[−.14, .01]	.04	.148
F → SOC → Subjective well-being	.10	[.04, .16]	.03	.007
F → SOC → Psychological health	.09	[.04, .15]	.03	.007
Squared multiple correlations				
Mediator (SOC)	.37	[.27, 44]	.05	.006
Psychological health	.61	[.52, .68]	.05	.003
Subjective well-being	.36	[.25, .44]	.06	.002

$n = 208$. We generated 2.000 bootstrapped samples

Est Estimate, *BC* bias-corrected, *CI* confidence interval, *SOC* sense of coherence, *PN* Past-Negative, *PP* Past-Positive, *PH* Present-Hedonistic, *PF* Present-Fatalistic, *F* Future

We did not find systematic differences between the sexes, as reflected by the multivariate analysis of variance. However, point-biserial correlations indicated that evaluations of the sense of coherence and three time perspectives—Past-Negative, Present-Hedonistic and Present-Fatalistic dimensions—were slightly different for women and men. Furthermore, we observed a large age range of 31 years. We also found that chronic morbidity was associated with the majority of study variables. Therefore, we included sex, age and morbidity as control variables in our regression analyses.

5.1 Time Perspectives in Old Age

As our pattern of time perspectives was similar to Desmyter and De Raedt's (2012) findings, we suggest that our profile reflects assessments of older individuals. All five time perspectives were significantly different from the Zimbardo's (2012) reference profile. All differences reflected huge effect sizes (Cohen's *d*s $> .80$). We found that evaluations of the past were more favorable, that is, respondents had both a less aversive view and a warmer,

Table 5 Summary of stepwise regression analyses for control variables, deviation from a balanced time perspective predicting the sense of coherence (N = 210) and for control variables, deviation from a balanced time perspective and sense of coherence predicting subjective well-being (n = 209) and psychological health (n = 209)

Variable	Sense of coherence		Subjective well-being			Psychological health		
	Model 1 β	Model 2 β	Model 1 β	Model 2 β	Model 3 β	Model 1 β	Model 2 β	Model 3 β
Control variables								
Sex	−.14*	−.11	−.11	−.09	−.01	−.06	−.05	.02
Age	−.01	.09	−.09	.01	−.05	−.12	−.05	−.10
Chronic morbidity	−.24***	−.20**	−.30***	−.24***	−.11*	−.17*	−.14*	−.03
DBTP		−.40***		−.46***	−.20***		−.29***	−.07
Sense of coherence	–	–			.64***			.56***
R^2	.08	.23	.12	.31	.63	.06	.14	.38
F	5.97**	14.99***	9.43***	23.25***	68.71***	4.22**	7.96***	24.19***
ΔR^2		.15		.19	.32		.08	.24
ΔF		38.91***		57.03***	172.50***		18.33***	77.17***

DBTP deviation from a balanced time perspective

* $p < .05$; ** $p < .01$; *** $p < .001$

more sentimental attitude towards the past. Likewise, their general future orientation was more positive. Although time horizons in older age get smaller (Carstensen 2006; Carstensen et al. 2003), their behavior is still dominated by striving for future goals and rewards. In contrast, evaluations of the present were less favorable. Their orientation towards present pleasure with little concern for the future was considerably less pronounced and their fatalistic and hopeless attitude towards their present life was clearly stronger. As the experience of subjective well-being can only take place in the here and now, these negative views implied that our participants had difficulties in enjoying their life at the very moment.

Comparing our pattern of time perspectives with ZPTI ideal values, we found our respondents to be significantly biased from a balanced time perspective, except for Past-Positive orientation. With respect to evaluations of the past, their negative attitude was clearly more aversive than desired, whereas their positive view turned out to be close to the ideal. Keeping in mind that these two time perspectives were independent of each other in our study, we suppose that older individuals are rather past-oriented, sticking to rituals, being conservative and being concerned over maintaining the status quo. With respect to the present, we found their two orientations to be clearly maladaptive, manifesting huge effect sizes. Again, this pattern suggests that older persons do not seem to be focused on the moment, which would be a good advice for positive aging (Carstensen et al. 2003). Finally, their future orientation was approaching the ideal. Although time horizons shrink and older people begin to realize that time ultimately runs out, our respondents still focus on their future life (Carstensen 2006; Carstensen et al. 2003).

