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What Do We Need at the End of Life? Competence, but not Autonomy, Predicts Intraindividual Fluctuations in Subjective Well-Being in Very Old Age

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Abstract

Objectives: Self-determination theory (SDT) suggests that fulfillment of the universal psychological needs for autonomy, competence, and relatedness is essential for well-being of all humans. However, it is not clear whether this prediction also holds in advanced old age. The present study aims to test SDT for the two less researched needs in advanced old age: the needs for competence and autonomy.

Method: A total of 111 very old adults (age range at first measurement occasion 87–97 years) were assessed up to 6 times over the course of about 4 years.

Results: Competence, but not autonomy, predicted subjective well-being at the within-person level of analysis. At the between-person level, only negative affect was predicted by autonomy and competence, whereas positive affect and life satisfaction were predicted by competence only.

Discussion: Results challenge the life-span universality of the needs for competence and autonomy postulated by SDT in very old adults and suggest that the high vulnerability in this life phase may change the importance of these needs for well-being.

Keywords: Life satisfaction—Longitudinal change—Self-determination—Very old adults

Self-determination theory (SDT) as proposed by Deci and Ryan (Deci & Ryan, 1985, 2000; Ryan & Deci, 2000) predicts that fulfillment of the basic psychological needs for autonomy, competence, and relatedness is a necessary prerequisite for subjective well-being (SWB). Autonomy relates to the feeling of being self-determined in and having the ability to choose one’s behavior. Competence is defined as perceiving oneself to be effective in one’s actions within given environments, and relatedness can be accomplished by having warm and trusting relationships with other people and thus attaining a sense of belonging. SWB is generally considered to consist of three interrelated yet distinct components (Ryan & Deci, 2001): The first one is referred to as life satisfaction (LS), which can be construed as a subjective evaluation of one’s life. The second component, high level of positive affect (PA), is supplemented by the third component, absence of negative affect (NA).

According to SDT, needs are more than only goals that people aim for; they are rather nutrients necessary for human flourishing, in a way that food and water are necessary for physical survival (Deci & Ryan, 2000). Although there is ample evidence to support this prediction for young and middle-aged adults (e.g., Howell, Chenor, Hill, & Howell, 2011; Reis, Sheldon, Gable, Roscoe, & Ryan, 2000; Vansteenkiste, Lens, Soenens, & Luyckx, 2006), SDT has received little attention in the study of very old adults.
of basic needs, which in turn fosters well-being” (Ryan & La Guardia, 2000, p. 158). In other words, while compensation may take place over the course of human development, well-being can only result if the activities that are established as compensations aim at fulfilling the three basic needs. This means that if activities that can no longer be performed are compensated for, the “new” activities must support the fulfillment of the basic needs (including competence), if they are to promote well-being.

Synthesizing arguments made by SDT and the SOC model, one could argue that because competence is so important even in very old age, activities which can no longer be performed have to be compensated for in order to avoid feelings of decreasing competence. In other words: It is not the case that activities are being dropped because competence is no longer central to very old adults, but rather that activities are chosen as compensations in order to attain a sense of competence that is essential to SWB. This line of reasoning is also inherent in another influential framework of adaptation to age-related loss, the life-span theory of control and its refinement as a motivational theory of life-span development (Heckhausen & Schulz, 1995; Heckhausen, Wrosch, & Schulz, 2010; see also Schilling et al., 2013). According to this control-motivational rationale, persons suffering from increasing difficulties in reaching everyday goals by their usual means will increasingly benefit from what Heckhausen and colleagues (2010) called compensatory secondary strategies—such as replacement of no longer achievable goals or self-serving attributions of one’s failure experiences—which are crucial to disengagement from goals that have become unattainable and reengagement in goals that still are attainable (Dunne, Wrosch, & Miller, 2011; Wrosch, Miller, Scheier, & de Pontet, 2007). That is, compensatory “giving up” is nothing bad and instead serves to maintain the attainability of the goals the person strives for, hence protecting rather than corrupting this person’s perceptions of competence. Overall, considering compensations for objective losses of competencies as crucial for successful adaptation to aging, it could be expected that the impact of feelings of competence on SWB should increase in very old age.

