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Research Article

Sociohistorical Change in Urban Older Adults' Perceived Speed of Time and Time Pressure

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Abstract

Objectives: Perceptions of time are shaped by sociohistorical factors. Specifically, economic growth and modernization often engender a sense of acceleration. Research has primarily focused on one time perception dimension (perceived time pressure) in one subpopulation (working-age adults), but it is not clear whether historical changes extend to other dimensions (e.g., perceived speed of time) and other subpopulations, such as older adults who are no longer in the workforce and experience age-related shifts in time perception. We therefore examined sociohistorical and age-related trends in two dimensions of time perception in two cohorts of urban older adults.
Method: Using propensity score matching for age and education, samples were drawn from the Berlin Aging Study (1990–1993, $n = 256$, $M_{age} = 77.49$) and the Berlin Aging Study-II (2009–2014, $n = 248$, $M_{age} = 77.49$). Cohort differences in means, variances, covariance, and correlates of perceived speed of time and time pressure were examined using multigroup SEM.
Results: There were no cohort differences in the perceived speed of time, but later-born cohorts reported more time pressure than earlier-born cohorts. There were no significant age differences, but perceptions of speed of time were more heterogeneous in the 1990s than in the 2010s. Cohorts did not differ in how time perceptions were associated with sociodemographic, health, cognitive, and psychosocial correlates.
Discussion: These findings document sociohistorical trends toward greater perceived time pressure and reduced heterogeneity in perceived speed of time among later-born urban adults. Conceptualizations of social acceleration should thus consider the whole adult life span.

Keywords: BASE, BASE-II, Historical change, Speed of time, Time pressure

Subjective perceptions of time are multifaceted, ranging from broad conceptions of future horizons spanning decades to fine-grained perceptions of the speed and availability of time in daily life (see Rutt & Löckenhoff, 2016; Staudinger et al., 1999). Time perceptions differ both across individuals and across the life course, and may be shaped by larger sociohistorical trends. Specifically, it has been argued that, with advancing modernization, the subjective speed of time accelerates and the sense of time pressure increases (e.g., Colvile, 2016; Rosa, 2016). Empirical studies have predominantly focused on changing perceptions of time among working-age populations (e.g., Cha & Suh, 2017; Sullivan & Gershuny, 2018). It is not yet known how sociohistorical trends interact with life-span developmental trajectories to affect older adults' time perceptions (Giasson et al., 2019; Löckenhoff & Rutt, 2015). The present study adds to the literature by quantifying sociohistorical trends in two dimensions of time perception: (a) the subjective *speed of time*, defined as the perceived pace at which time proceeds in everyday life, and (b) perceived *time pressure*, defined as a sense that the time one has available is scarce and not sufficient to complete necessary tasks. We tested for cohort differences in matched samples of older urban adults recruited from the Berlin (Germany) metropolitan area in the 1990s and 2010s.

Sociohistorical Trends in Perceived Speed of Time and Time Pressure

Social acceleration theory (Rosa, 2016) and the concept of a societal "speed-up" (e.g., Colvile, 2016; Sullivan & Gershuny, 2018) suggest that modernization is accompanied by three accelerative processes that pervade all aspects of society. *Technical acceleration* involves increases in the pace of production, communication, and transportation. *Acceleration of social change* involves increases in the tempo at which societally shared knowledge, beliefs, and customs change. *Acceleration in the pace of life* involves objective acceleration in the speed of everyday transactions and subjective increases in both the perceived speed of time and time pressure (i.e., perceived lack of time). In combination, these processes are thought to mutually escalate, forming an ever-faster "circle of acceleration" (Rosa, 2016, p. 193).

Accelerations in the pace of life, which are the focus of the present paper, are supported by a growing body of empirical evidence. Large-scale cross-cultural comparisons find that the objective pace of life (as measured by work speed, walking speed, and the accuracy of public clocks) is faster in countries with more advanced socioeconomic development (Levine & Norenzayan, 1999). Perceived time pressure was also found to increase across cohorts in European working-age samples (Lopes et al., 2014). Consistent with social acceleration theory, both faster perceived pace of life and greater time pressure have been linked with more frequent use of technology, higher socioeconomic status, and more complex work roles (Chesley, 2010; Sullivan & Gershuny, 2018).

However, increases in perceived time pressure that are thought to accompany an accelerated pace of life are not universal. For instance, evidence from Korea suggests that the implementation of a 5-day work week has reversed earlier trends toward greater perceived time pressure (Cha & Suh, 2017), and recent data from the UK suggest that although the sense of being rushed differs across demographic groups, it does not appear to differ across historical time (Sullivan & Gershuny, 2018). Existing studies on societal changes in time perception are also limited in that they mostly assess time pressure rather than the subjective speed of time. Moreover, the literature on social acceleration has mostly focused on working-age samples. Thus, there is a disconnect from the growing literature on age-related shifts in temporal perception that manifest in older adulthood.