5.2 Relations Among Time Perspectives, Sense of Coherence and Positive Aging

Overall, our bivariate correlational findings showed that our study variables were largely related, the magnitudes of the correlations being mostly in the small or moderate range. Our respondents' evaluations of Past-Positive and Present-Hedonistic dimensions were not related to their sense of coherence, positive aging and control variables (sex, age, morbidity). With respect to these two time scales, our hypotheses were not supported (see below). Concordantly, Desmyter and De Raedt (2012) found these two time perspectives to be largely unrelated with four subjective well-being measures (except for Present-Hedonistic significantly predicting positive affect and Present-Fatalistic significantly predicting depression). In line with this, Drake et al. (2008) found that the Present-Fatalistic dimension was not linked with happiness.

The sense of coherence shared a high proportion of common variance with subjective well-being (56.25%). This raises the question of redundancy, to which we already replied elsewhere (Wiesmann and Hannich 2008). From a theoretical point of view, these variables are separate constructs, although they might be strongly positively associated. The strong-SOC person will be no more happy than the weak-SOC person in stressful situations or under inhuman conditions. "But what he or she can feel is that, given the facts of the situation, one is handling it as well as possible, one is making life bearable. It is to this specific sense of well-being that the SOC is directly relevant" (Antonovsky 1987, pp. 181).

5.2.1 Prediction of the Sense of Coherence

On a bivariate level, three time perspectives were significantly related to the sense of coherence. A strong sense of coherence was associated with a low negative attitude towards one's past, a low fatalistic attitude toward one's present life and a positive view of one's future. In our multiple regression, only two dimensions—Past-Negative and Future— along with chronic morbidity were significant predictors of the sense of coherence. A low extent of Past-Negative attitudes and turned out to be the most important predictor for a strong sense of coherence.

In line with Rennemark and Hagberg (1997), we showed that evaluations of the past are related to the sense of coherence. However, Rennemark and Hagberg (1997) did not assess positive and negative aspects of the past separately, using a bipolar Likert-type scale (bad [0], neutral [1], good [2]) instead. Our Past-Negative effect is in line with the salutogenic model which states that the sense of coherence is shaped by life experiences over the lifespan. Specifically, our data suggest that negative past experiences such as stressors, that cannot be overcome, would breed a weak sense of coherence. What is more, salutogenic theory assumes that *positive* experiences bring forth a strong sense of coherence. Our data did not support this proposition, as the Past-Positive dimension was unrelated to the sense of coherence. This means, from the perspective of advanced years in the life cycle, unresolved conflicts and unpleasant or even traumatic events—either experienced in earlier life stages or in the recent past—that are related to the sense of coherence, and not positive reminiscences of positive experiences in one's past.

Our finding that a general orientation towards the future, which involves behaviors that are motivated by prospected goals and rewards, is significantly associated with a strong sense of coherence, supports salutogenic theory. Being future oriented implies a notion of older individuals' comprehensibility of the world, expecting "that stimuli he or she will

encounter in the future will be predictable" (Antonovsky 1987, p. 17) and "that things will work out as well as can reasonably be expected" (Antonovsky 1979, p. 123). A future orientation also entails a notion of manageability in that older individuals feel that the demands of everyday life can be met, and also a notion of meaningfulness, expecting to be personally involved in shaping their future in a positive way.

Consistent with recent findings (Wiesmann and Hannich 2013; Wiesmann et al. 2009), we found that chronic morbidity as a GRD predicts a low sense of coherence. In the context of time perspectives, current illness experiences might represent a Present-Negative dimension ("I cannot enjoy current activities, because I am limited by persistent pain"), complementing the ZTPI.

Finally, the salutogenic model suggests that the first three decades would be decisive in forming the sense of coherence (Antonovsky 1987). Unfortunately, the ZTPI measure does not differentiate between developmental stages. Thus, it would be interesting to see if positive or negative life experiences before 30 years of age do have a greater impact than experiences after young adulthood.