Autonomy seems to play a very important part in the life of very old adults, too: Kasser and Ryan (1999) investigated predictors for well-being among nursing home residents and hypothesized that autonomy support of nursing home staff would be associated with higher LS scores among residents; they reported data supporting this hypothesis. Vallerand and O’Connor (1989) showed that experienced autonomy was related to LS and other markers of positive psychological functioning in nursing home residents. These findings are promising in that they show that the positive effects of autonomy on well-being found in young adults (Vansteenkiste et al., 2006) also hold for old adults. They are, however, restricted in at least two ways: First, these studies did not control for levels of competence, and it could be suspected that autonomy and competence overlap to a substantial degree in this population: If older adults

Are There Age-Related Changes in the Importance of Needs?

Arguments made by several theoretical accounts not directly connected with SDT suggest that there may be a shift in the relative importance of needs in very old age (see also Ryff, 1989b). Regarding competence, the model of selective optimization with compensation (SOC; Baltes & Baltes, 1990) argues that aging necessitates a selection of activities (both behaviorally and psychologically) that the individual is capable of performing well even in the face of age-related losses in functionality. The key idea is that such a narrowed down selection of activities remains subject for optimization processes, serving to maintain optimal performance in domains that the individual has selected to prioritize and compensating for other activities that can no longer be performed. Indeed, it is argued by the SOC model that efficient compensation may support optimization processes, and this may be critical in very old age. In particular, effectively mastering one’s environment might be compensated for by other priorities (such as emotionally meaningful relationships and goals; Carstensen et al., 1999), and feelings of competence might be perceived as relatively less important for SWB in very old age. SDT, on the other hand, argues that while people “may deal with change through varied selections or compensations, […] the impact and adequacy of those adaptations is predicted to be largely a function of the extent to which they facilitate the meeting

of adults’ SWB. One exception is the need for relatedness, which is a target construct in the highly influential socio-emotional selectivity theory (SST; Carstensen, 2006; Carstensen, Isaacowitz, & Charles, 1999). SST argues that if time is perceived as limited (as in very old age), people value emotionally meaningful relationships and goals over those directed toward information gaining. That is, deriving meaning from interpersonal relationships becomes more and more important in very old age (Carstensen, Pasupathi, Mayr, & Nesselroade, 2000), suggesting that the association between relatedness and well-being should be particularly pronounced in old adults. A recent study by Huxhold, Miche, and Schüz (2014), for example, showed that social activities with friends predicted decreases in NA across 6 years in old adults (65 years and older) but not in middle-aged adults (40–65 years), supporting predictions made by SST. Due to the wealth of data already reported on SST (for a review, see Carstensen, 2006), we restrict our focus to the other two needs, the need for competence and the need for autonomy. Specifically, the present study investigates whether fulfillment of the needs for competence and autonomy, respectively, predicts SWB in very old adults, that is, in a highly vulnerable phase of life. This is important because SDT argues that the postulated effects apply “as much to the aged as […] to earlier developmental epochs” (Ryan & La Guardia, 2000, p. 150). The present study aims to approach this question empirically.
have to selectively pursue activities due to age-related losses (see our reflections on SOC and the life-span theory of control), only these activities can be pursued autonomously. Hence, fulfillment of the need for autonomy might in part depend on fulfillment of the need for competence and the effects of autonomy need fulfillment and competence need fulfillment on SWB might be conflated. Second, the reported studies focused on residents in long-term care facilities, and it is not clear whether these results translate to populations outside of these facilities. Both of these issues are addressed in the current study.