Age Trends in Perceived Speed of Time and Time Pressure

In addition to the inevitable realization that future time horizons become more limited as people age (Giasson et al., 2019), folklore holds that subjective time speeds up in later life (Janssen et al., 2013). Consistent with this conception, young adults expect that time will appear to pass faster in the future, and both middle-aged and older adults report that time used to pass slower in their youth (for a review, see Janssen et al., 2013).

Whereas broad judgments about life stages are likely to be influenced by implicit theories about aging (cf., Ross, 1989), estimates of short-term intervals, which are more indicative of actual age-related changes in time perception, yield mixed results. The objective ability to estimate and reproduce short-term intervals ranging from seconds to minutes becomes more variable with age, but does not evince systematic under- or overestimation (Mioni et al., 2020). General subjective perceptions of how quickly time is passing show a small age-related speed-up of time (Wittmann & Lehnhoff, 2005), although the age gradient appears to reverse beyond age 70 (Staudinger et al., 1999). When reconstructing their day, older adults tend to rate the pacing of concrete episodes (such as household tasks or exercising) as more rapid than younger adults do (John & Lang, 2015). However, when judging the current pace of time at various points in the day, ratings by community-dwelling younger and older adults do not differ (Droit-Volet & Wearden, 2015), whereas those older than 75 years report a slowing in the pace of time, especially in institutional settings (Droit-Volet, 2019). Further, when evaluating how fast previous time periods had passed, little age variation is seen for the previous hour, week, month, and year, but the past decade is perceived as passing faster by older as compared to younger adults (Friedman & Janssen, 2010; Janssen et al., 2013; Wittmann & Lehnhoff, 2005). Taken together, although there is a general trend toward time passing faster in later life, the extent of those differences varies across measures and subpopulations.

In contrast to the broad research record on age-related accelerations in subjective speed of time, studies on age differences in time availability or scarcity are quite limited. In working-age samples, perceptions of time pressure seem to follow a curvilinear age gradient with a peak in midlife and lower levels in both young adulthood and early old age, as shown in time use diaries (Sullivan & Gershuny, 2018), in-person assessments (Wittmann & Lehnhoff, 2005), and online surveys (Friedman & Janssen, 2010; Janssen et al., 2013). In the single study examining postretirement age (age 70+ years), perceived availability of time followed an increasing age gradient, although the effect size appeared quite small (Staudinger et al., 1999). Beyond this one study, it is not known how perceptions of time pressure differ across old age or whether any of the hypothesized accelerations in the pace of life also pervade recent cohorts' experiences of old age.

Association of Time Perceptions With Physical, Cognitive, and Psychosocial Variables

It is important to understand whether sociohistorical changes in time perception extend into old age because subjective experiences of time have implications for well-being and functioning. Perceived speed of time is associated with a range of consequential outcomes: Independent of age, slower perceived speed is associated with poorer health and more physical symptoms (Melehin, 2018; Rey et al., 2017) as well as lower working memory capacity and impoverished fluid cognition (Droit-Volet, 2019; Melehin, 2018; Woehrle & Magliano, 2012). With respect to mental health, faster perceived speed of time is associated with a sense of meaning and positive affect (Zheng & Wang, 2020), whereas slower speed is linked with negative mood, depression, and poor mental health (Thönes & Oberfeld, 2015) well into later life (Baum et al., 1984; Melehin, 2018). Finally, perceived speed of time is sensitive to social context such that time appears to pass more slowly for those who feel lonely and lack social engagement (Melehin, 2018; Ogden, 2020).

Perceived time pressure, in turn, is associated with poor physical health, a sense of exhaustion, high physical symptoms, elevated blood pressure (Kottwitz et al., 2014; Moen et al., 2013), as well as mental distress, particularly symptoms of depression (Roxburgh, 2004; Ruppanner et al., 2018), and it may negatively affect social relationships (Ruppanner et al., 2018). Although much of the extant research has focused on young and middle-aged samples, associations between poor health and time pressure appear to extend into the second half of life. For instance, in a sample of workers aged 50 years and older, perceived time pressure was linked to both mental health (e.g., nervousness, discouragement) and physical health (e.g., fatigue, pain; Volkoff et al., 2010).