5.2.2 Prediction of Positive Aging

In regression model 2, we found four time perspectives to be significantly associated with subjective well-being. A low negative attitude towards one's past, both a hedonistic orientation and a low fatalistic attitude toward one's present life as well as a positive view of one's future predicted subjective well-being. With respect to psychological health, only two time perspectives were significant—Past-Negative and Future (model 2). Thus, a low extent of reminiscing unpleasant encounters with others as well as a high degree of future orientation (e.g., making future plans) were associated with positive aging, whereas having fond memories of good old times do not play any role. A low Past-Negative orientation implies an ability to distance oneself from aversive past events or even to solve conflicts from the past in order to relieve oneself from rumination and negative affects (Westerhof et al. 2010; Westerhof and Bohlmeijer 2014). A Future orientation is associated with high motivation and aspirations, and as the time frame becomes smaller in advanced age, future opportunities are precious and give rise to optimism and positive feelings (Desmyter and De Raedt 2012). We can only speculate why present-time orientations—low Present-Fatalistic (believing to a lesser extent that one's present life is controlled by forces one cannot influence) and Present-Hedonistic (enjoying the moment)—were important predictors for subjective well-being, but not for psychological health. One reason may be different levels of generality, or specificity. Both the sense of coherence and subjective well-being represented global measures, whereas the assessment of psychological health referred to the last 4 weeks. In case of lack of correspondence in time frame, correlations are expected to be smaller. Another reason may be the lower internal consistency of psychological health which might reduce the magnitude of correlations.

Current illness experiences stemming from chronic conditions were associated with low positive aging (this holds particularly true for subjective well-being). As already mentioned, in the context of the five ZTPI time orientations, we suppose that experiences of chronic illness might represent a Present-Negative factor that is different from Present-Fatalistic attitudes.

Our regression analyses corroborated partial and full mediating effects of the sense of coherence which were more closely tested in our second path analytical model. This parsimonious mediation model fitted our data well. However, as our study design is cross-sectional, we do not draw causal inferences (e.g., that positive aging is rooted in a strong

sense of coherence). Nevertheless, we scrutinized if our theoretically derived cause-effect relations as displayed in our model could be identified in our data. Therefore, we discuss significant effects not in a causal, but in a confirmatory sense.

We found that both Past-Negative and Future orientations had a direct effect on the sense of coherence, which had a direct impact on both subjective well-being and psychological health. As shown in the regression, Past-Negative had a direct effect on subjective well-being. Our model shows that both Past-Negative and Future orientations influenced the two positive aging measures indirectly via the sense of coherence. All other indirect effects involving Past-Positive, Present-Hedonistic and Present-Fatalistic evaluation were not significant.

Verifying—but not proving—salutogenic theory, our correlational data pattern showed that the sense of coherence served as a mediator variable (e.g., Wiesmann and Hannich 2008, 2013, 2014; Wiesmann et al. 2009). As indicated by the suggested path model, specific time perspective dimensions (in salutogenic terms psychological resistance resources) strengthen the sense of coherence which in turn fortifies positive aging. In terms of the time perspective approach, time orientations help to give *coherence* to an individual's experiences (Zimbardo and Boyd 1999).

5.3 The Significance of a Balanced Time Perspective

We found support for our third hypothesis. For the first time, we showed that a balanced time perspective was associated with a strong sense of coherence. Coherent persons seem to be able to consider all time perspectives simultaneously and evaluate them in a rather balanced way, tending to score low on Past-Negative and Present-Fatalistic attitudes as well as moderate to high on Past-Positive, Present-Hedonistic, and Future orientations.

Our finding that the closer to a balanced time perspective, the more respondents experience subjective well-being and psychological health, corroborated recent findings from young adult and/or student samples (Boniwell et al. 2010; Drake et al. 2008; Zhang et al. 2013). It also backed up findings from a sample of older individuals (Drake et al. 2008) that the "balanced" minority group was happier than the "unbalanced" majority. Thus, in the advanced years, a balanced time perspective proves to be psychologically healthy in contrast to relying on a single dimension, which might bias an individual's thinking and behaviors (Boniwell and Zimbardo 2004). It seems to be important to be flexible, that is, to reconcile experiences from the past, present and prospects of the future in order to make better choices that facilitate well-being. In a given situation, it might be wise to enjoy life (to be present-oriented), in other it might be better to be goal-directed and to invest into the future (Zhang et al. 2013).