However, the specific importance of these two needs in very old age may not only be considered through the lenses of life-span developmental models, but a psychodemographic view may also help to understand the need situation in very old age. In particular, those who exceeded their cohort’s average life expectancy by far should be viewed as special in twofold regard. First, advanced old age means living under an extremely limited future time perspective (FTP) with the awareness of impending death (Baltes, 2006; Erikson, Erikson, & Kivnick, 1986). Second, very old individuals can be regarded as long-term survivors of age-related losses, hence they have already gone through a prolonged “adaptation history” prior to a respective assessment occasion. Considering these special conditions, very old age may not be understood only in terms of the prolongation of developmental trends that typically unfold across the second half of the human life span but also as a terminal phase of the life span unfolding end-of-life processes (Gerstorf & Ram, 2013) that may affect basic human needs. It may, for instance, be questioned whether the very old adults are in need of feelings of being self-determined: Loss of autonomy may be perceived as being “on time”, that is, an unavoidable and “adequate” consequence of reaching advanced old age. Again, in terms of the motivational theory of life-span development (Heckhausen et al., 2010) abolishing the need for autonomy might be adaptive, if this motivational shift optimizes the very old individuals’ capacity for primary control over everyday attainment (e.g., employing so-called compensatory secondary control strategies in advanced old age, such as replacing formerly autonomously pursued goals, which are no longer attainable, by possibly more externally regulated but attainable goals; example: Replacing self-driving with the “controlled” use of my daughter driving me in the interest to visit a museum downtown). Going further, considering that acceptance of death denotes a fundamental developmental task for those at very old ages (Erikson, 1950), there may rather be a need to “relax” demands for autonomy. If so, the need for autonomy could in fact be maladaptive to the terminal conditions of late life. Although empirical research is rare in this area, such reflections illustrate that SDT’s claim of universality of the basic human needs could be questioned with respect to the latest life period, because end-of-life conditions may overburden individual fulfillment of each of these needs and may attenuate some of them.

In conclusion, although previous theory and research suggest that fulfillment of the three basic psychological needs (autonomy, competence, and relatedness) is a predictor of SWB, this prediction has mainly been tested in samples of young and middle-aged adults. SDT proposes that the relative importance of the three needs does not change as we age and predicts that fulfillment of all three needs independently predicts SWB in very old adults as well. Although prior research has shown that relatedness gains importance in this final developmental period, the roles of the needs for competence and autonomy remain unclear. However, very old age may also be viewed as a phase distinctive from earlier periods of the human life span (Baltes, 2006), in that specific end-of-life conditions promote attenuations of basic psychological needs, hence changing the universal structure of needs as proposed by SDT.

Testing Predictions—The Importance of a Between- versus Within-Person Perspective

Empirically, there are two ways to test the predictions made by SDT: The between-person perspective and the within-person perspective. Following the logic of the former, individuals who have higher levels of need saturation than other individuals should also report higher SWB. According to the latter perspective, individuals should have higher SWB at time points when the needs are more saturated than at time points when the needs are less saturated. Statistically, these two perspectives are independent and can be disentangled in longitudinal designs. This also means that conclusions drawn can differ. For example, Taylor and Stebbings (2012) aimed at disentangling between- and within-person effects of need satisfaction on well-being. Results showed that all three needs predicted interindividual differences in PA, but only competence and autonomy (and not relatedness) were associated with within-person fluctuations in PA. While these authors argue that SDT can be tested by both perspectives, we argue that testing the within-person perspective is the more critical one, because SDT aims at describing within-person processes. For illustration consider again the example used earlier: If the need for autonomy would be attenuated in very old age, it could still be expected that measures of autonomy are predictive for SWB at the between-subject level. Given that perceived autonomy has been a crucial need in earlier phases of the life span, individuals who generally perceived higher levels of autonomy may have also developed higher general levels of SWB. However, if autonomy had become less important in latest life, a very old individual’s ups and downs in feeling autonomous would not promote respective ups and downs of this person’s SWB. Therefore, to test within-person processes, the within-person perspective is indeed essential (Hamaker, 2012; Molenaar, 2004).