The Present Study

In summary, prior theories and research suggest that people's perceptions of time are subject to both societal changes and life-span developmental forces. However, the literature has largely focused on young and middle-aged adults. Thus, it is not clear whether the observed sociohistorical trends toward acceleration extend into later adulthood. On the one hand, older adults may show reduced cohort effects because they are no longer part of the workforce and thus less exposed to drivers of social acceleration (Rosa, 2016). On the other hand, Freund (2020) proposes a recent historical trend such that older adults in the postretirement phase increasingly pursue the leisure-related and social goals they had to put off during the busy period of middle adulthood. She calls this phenomenon the "bucket list effect." Thus, the historically later cohort of older adults might feel more time pressure as they pursue these goals and experience time as passing faster as they engage in enjoyable and novel activities (Danckert & Allman, 2005).

The present report also adds to the limited set of prior studies that assessed both speed of time and time pressure within the same sample (Friedman & Janssen, 2010; Janssen et al., 2013; Staudinger et al., 1999). According to Janssen and colleagues, a constant sense of being busy eventually leads to the perception that time has been passing more quickly (Friedman & Janssen, 2010; Janssen et al., 2013). Thus, societal acceleration is likely to have a more pronounced and immediate effect on time pressure, whereas effects on the perceived speed of time are likely to lag behind. Conceivably, this could also weaken the association between the two variables in rapidly accelerating societies.

To extend understanding of such dynamics, this study simultaneously examined cohort and age differences in two dimensions of time perceptions (i.e., perceived speed of time and perceived time pressure) using data from matched samples of older adults gathered two decades apart in the metropolitan region of Berlin, Germany. Berlin is an ideal setting for studying social acceleration. Since 1989, the city has undergone both massive political changes in the aftermath of the German reunification and significant economic and structural changes with a reorientation from traditional industries toward the high-tech and service sector, a real-estate boom, and a streamlining of the public transportation system (Häußermann & Kapphan, 2012). Thus, the area has experienced both technological acceleration and acceleration of social change, which according to social acceleration theory should have elicited concomitant acceleration in the pace of life. Within Germany, the hypothesized changes in time perception that might have occurred over the last 30 years should therefore be particularly evident among older adults in Berlin.

As outlined above, time perceptions are sensitive to sociodemographic factors (Sullivan & Gershuny, 2018). In addition to gender, we therefore examined the role of education, physical functioning, fluid cognition, well-being, and loneliness. Importantly, these correlates are also known to differ across historical time with older adults today being cognitively and functionally fitter, reporting higher well-being, and lower levels of loneliness (for an overview, see Drewelies et al., 2019).

Method

Participants and Procedure

Data were drawn from two studies of older adults in the Berlin metropolitan area; the Berlin Aging Study (BASE; conducted 1990–1993; Baltes & Mayer, 1999) and the Berlin Aging Study-II (BASE-II; conducted 2009–2018; Bertram et al., 2014; Gerstorf et al., 2016); for details, see Supplementary Material 1.

This study includes data from 256 BASE participants (M_{age} = 77.49, SD_{age} = 4.45, 52% women) who had completed the measures of interest and from 248 BASE-II participants (M_{age} = 77.49, SD_{age} = 3.92, 51% women) who had completed the measures of interest and could be matched to the BASE sample on age and education using propensity score matching (see Supplementary Material 2).

An earlier study examining secular changes in well-being (Gerstorf et al., 2015) found small but statistically significant cohort effects within a smaller matched subsample of the BASE/BASE-II (n = 161). Given the larger sample size in our study (n = 248), we should thus be in a good position to detect small-sized effects.

Since the BASE drew selectively on former West Berlin, whereas the BASE-II drew on the larger Berlin metropolitan area, we conducted supplemental analyses excluding all participants who had previously resided in the German Democratic Republic (i.e., former East Germany). As seen in Supplementary Material 3, this did not affect the general pattern of results. We therefore reported findings for the full sample.

Measures

Perceived speed of time and time pressure

Each variable was assessed with three items using 3-point Likert scales (Staudinger et al., 1999; see Supplementary Material 4 for item wording). Speed-of-time items focused on how fast time was perceived as passing at the current time, in comparison to younger adulthood, and whether it was passing too fast. Time pressure items focused on the availability of time at the current time, in comparison to younger adulthood, and whether the available amount of time was perceived as sufficient. For each three-item scale, items were recoded and summarized such that higher scores indicated higher speed of time (Cronbach's α = .72/.66 for BASE/BASE-II) and higher time pressure (Cronbach's α = .75/.72 for BASE/BASE-II). Results were comparable when excluding the items in each scale that prompted comparisons with younger adulthood (see Supplementary Material 5). We therefore reported findings for the full scales.