In line with the analyses above involving the five single ZTPI dimensions, we observed that the sense of coherence was a partial mediator of the BTP-positive aging relationship, manifesting both a direct and indirect effect of the BTP on positive aging. In any case, the predictive value of the sense of coherence was higher than the predictive value of the BTP measure.

5.4 Limitations of This Study

We surprisingly found the internal consistencies of the ZTPI scales to be rather modest, ranging from satisfactory to acceptable. Concordantly, Desmyter and De Raedt (2012) reported similar moderate Cronbach's Alpha values in their sample of 65–96 year old individuals. In fact, the highly reliable ZTPI has been developed and applied in largely

young and middle-aged adult samples (Boniwell et al. 2010; Stolarski et al. 2014; Zhang et al. 2013; Zhang and Howell 2011; Zimbardo and Boyd 1999). Thus, ZTPI does not seem to capture time orientations of older individuals precisely enough as opposed to younger adult age groups. Further research is needed to adapt the ZTPI to the everyday reality of older individuals with respect to their past, present and future time frames.

As it is common in psychogerontological research (Baltes et al. 1999), our volunteers represented a fairly healthy convenience sample of older persons. We succeeded in addressing a positively self-selected group of individuals who are intrigued with health and psychology issues. It would be desirable to obtain a representative sample in the future.

As already mentioned, our cross-sectional design does not allow for causal interpretations. We therefore strongly recommend conducting a prospective study in which measurements are taken at two or more measuring times. Such a longitudinal design would allow for investigating the causal directionality of time perspective, sense of coherence and positive aging. For example, it would be appealing to explore psychological consequences of a balanced time perspective in a given situation, that is, to what extent a flexible handling of being past-, present-, or future-oriented would nurture a strong sense of coherence and positive aging. At the same time, it would be possible to test conceivable reverse causal relations (e.g., influence of positive aging on sense of coherence and/or time perspective), a cause-effect relation that we did not explore in our salutogenic framework.

6 Conclusions

This salutogenic study investigated the role of time perspective and the sense of coherence on positive aging. Despite the aforementioned limitations, our study made several contributions. First, our study has gained additional knowledge concerning the importance of five time perspectives and their inter-relations in older age. Second, our study has expanded the literature on the sense of coherence and its associations with time perspective. Third, this study elucidated the relative contribution of the sense of coherence and time perspectives, showing that the sense of coherence is the key predictor variable for positive aging. Fourth, our analyses revealed that the sense of coherence as the central salutogenic construct is a mediator of the time perspective-positive aging relationship. A low endorsement of past-negative perspective and a high level of future orientation, which have been identified as important predictors for aging well, are also effective through a coherent life orientation.

As time horizons shrink in older age, reviewing negative experiences in one's past constructively—re-evaluating past failures and interpersonal conflicts—would be a good way to bolster one's sense of coherence and the process of aging well (Westerhof et al. 2010; Westerhof and Bohlmeijer 2014). We suppose that life review interventions would be promising in this regard.

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References

Antonovsky, A. (1979). *Health, stress, and coping. New perspectives on mental and physical well-being*. San Francisco: Jossey-Bass.