In conclusion, this study investigates the importance of the needs for competence and autonomy postulated by SDT in very old age. Following the rationale of SDT, it is
expected that both needs independently predict both inter- and intraindividual differences in SWB (LS, PA, and NA).

Method

Participants and Procedure

The sample consisted of participants of the LateLine study. This study started as a follow up of the German subsample of the ENABLE-AGE study (for further information on ENABLE-AGE, see Iwarsson et al., 2007). The ENABLE-AGE sample was a random sample of community-dwelling older adults living alone in the greater Mannheim/Heidelberg area. At the first measurement occasion of LateLine in 2009, all participants were between 87 and 97 years of age. All in all, there were six measurement occasions in LateLine (hereafter referred to as t1 through t6), the first three of which were separated by approximately 1 year each; after that, measurement intervals were reduced to roughly 6 months. Data of 111 participants were included in the analyses, all of whom provided complete data at least at one measurement occasion; 45 participants completed all six assessments. Comparing these participants with those who dropped out, there were no differences in age, p = .249, or gender, p = .666. We further computed mean scores of all study variables (see next section) and compared these mean scores between dropouts and study completers. These two groups did not differ in mean NA, LS, autonomy, environmental mastery, FTP, or self-rated health, p = .060, Cohen’s d < .35 for all, but dropouts had lower mean scores in PA, p = .019, d = .44, the Mini Mental State Examination (MMSE), p = .001, d = .58, and hand grip strength (HGS), p = .040, d = .41. Missing data were implicitly dealt with via the full information maximum likelihood estimator, which was used for the hierarchal linear modeling approach (see Data Analysis). This estimator leads to unbiased results, if the missing data are missing at random (Graham, 2009).

Assessment and Measurements

Well-Being

The Satisfaction with Life Scale (SWLS; Diener, Emmons, Larsen, & Griffin, 1985) was used to assess LS. The SWLS is a 5-item measure that asks participants to indicate the extent to which they agree with statements about their lives (e.g., “I am satisfied with my life,” “In most ways, my life is close to my ideal”). In this study, responses to the items were given on a 5-point Likert scale ranging from not at all to very much. Internal consistency (Cronbach’s α) for the six measurement occasions ranged from .75 to .83. The affective component of SWB was assessed with the German version of the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988). This measure consists of two subscales, one assessing PA and the other one assessing NA, built by 10 items each. Participants are asked to indicate on a 5-point Likert scale how often they experienced a certain affect during the past year. Exemplary items are active, proud (PA) and nervous, hostile (NA). Cronbach’s α ranged from .82 to .87 (PA) and from .79 to .86 (NA).

Need Fulfillment

Need fulfillment was assessed separately for the two needs using the subscales “autonomy” and “environmental mastery” of the scales developed by Ryff (1989a). The subscale “environmental mastery” has been used as operationalization for the fulfillment of the need for competence in prior research (Hofer, Busch, & Kiessling, 2008). A shorter version than the original 20-item version was used; in this version, 9 items per dimension were administered (Staudinger, Lopez, & Baltes, 1997). Participants were asked to indicate on a 5-point Likert scale to what degree statements apply to them (from not at all to very much). Exemplary items are “My decisions are not usually influenced by what everyone else is doing” (autonomy), and “In general, I feel I am in charge of the situation in which I live” (environmental mastery). Cronbach’s α in this study ranged from .62 to .80 (autonomy) and from .72 to .87 (environmental mastery), respectively.

Covariates

We included some time-varying covariates in the analyses to account for possible confounders: the MMSE (Folstein, Folstein, & McHugh, 1975) was used as a measure of overall cognitive functioning. Additionally, measures of perceived health (“All in all, how would you rate your current health?”) and FTP (“How would you rate your current future time perspective?”) were included in the analyses. Both measures were assessed on a scale ranging from 1 (bad) to 5 (excellent). As a measure of physical functioning, we included a measure of HGS for which participants were instructed to press a measurement device as hard as they can. Three measurements were taken and combined into one average score per measurement occasion (Cronbach’s α > .98).