Physical functioning

Upper body physical functioning was assessed via grip strength. Following standard protocol, participants were asked to compress a hand dynamometer three times per hand. Grip strength was indexed as the maximum force (in kilograms) recorded across the six trials. To accommodate differences in device scale across studies (BASE: max = 35 kg; BASE-II: max = 62.17 kg), we employed a percent-of-maximum-possible approach (Cohen et al., 1999).

Processing speed

The Digit Symbol test (Wechsler, 1955) requires participants to match as many digits as possible with a corresponding set of abstract symbols within 90 s. Scores were computed by subtracting the number of incorrect responses from the total number of all responses.

Well-being

Three items from the Philadelphia Geriatric Center Morale scale (Lawton, 1975) captured sadness, taking things hard, and feeling life is not worth living on a 5-point Likert scale. Items were averaged and reverse-coded into a composite where higher scores indicate better well-being (Cronbach's α = .56/.75 for BASE/BASE-II).

Loneliness

Seven items from the UCLA Loneliness Scale (Russell et al., 1984) used a 5-point Likert scale. Items were averaged and recoded into a composite where higher scores indicate higher loneliness (Cronbach's α = .77/.83 for BASE/BASE-II).

Statistical Approach

Using a multivariate Structural Equation Modeling framework (Loehlin, 1998), we examined group differences in the means (μ_{st} and μ_{tp}), variances (σ_{aa} and σ_{tp}), and the covariance ($\rho_{st,tp}$) of *perceived speed of time* and *perceived time pressure*, and tested how these two variables were uniquely related to sociodemographic, health, cognitive, and psychosocial correlates ($\beta_{a,sf}$ through $\beta_{l,tp}$). The basic setup of the model is shown in Supplementary Material 6.

Formally, the differences between groups were tested using a series of nested multigroup models wherein fit of models was compared when the parameters describing the earlier-born cohort from BASE and the later-born cohort from BASE-II were constrained to be equal or allowed to differ. Following usual practice of examining group differences/similarities (Grimm et al., 2016), we estimated and compared a series of four models, ordered to allow for increasing cohort group specificity.

The first model M1 was an invariance model in which all estimated parameters were invariant (identical) across cohorts. This model had the fewest parameters (simplest model) and is shown in Supplementary Material 6 with one set of parameters used to describe the full sample, without any cohort group specificity. The second model M2 allowed the means of the time perception variables to differ across cohorts, while all other parameters remained invariant across cohorts. This model followed the logic of commonly utilized statistical models (e.g., analysis of variance and independent samples *t* test) that are used to examine differences in group-level means. The third model M3 additionally allowed the variances and the covariance of the time perception variables to differ across cohorts. Then, in a fourth model M4, we introduced the correlates and examined if and how differences between cohorts in sociodemographic, health, cognitive, and psychosocial factors carried through to the time perception dimensions and/or the relations between these factors and the time perception variables. Following earlier reports of cohort differences, we always allowed the means and variances of the correlates to differ across groups. At each step, if omnibus tests indicated that the cohorts differed, we engaged a series of one-parameter tests to identify which specific parameters differed across cohorts.

For ease of interpretation, the two time perception variables and health, cognitive, and psychosocial correlates were all *z*-standardized ($M = 0$, $SD = 1$) and sociodemographic variables were centered using the earlier-born BASE cohort as the reference. Thus, noted differences are in an effect size metric. Models were fit using M*plus* (Muthén & Muthén, 1998–2017), with missing data (<4%) accommodated via full information maximum likelihood estimation and missing at random assumptions (Little & Rubin, 1987).

Follow-up analyses (Supplementary Material 7) examined the robustness of the findings when accounting for skewed distributions and explored evidence for nonlinear associations.

Results

Preliminary Analyses

Table 1 reports descriptive statistics and intercorrelations for the measures under study, separately for the two cohort samples. Five aspects are of note. First, the mean of perceived speed of time was tilted toward the upper end of the 3-point response scale ($M = 2.66$ in BASE and $M = 2.73$ in BASE-II; see Figure 1A), indicating that respondents in both cohorts perceived time as progressing rather quickly (see also Staudinger et al., 1999). In contrast, the mean of the perceived time pressure scale was located toward the lower middle of the 3-point response scale ($M = 1.75$ in BASE and $M = 1.90$ in BASE-II; see Figure 1B), indicating that respondents generally did not perceive high time pressure. Second, the two time perception dimensions were only moderately intercorrelated ($r \le .33$). This suggested

Table 1. Descriptive Statistics and Intercorrelations for the Variables Under Study