Antonovsky, A. (1987). *Unraveling the mystery of health. How people manage stress and stay well*. San Francisco: Jossey-Bass.
Antonovsky, A. (1992). Can attitudes contribute to health? *Advances, The Journal of Mind-Body Health, 8*(4), 33–49.
Antonovsky, A., & Sagy, S. (1990). Confronting developmental tasks in the retirement transition. *Gerontologist, 30*(3), 362–368.
Arbuckle, J. L. (2012). *Amos 21 reference guide*. Meadville: Amos Development Corporation.
Baltes, P. B., Mayer, K. U., Helmchen, H., & Steinhagen-Thiessen, E. (1999). The Berlin Aging Study (BASE): Sample, design, and overview of measures. In P. B. Baltes & K. U. Mayer (Eds.), *The Berlin Aging Study: Aging from 70 to 100* (pp. 15–55). Cambridge: Cambridge University Press.
Boniwell, I., Osin, E., Linley, P. A., & Ivanchenko, G. V. (2010). A question of balance: Time perspective and well-being in British and Russian samples. *The Journal of Positive Psychology, 5*(1), 24–40.
Boniwell, I., & Zimbardo, P. G. (2004). Balancing time perspective in pursuit of optimal functioning. In P. A. Linley & S. Joseph (Eds.), *Positive psychology in practice* (pp. 165–178). Hoboken, NJ: Wiley.
Carstensen, L. L. (2006). The influence of a sense of time on human development. *Science, 312*(5782), 1913–1915.
Carstensen, L. L., Fung, H. H., & Charles, S. T. (2003). Socioemotional selectivity theory and the regulation of emotion in the second half of life. *Motivation and Emotion, 27*(2), 103–123.
Cheung, G. W., & Lau, R. S. (2008). Testing mediation and suppression effects of latent variables. Bootstrapping with structural equation models. *Organizational Research Methods, 11*(2), 296–325.
Desmyter, F., & De Raedt, R. (2012). The relationship between time perspective and subjective well-being of older adults. *Psychologica Belgica, 52*(1), 19–38.
Dezutter, J., Wiesmann, U., Apers, S., & Luyckx, K. (2013). Sense of coherence, depressive feelings and life satisfaction in older persons: A closer look at the role of integrity and despair. *Aging and Mental Health, 17*(7), 839–843.
Diener, E., Oishi, S., & Lucas, R. E. (2009). Subjective well-being: The science of happiness and life satisfaction. In S. J. Lopez & C. R. Snyder (Eds.), *Oxford handbook of positive psychology* (2nd ed., pp. 187–194)., Oxford library of psychology New York, NY: Oxford University Press.
Drageset, J., Espehaug, B., Hallberg, I. R., & Natvig, G. K. (2014). Sense of coherence among cognitively intact nursing home residents—A five-year longitudinal study. *Aging and Mental Health, 18*(7), 889–896. doi:10.1080/13607863.2014.896866.
Drageset, J., Nygaard, H. A., Eide, G. E., Bondevik, M., Nortvedt, M. W., & Natvig, G. K. (2008). Sense of coherence as a resource in relation to health-related quality of life among mentally intact nursing home residents—A questionnaire study. *Health and Quality of Life Outcomes, 6,* 85. doi:10.1186/1477-7525-6-85.
Drake, L., Duncan, E., Sutherland, F., Abernethy, C., & Henry, C. (2008). Time perspective and correlates of wellbeing. *Time and Society, 17*(1), 47–61.
Fernández-Ballesteros, R. (2011). Positive ageing: Objective, subjective, and combined outcomes. *E-Journal of Applied Psychology, 7*(1), 22–30.
Fries, J. F. (2002). Successful aging—An emerging paradigm of gerontology. *Journal of Clinical and Geriatric Medicine, 18*(3), 371–382.
Fry, P. S., & Debats, D. L. (2010). Sources of human life-strengths, resilience, and health. In P. S. Fry & C. L. M. Keyes (Eds.), *New frontiers in resilient aging: Life-strengths and well-being in late life* (pp. 15–59). New York, NY: Cambridge University Press.
Gerostat. (2014). Statistisches informations system Gerostat [Gerostat—Statistical Information System]. Retrieved November 19, 2014 from http://www.gerostat.de/.
Hill, R. D., & Smith, D. J. (2015). Positive aging: At the crossroads of positive psychology and geriatric medicine. In P. A. Lichtenberg, B. T. Mast, B. D. Carpenter, J. Loebach Wetherell, P. A. Lichtenberg, B. T. Mast, et al. (Eds.), *APA handbook of clinical geropsychology. Vol. 1: History and status of the field and perspectives on aging* (pp. 301–329)., APA handbooks in psychology Washington, DC: American Psychological Association.
Kazakina, E. (1999). *Time perspective of older adults: Relationships to attachment style, psychological well-being, and psychological distress*. Ann Arbor: ProQuest Information and Learning.
Kline, R. B. (2011). *Principles and practice of structural equation modeling* (3rd ed.). New York: The Guilford Press.
Lawton, M. P. (1975). PGCMS. The Philadelphia Geriatric Center Morale Scale: A revision. *Journal of Gerontology, 30,* 85–89.
Lewin, K. (1951). *Field theory in the social sciences: Selected theoretical papers*. New York: Harper.