Data Analysis

Study hypotheses were tested using hierarchal linear modeling. Three separate models were tested, one model per dependent variable (LS, PA, and NA). For each of the three dependent variables, models of increasing complexity were tested. Model fit of the competing models were compared via χ2 difference tests for nested models, the Akaike Information Criterion (AIC), and variance explained (R2) computed as 1 − (σ2/σ2_0) (where σ2 is the residual variance of the model being tested and σ2_0 is the residual variance of the random-intercept model; see Xu, 2003).

To test the impact of need fulfillment, the time-varying predictors autonomy and competence were entered simultaneously as (level-1) predictors (centered on the individual means). To account for the effect of interindividual differences in these predictors, the individual means in the predictors were entered as time-invariant (level-2) predictors; these scores were grand-mean centered before they
were entered into the model. The covariates (MMSE, perceived health, FTP, and HGS) were centered on the individual means. Participants’ age was included as additional time-varying (level-1) predictor in all models; age was centered on the grand mean (91.6 years). Analyses were performed using the R-package nlme (Pinheiro, Bates, DebRoy, Sarkar, & R. Development Core Team, 2013) with full information maximum likelihood estimation.

Results

Descriptive Data and Preparatory Analyses

Table 1 shows descriptive statistics of the study variables as well as estimates of within- and between-person variability. About 70% of the variability in the well-being measures could be attributed to stable interindividual differences (see intraclass correlation). Before testing our predictions, we first set up a random-intercept, random-slope model separately for the three well-being indicators as baseline model for all further analyses. In these three models, only the fixed age effect on PA was statistically significant, b = −.034, p = .026, whereas neither LS, b = −.026, p = .133, nor NA, b = −.011, p = .487, changed significantly with increasing age. Hence, PA decreased with increasing age, but there was no effect of age on NA or LS. The random slope was significant for all models, that is, although on average there was no decline in LS (and no increase in NA), participants differed in their slopes across the six measurement occasions (we also fitted models with a quadratic age trend plus random effect for this quadratic trend. These models did, however, not improve model fit substantially and are therefore not reported in detail).

Association of Need Fulfillment and SWB

To test the impact of need fulfillment on the three SWB components, the first model tested was the random-intercept, random-slope model (as built in the previous section), with person means in competence and autonomy need fulfillment across all measurement occasions entered as level-2 predictors to account for interindividual differences in average need fulfillment. Furthermore, the time varying covariates (MMSE, perceived health, FTP, and HGS) were also included. Regarding the effects of the level-2 predictors, results (Table 2) indicate that interindividual differences in fulfillment of the needs for competence and autonomy predict interindividual differences in NA, with high scores in autonomy and competence being associated with lower NA scores. However, contrary to expectations implied by SDT, only higher individual levels of competence were associated with higher levels of LS and PA.

In the next step, the two time-varying predictors were entered simultaneously, which significantly improved prediction of LS and PA, p < .001, but only marginally NA, p = .058. The regression coefficients for the time-varying need predictors tested whether intraindividual deviations from the person-specific means in these constructs were associated with intraindividual differences in SWB. In other words: Is SWB higher at times when the two needs are more fulfilled as compared with times when the two needs are less fulfilled? For all three dependent variables, only fulfillment of the need for competence predicted SWB, while autonomy had no statistically meaningful effects. Put differently, at measurement occasions when participants indicated higher competence scores they also had higher LS and PA as well as lower NA scores than at measurement occasions when competence was relatively lower. Notably, addition of the intraindividual effects elevated the R²’s substantially. Virtually, R² computation according to Xu (2003) provides an estimate of the intraindividual variance explained by the model predictors (see Method), hence comparing in Table 2 the R² of the models with and without the intraindividual