	Intercorrelations									*M*	(*SD*)
	1	2	3	4	5	6	7	8	9		
1. Perceiving the speed of time (1–3)	1	.28*	−.07	−.04	.04	.06|.11	.21*	.00	−.25*	2.66	(0.46)
2. Perceiving time pressure (1–3)	.33*	1	−.11	−.02	.07	.09|.15	.02	.02	−.12	1.75	(0.57)
3. Chronological age (70–92)	−.03	−.07	1	.08	−.07	−.35*	−.30*	−.07	.12*	77.49	(4.45)
4. Women	.21*	.09	−.05	1	−.29*	−.75*	−.03	−.22*	.14	52%	
5. Education (−2.70 to 3.50)	.03	.07	.11	.02	1	.28*	.30*	.14	−.22*	0.11	(0.99)
6. Grip strength (0–100)	−.09|.00	−.16|.05	−.05	−.78*	−.04	1	.24*|.35*	.19*	−.15*	40.58	(25.57)
7. Digit Symbol (3–76)	.19*	−.04	−.09	.26*	−.06	−.05|.20*	1	.07	−.22*	29.22	(10.13)
8. Well-being (1–5)	−.03	−.00	−.08	−.12	.10	.13*	.09	1	−.30*	3.63	(0.82)
9. Loneliness (1–4.14)	−.14*	−.11	.10	−.07	.03	.00	−.03	−.32*	1	2.06	(0.63)
M (*SD*)	2.73 (0.36)	1.90 (0.52)	77.49 (3.92)	51%	−0.06 (1.04)	43.80 (12.49)	42.60 (10.99)	4.12 (0.83)	1.58 (0.63)		

Notes: Descriptive statistics and intercorrelations are presented above the diagonal for the Berlin Aging Study ($n = 256$) and below the diagonal for the Berlin Aging Study-II ($n = 248$). Because of strong sex differences in grip strength ($r = .78$), intercorrelations with the two time perception variables and Digit Symbol are presented separately for men and women (M\|W).
*$p < .05$.

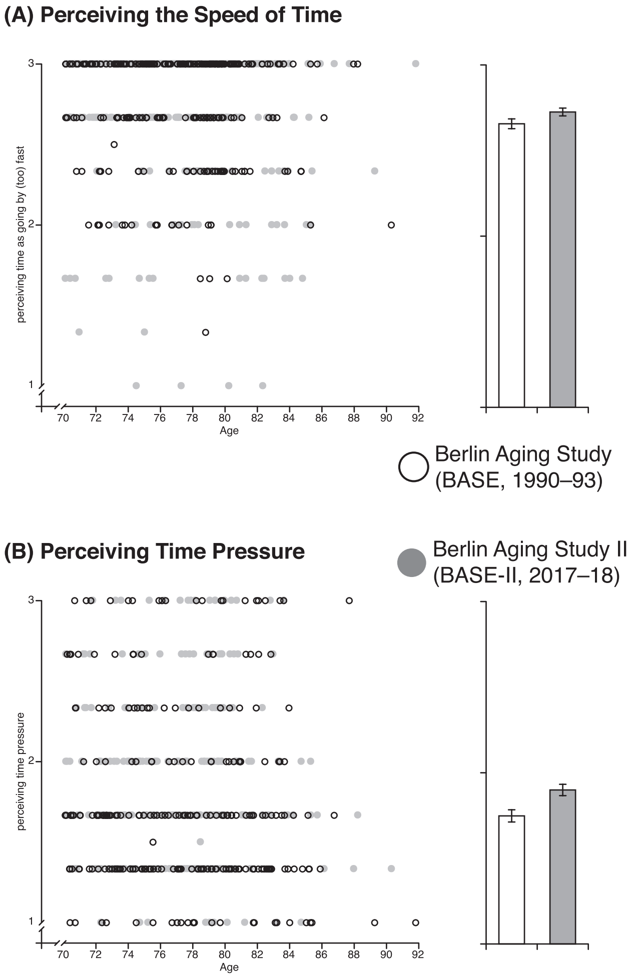

Figure 1. Average cohort differences and individual differences in perceiving the speed of time (**A**) and perceiving time pressure (**B**). The dots are raw data from participants in the matched Berlin Aging Study (BASE; $n = 256$; open circles) and Berlin Aging Study-II (BASE-II; $n = 248$, closed gray circles) samples. Sample means and standard errors for each cohort are displayed separately. Cohort differences in average perceived speed of time were not statistically significant. In contrast, later-born cohorts of older adults, on average, perceived more time pressure than their earlier-born peers, with the standardized mean difference amounting to about one third of a *SD* unit.

that while the two measures of time perception were interrelated, they represented distinguishable facets of the larger concept space. In other words, perceiving time to go by (too) fast does not necessarily mean that one feels time-pressured. Third, the time perception dimensions were related to the sociodemographic, health, cognitive, and psychosocial factors in expected ways. For example, perceiving time as going by (too) fast was moderately associated with better performance on the Digit Symbol test and lower levels of loneliness (r = .21 and r = –.25, respectively, in the earlier-born BASE cohort). Fourth, associations with correlates were found for perceived speed of time, but not for perceived time pressure. Finally, as one would expect, associations among correlates were considerable. For example, grip strength and Digit Symbol exhibited moderate intercorrelations with one another ($r \geq .24$ in the earlier-born cohort) as well as with chronological age (r = –.35 and r = –.30, respectively, in the earlier-born cohort). In sum, the pattern of correlations validated that the measures worked as expected from the prior literature.