Lövheim, H., Graneheim, U. H., Jonsén, E., Strandberg, G., & Lundman, B. (2013). Changes in sense of coherence in old age—A 5-year follow-up of the Umeå 85 + study. *Scandinavian Journal of Caring Sciences, 27*(1), 13–19. doi:10.1111/j.1471-6712.2012.00988.x.

MacKinnon, D. P., Lockwood, C. M., & Williams, J. (2004). Confidence limits for the indirect effect: Distribution of the product and resampling methods. *Multivariate Behavioral Research, 39*(1), 99–128.

Marengoni, A., Angleman, S., Melis, R., Mangialasche, F., Karp, A., Garmen, A., et al. (2011). Aging with multimorbidity: A systematic review of the literature. *Ageing Research Reviews, 10*(4), 430–439. doi:10.1016/j.arr.2011.03.003.

Norekval, T. M., Fridlund, B., Moons, P., Nordrehaug, J. E., Saevareid, H. I., Wentzel-Larsen, T., et al. (2010). Sense of coherence—A determinant of quality of life over time in older female acute myocardial infarction survivors. *Journal of Clinical Nursing, 19*(5–6), 820–831. doi:10.1111/j.1365-2702.2009.02858.x.

Pinquart, M., & Forstmeier, S. (2012). Effects of reminiscence interventions on psychosocial outcomes: A meta-analysis. *Aging and Mental Health, 16*(5), 541–558.

Rennemark, M., & Hagberg, B. (1997). Sense of coherence among the elderly in relation to their perceived life history in an Eriksonian perspective. *Aging and Mental Health, 1*(3), 221–229.

Rowe, J. W., & Kahn, R. L. (2015). Successful aging 2.0: Conceptual expansions for the 21st century. *The Journals of Gerontology: Series B: Psychological Sciences and Social Sciences, 70B*(4), 593–596. doi:10.1093/geronb/gbv025.

Scholz, U., König, C., Eicher, S., & Martin, M. (2015). Stabilisation of health as the centre point of a health psychology of ageing. *Psychology and Health, 30*(6), 732–749. doi:10.1080/08870446.2014.991733.

Schumacher, J., Gunzelmann, T., & Brähler, E. (2000a). Deutsche Normierung der Sense of Coherence Scale von Antonovsky [Standardization of Antonovsky's sense of coherence scale in the German population]. *Diagnostica, 46*(4), 208–213.

Schumacher, J., Wilz, G., Gunzelmann, T., & Brähler, E. (2000b). Die Sense of Coherence Scale von Antonovsky. Teststatistische Überprüfung in einer repräsentativen Bevölkerungsstichprobe und Konstruktion einer Kurzskala [Antonovsky's Sense of Coherence Scale. Test-statistical examination in a representative population sample and construction of a short scale]. *Zeitschrift für Psychotherapie, Psychosomatik und Medizinische Psychologie, 50,* 472–482.

Shrout, P. E., & Bolger, N. (2002). Mediation in experimental and nonexperimental studies: New procedures and recommendations. *Psychological Methods, 7*(4), 422–445.

Sinnige, J., Korevaar, J. C., Westert, G. P., Spreeuwenberg, P., Schellevis, F. G., & Braspenning, J. C. (2015). Multimorbidity patterns in a primary care population aged 55 years and over. *Family Practice, 32*(5), 505–513. doi:10.1093/fampra/cmv037.

Sobol-Kwapinska, M., & Jankowski, T. (2015). Positive time: Balanced time perspective and positive orientation. *Journal of Happiness Studies*. doi:10.1007/s10902-015-9656-2.