Table 1. Overview of Sample Characteristics

<table>
<thead>
<tr>
<th>Sample size</th>
<th>t1</th>
<th>t2</th>
<th>t3</th>
<th>t4</th>
<th>t5</th>
<th>t6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>90.3 (2.81)</td>
<td>91.3 (2.92)</td>
<td>91.7 (2.77)</td>
<td>92.3 (2.80)</td>
<td>92.7 (2.71)</td>
<td>92.9 (2.52)</td>
</tr>
<tr>
<td>SWLS</td>
<td>3.66 (0.86)</td>
<td>3.77 (0.82)</td>
<td>3.84 (0.75)</td>
<td>3.92 (0.69)</td>
<td>3.88 (0.70)</td>
<td>3.68 (0.80)</td>
</tr>
<tr>
<td>PA</td>
<td>3.25 (0.64)</td>
<td>3.20 (0.68)</td>
<td>3.26 (0.62)</td>
<td>3.28 (0.60)</td>
<td>3.22 (0.60)</td>
<td>3.16 (0.70)</td>
</tr>
<tr>
<td>NA</td>
<td>2.12 (0.62)</td>
<td>2.08 (0.63)</td>
<td>2.07 (0.62)</td>
<td>1.99 (0.62)</td>
<td>2.03 (0.59)</td>
<td>1.97 (0.56)</td>
</tr>
<tr>
<td>Autonomy</td>
<td>3.99 (0.57)</td>
<td>3.91 (0.57)</td>
<td>3.96 (0.63)</td>
<td>3.89 (0.57)</td>
<td>3.95 (0.57)</td>
<td>3.99 (0.47)</td>
</tr>
<tr>
<td>Environmental mastery</td>
<td>4.09 (0.59)</td>
<td>4.00 (0.68)</td>
<td>4.11 (0.64)</td>
<td>4.08 (0.71)</td>
<td>4.00 (0.60)</td>
<td>3.94 (0.54)</td>
</tr>
<tr>
<td>MMSE</td>
<td>27.6 (2.26)</td>
<td>27.5 (2.27)</td>
<td>27.7 (2.34)</td>
<td>27.9 (1.85)</td>
<td>27.8 (2.20)</td>
<td>27.7 (2.22)</td>
</tr>
<tr>
<td>Health</td>
<td>2.53 (0.72)</td>
<td>2.63 (0.75)</td>
<td>2.66 (0.74)</td>
<td>2.66 (0.63)</td>
<td>2.49 (0.81)</td>
<td>2.68 (0.84)</td>
</tr>
<tr>
<td>FTP</td>
<td>2.33 (0.76)</td>
<td>2.39 (0.70)</td>
<td>2.39 (0.67)</td>
<td>2.53 (0.73)</td>
<td>2.35 (0.78)</td>
<td>2.42 (0.61)</td>
</tr>
<tr>
<td>HGS</td>
<td>19.0 (7.06)</td>
<td>19.0 (6.78)</td>
<td>18.3 (7.12)</td>
<td>18.5 (7.82)</td>
<td>18.2 (7.43)</td>
<td>18.6 (7.57)</td>
</tr>
</tbody>
</table>

Notes: Table depicts mean (SD). FTP = Future time perspective; HGS = hand grip strength; ICC = intraclass correlation; MMSE = Mini Mental State Examination; NA = negative affect; PA = positive affect; SWLS = Satisfaction with Life Scale.
Table 2. Results on the Effects of Psychological Need Variables on Well-Being