Historical Change in Time Perception: Mean Levels, Variances, and Covariances

Results of multigroup nested model comparisons are reported in Table 2. The baseline invariance model, which assumes that the earlier-born and later-born cohorts are from a single population (i.e., are not different), did not fit the data well (e.g., root mean square error of approximation = 0.137; comparative fit index = 0.495). Successive models examined how the groups differed.

Mean differences

First, we allowed the group means to differ. The improvement in fit was statistically significant ($\Delta\chi^2 = -10.61$, df = 2, $p < .01$), suggesting that, on average, older adults today differ from older adults 25 years ago on the two time perception variables considered here. Follow-up probes revealed that mean levels differed between cohorts in perceived time pressure (relative to model M1 in Table 2: $\Delta\chi^2 = -7.11$, df = 1, $p < .01$), but not in perceived speed of time ($\Delta\chi^2 = -0.96$, df = 1, $p > .10$). As Figure 1 shows, there were substantial between-person differences within each cohort, but the cohorts did not, on average, differ in how they perceived the speed of time. In contrast, later-born cohorts of older adults perceived, on average, more time pressure than earlier-born cohorts of older adults. Figure 2 reports all parameter estimates for the model that allows for cohort group specificity in means, variances, and the covariance at the zero-order level; and Figure 3 reports these parameters with the correlates included. The standardized mean difference between BASE and BASE-II amounted to about one-third of a *SD* unit (M = 0.27 in the zero-order model and M = 0.32 in the model with correlates).

Variance–covariance differences

Second, we allowed the group-level variances and the covariance to differ. The improvement in fit was statistically significant ($\Delta\chi^2 = -17.95$, df = 3, $p < .0001$), suggesting the groups differed in the extent of between-person differences in time perception or the relations among the two dimensions.

Formal tests of each variance/covariance term indicated that the extent of between-person differences varied across cohorts for perceived speed of time (relative to model M2 in Table 2 that allowed the means only to vary across groups: $\Delta\chi^2 = -15.81$, df = 1), but not for perceived time pressure ($\Delta\chi^2 = -2.88$, df = 1, $p > .10$) or for the covariation between the two variables ($\Delta\chi^2 = -2.81$, df = 1, $p > .10$). Inspection of parameter estimates (Figures 2 and 3) indicated that between-person heterogeneity in perceived

Table 2. Results of Nested Model Comparisons That Allow for Increasing Cohort Group Specificity

	Goodness-of-fit indices				
Model	χ^2 (df)	$\Delta\chi^2$ (df)	RMSEA	AIC	CFI
Zero-order models					
M1: invariance	28.56 (5)	—	0.137	2,680.98	0.495
M2: means time perceptions allowed to vary	17.95 (3)	−10.61 (2)*	0.141	2,674.37	0.680
M3: (co)variances time perceptions allowed to vary	0.00 (0)	−17.95 (3)*	0.000	2,662.42	1.000
Correlates included					
M1: invariance	40.12 (19)	—	0.066	12,573.60	0.748
M2: means time perceptions allowed to vary	28.21 (17)	−11.91 (2)*	0.051	12,565.70	0.866
M3: (co)variances time perceptions allowed to vary	11.01 (14)	−17.20 (3)*	0.000	12,554.50	1.000
M4: prediction allowed to vary	0.00 (0)	−11.01 (14)	0.000	12,571.49	1.000

Notes: AIC = Akaike information criterion; CFI = comparative fit index; M = model; RMSEA = root mean square error of approximation. Means, variances, and covariances among the correlates were estimated freely across groups.
*$p < .05$.

speed of time was larger among the earlier-born cohort of older adults than among the later-born cohort. Individual differences were about one-third larger in the early 1990s (at the zero-order level, 1.00) than in the late 2010s (at the zero-order level, 0.62). To illustrate, as Figure 1A shows, a larger percentage among the later-born older adults endorsed the maximum response category (54%) relative to the earlier-born older adults (48%), who were distributed more broadly across the response categories.