Stolarski, M., Bitner, J., & Zimbardo, P. G. (2011). Time perspective, emotional intelligence and discounting of delayed awards. *Time and Society, 20*(3), 346–363.

Stolarski, M., Matthews, G., Postek, S., Zimbardo, P. G., & Bitner, J. (2014). How we feel is a matter of time: Relationships between time perspectives and mood. *Journal of Happiness Studies, 15*(4), 809–827. doi:10.1007/s10902-013-9450-y.

Ware, J. E., Gandek, B., & the IQOLA Project Group. (1994). The SF-36® Health Survey: Development and use in mental health research and the IQOLA Project. *International Journal of Mental Health, 23*(2), 49–73.

Westerhof, G. J., & Bohlmeijer, E. T. (2014). Celebrating fifty years of research and applications in reminiscence and life review: State of the art and new directions. *Journal of Aging Studies, 29,* 107–114.

Westerhof, G. J., Bohlmeijer, E., & Webster, J. D. (2010). Reminiscence and mental health: A review of recent progress in theory, research and interventions. *Ageing and Society, 30*(4), 697–721.

Wiesmann, U., Dezutter, J., & Hannich, H.-J. (2014). Sense of coherence and pain experience in older age. *International Psychogeriatrics, 26*(1), 123–133.

Wiesmann, U., & Hannich, H.-J. (2008). A salutogenic view on well-being in active elderly persons. *Aging and Mental Health, 12*(1), 56–65. doi:10.1080/13607860701365998.

Wiesmann, U., & Hannich, H.-J. (2010). A salutogenic analysis of healthy aging in active elderly persons. *Research on Aging, 32*(3), 349–371.

Wiesmann, U., & Hannich, H.-J. (2011a). A salutogenic analysis of developmental tasks and ego integrity vs. despair. *International Journal of Aging and Human Development, 73*(4), 351–369.

Wiesmann, U., & Hannich, H.-J. (2011b). Salutogenic perspectives on health maintenance: The role of resistance resources and meaningfulness. *GeroPsych—The Journal of Gerontopsychology and Geriatric Psychiatry, 24*(3), 127–135.

Wiesmann, U., & Hannich, H.-J. (2013). The contribution of resistance resources and sense of coherence to life satisfaction in older age. *Journal of Happiness Studies, 14*(3), 911–928. doi:10.1007/s10902-012-9361-3.

Wiesmann, U., & Hannich, H.-J. (2014). A salutogenic analysis of the well-being paradox in older age. *Journal of Happiness Studies, 15*(2), 339–355. doi:10.1007/s10902-013-9425-z.

Wiesmann, U., Niehörster, G., & Hannich, H.-J. (2009). Subjective health in old age from a salutogenic perspective. *British Journal of Health Psychology, 14*(4), 767–787. doi:10.1348/135910709X413124.

Wiesmann, U., Rölker, S., Ilg, H., Hirtz, P., & Hannich, H.-J. (2006). Zur Stabilität und Modifizierbarkeit des Kohärenzgefühls aktiver älterer Menschen [On the Stability and Modifiability of the Sense of Coherence in Active Seniors]. *Zeitschrift fur Gerontologie und Geriatrie, 39*(2), 90–99.

Zhang, J. W., & Howell, R. T. (2011). Do time perspectives predict unique variance in life satisfaction beyond personality traits? *Personality and Individual Differences, 50*(8), 1261–1266.

Zhang, J. W., Howell, R. T., & Stolarski, M. (2013). Comparing three methods to measure a balanced time perspective: The relationship between a balanced time perspective and subjective well-being. *Journal of Happiness Studies, 14*(1), 169–184.

Zimbardo, P. G. (2012). The time paradox. http://www.thetimeparadox.com/surveys/. Accessed 6 Nov 2012 2014.

Zimbardo, P. G., & Boyd, J. N. (1999). Putting time in perspective: A valid, reliable individual-differences metric. *Journal of Personality and Social Psychology, 77*(6), 1271–1288.

Zimbardo, P. G., & Boyd, J. N. (2008). *The time paradox: The new psychology of time that will change your life*. New York, NY: Free Press.