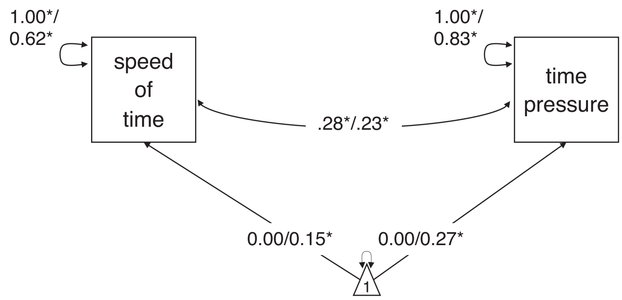

Figure 2. Parameter estimates (earlier-born cohort/later-born cohort) for the zero-order model that allows for cohort group specificity in means, variances, and the covariance. Means, variances, the covariance, and regression coefficients are all standardized.

Historical Change in Correlates of Time Perception

Models that included the sociodemographic, health, cognitive, and psychosocial correlates are reported in the bottom portion of Table 2. In the final step, allowing the 14 regression parameters from the correlates to the time perception outcomes to differ across cohorts did not improve model fit in statistically significant ways ($\Delta\chi^2 = -11.01$, $df = 14$, $p > .10$). Thus, no evidence was found that correlates of successful aging would be intertwined differently with perceptions of time today than in the past.

Inspection of model parameters reported in Figure 3 indicated that, for example, better performance on the Digit Symbol test and lower levels of loneliness were both—independently from one another and other correlates included in the model—associated with perceiving time as going by (too) fast. Most important for the question under study, the strength of these associations was comparable across cohorts (e.g., for loneliness, $\beta = -.24$ among earlier-born and $\beta = -.13$ among later-born older adults).

Discussion

This study examined cohort and age trends in time perception in matched samples of older adults gathered two decades apart in the rapidly developing metropolitan area of Berlin, Germany. Importantly, we modeled not only mean-level differences but also the extent of heterogeneity across participants, how the dimensions of time perception—speed and time pressure—were correlated, and how each related to a set of theoretically implicated correlates.

Consistent with the concept of social acceleration (Colvile, 2016; Rosa, 2016) and the "bucket list effect" (Freund, 2020), and converging with prior results from working-age samples (Lopes et al., 2014), the later-born BASE-II cohort reported more time pressure. This suggests that sociohistorical increases in time pressure extend beyond the formal working years, implying that accelerative forces operate not just via the workplace but well into the postretirement phase (Freund, 2020). However, mean levels of perceived speed of time did not differ significantly across cohorts. As noted previously, this is not unexpected because there may be some lag before the constant sense of being busy leads to a subjective acceleration in the pace of time (Janssen et al., 2013). However, the later-born BASE-II cohort also showed smaller between-person heterogeneity driven by a greater tendency to endorse the maximum response category (see Figure 1A). Thus, a ceiling effect may have obscured mean-level differences across cohorts. Follow-up analyses to account for variable skew

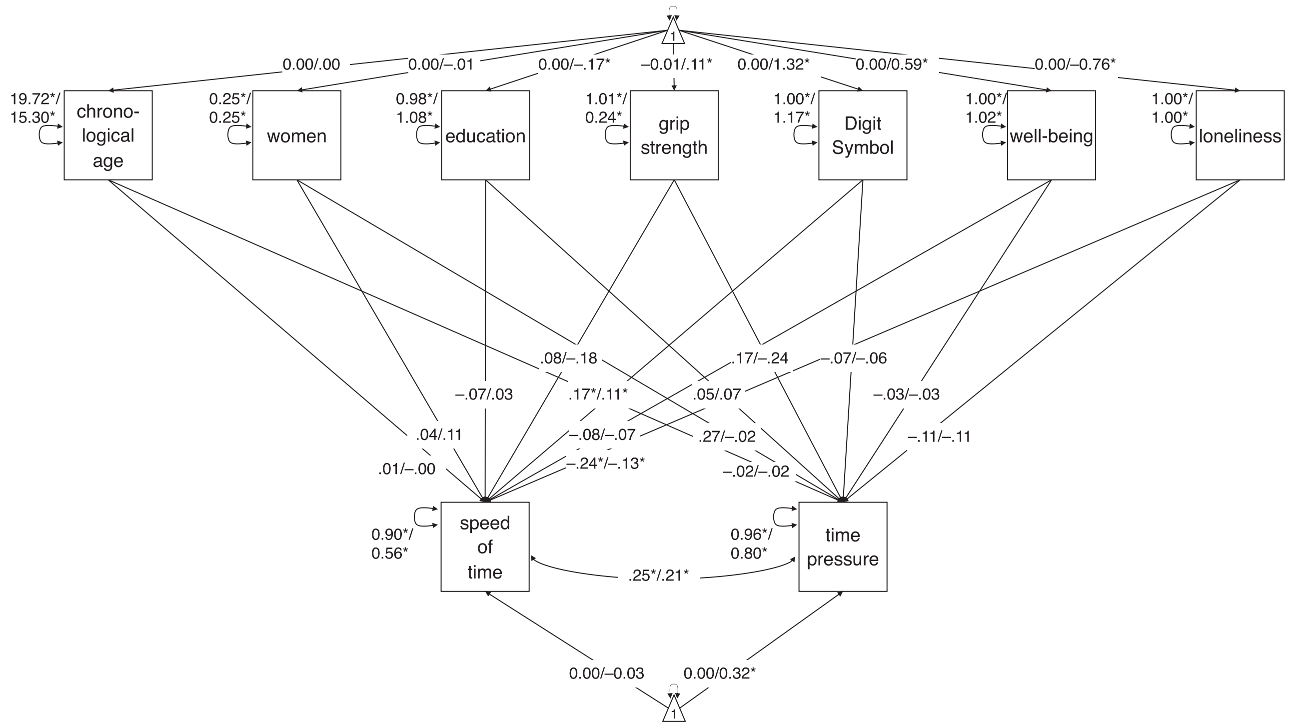

Figure 3. Parameter estimates (earlier-born cohort/later-born cohort) for a model with correlates that allows for cohort group specificity in means, variances, the covariance, and prediction effects. Means, the covariance, and regression coefficients are standardized, variances are unstandardized. For parsimony, intercorrelations among the correlates are not shown.

(Supplementary Material 7) could not fully resolve this concern. Future studies examining speed of time in advanced age should therefore utilize revised measures with added items and response options that would provide more differentiation at the upper end of the scale as well as repeated measurements allowing for more detailed examinations of changes in (within-person) means, variability, and covariation among individual perceptions of time (Ram & Gerstorf, 2009).

The present findings also add to the understanding of potential contributors to sociohistoric trends in time perception. We established that the link between time pressure and speed of time and their respective associations with various correlates do not differ across cohorts. As to be expected, the two time perception measures were moderately related. However, they demonstrated differential associations with covariates, attesting that they are conceptually distinct. Specifically, only speed of time showed significant associations with correlates. Consistent with the prior literature (Ogden, 2020; Woehrle & Magliano, 2012), participants with faster processing speed and lower levels of loneliness reported that time passed more quickly. This implies that speed of time is associated with both cognitive aging and social embeddedness, and that these factors retain their relevance across cohorts, even as older adults become more pressed for time.

One notable finding is the absence of significant age effects in either of the time perception constructs. This contrasts with Staudinger and colleagues (1999), who found age associations in the full BASE sample such that older participants reported a slower passing of time and lower time pressure. In our smaller and younger matched sample, these effects retain their general direction (see Table 1, above diagonal), but are not statistically significant. In line with prior literature documenting that age differences in time perception appear to level off or even reverse in late life (Droit-Volet, 2019), the present samples, which were largely composed of septa- and octogenarians, may have captured the flat area of a curvilinear age gradient.

Some care in interpretation is also warranted because measures focused on general perceptions of the speed of time and time pressure, rather than assessing time perceptions with respect to specific everyday episodes (John & Lang, 2015; Wittmann & Lehnhoff, 2005) or linking them to more detailed time diaries (Sullivan & Gershuny, 2018). In addition to pursuing more leisure-related goals, as would be expected based on the "bucket list" hypothesis (Freund, 2020), previous work suggests that older adults nowadays spend more time volunteering than their peers in earlier cohorts (Broese van Groenou & van Tilburg, 2012) and this may further contribute to feelings of time pressure. To differentiate among the relative role of leisure versus volunteer activities, future research should combine global measures of time perceptions with finer-grained assessments of actual time use.

In conclusion, the present study documents sociohistorical trends toward greater time pressure and lower heterogeneity in perceived speed of time when comparing participants in the BASE (assessed 1990–1993) and the BASE-II (assessed 2013–2018). Further research should both address the aforementioned methodological limitations and examine whether the sociohistorical trends generalize to more representative samples of older adults and extend across different regions of Germany. These questions gain particular relevance as older Germans become more likely to work beyond the prior statutory retirement age of 65, which could potentially make them even more susceptible to accelerative trends (Hofäcker & Naumann, 2015).

Supplementary Material

Supplementary data are available at *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences* online.

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Conflict of Interest

None declared.

Acknowledgments

Analysis code is available via OSF (https://osf.io/ehxsd/). This study was not preregistered.

Data Availability

Data are not publically available but can be requested https://www.base2.mpg.de/7549/data-documentation.

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