<table>
<thead>
<tr>
<th></th>
<th>Between + Covariates</th>
<th>+ Within</th>
<th>Between + Covariates</th>
<th>+ Within</th>
<th>Between + Covariates</th>
<th>+ Within</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fixed effects</td>
<td></td>
<td>Fixed effects</td>
<td></td>
<td>Fixed effects</td>
<td></td>
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<tr>
<td>LS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>0.023 [-0.003, 0.049]</td>
<td></td>
<td>0.034* [0.008, 0.059]</td>
<td></td>
<td>-0.018 [-0.047, 0.011]</td>
<td></td>
</tr>
<tr>
<td>MMSE</td>
<td>-0.009 [-0.047, 0.028]</td>
<td></td>
<td>-0.016 [-0.052, 0.019]</td>
<td></td>
<td>0.021 [-0.008, 0.051]</td>
<td></td>
</tr>
<tr>
<td>Health</td>
<td>0.031 [-0.064, 0.125]</td>
<td></td>
<td>-0.019 [-0.110, 0.071]</td>
<td></td>
<td>0.127** [-0.202, -0.051]</td>
<td></td>
</tr>
<tr>
<td>FTP</td>
<td>0.138** [0.050, 0.225]</td>
<td></td>
<td>0.090* [0.007, 0.175]</td>
<td></td>
<td>0.062 [-0.007, 0.132]</td>
<td></td>
</tr>
<tr>
<td>HGS</td>
<td>0.012 [-0.006, 0.029]</td>
<td></td>
<td>0.010 [-0.007, 0.026]</td>
<td></td>
<td>-0.003 [-0.017, 0.011]</td>
<td></td>
</tr>
<tr>
<td>Aut_mean</td>
<td>-0.054 [-0.248, 0.139]</td>
<td></td>
<td>-0.044 [-0.238, 0.150]</td>
<td></td>
<td>-0.000 [-0.174, 0.174]</td>
<td></td>
</tr>
<tr>
<td>Com_mean</td>
<td>0.915*** [0.745, 1.085]</td>
<td></td>
<td>0.917*** [0.745, 1.090]</td>
<td></td>
<td>0.623*** [0.473, 0.774]</td>
<td></td>
</tr>
<tr>
<td>Aut</td>
<td>-0.023 [-0.161, 0.115]</td>
<td></td>
<td>-0.037 [-0.148, 0.073]</td>
<td></td>
<td>-0.012 [-0.162, 0.186]</td>
<td></td>
</tr>
<tr>
<td>Com</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Random variances</td>
<td>0.383*** [0.255, 0.511]</td>
<td></td>
<td></td>
<td></td>
<td>0.256*** [0.156, 0.362]</td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>0.204*** [0.140, 0.297]</td>
<td></td>
<td>0.215*** [0.149, 0.310]</td>
<td></td>
<td>0.147*** [0.096, 0.226]</td>
<td></td>
</tr>
<tr>
<td>Slope (age)</td>
<td>0.001*** [0.000, 0.005]</td>
<td></td>
<td>0.001*** [0.000, 0.008]</td>
<td></td>
<td>0.007*** [0.003, 0.017]</td>
<td></td>
</tr>
<tr>
<td>Residual variance</td>
<td>0.148*** [0.125, 0.175]</td>
<td></td>
<td>0.096*** [0.080, 0.115]</td>
<td></td>
<td>0.089*** [0.074, 0.106]</td>
<td></td>
</tr>
</tbody>
</table>

Notes: Table depicts point estimates and associated 95% confidence intervals in brackets. The between+ covariates model was compared to the baseline model (random-intercept, random-slope model). \(N = 111\). AIC = Akaike Information Criterion. Computation of \(R^2\) based on Xu (2003); Aut = autonomy; Com = competence; FTP = future time perspective; HGS = hand grip strength; LS = life satisfaction; MMSE = Mini Mental State Examination; NA = negative affect; PA = positive affect.

* \(p < .05\). ** \(p < .01\). *** \(p < .001\).
deviation scores yields an ad hoc estimate of within-subject variation accounted for by the two needs (controlling for age-related intraindividual changes and effects of the intraindividual covariates). As can be seen, inclusion of the intraindividual effects led to $R^2$ increases of .103, .066, and .020 for LS, PA, and NA, respectively, representing largely the intraindividual effects of competence (rerunning the models with only intraindividual deviation scores of competence included, the respective increases in $R^2$ were .102, .066, and .017, whereas rerunning with only autonomy without competence revealed $R^2$ increases of .000, .000, and .002). It may be concluded from these numbers that competence had some substantial intraindividual effects on LS and PA (explaining about 6–10% of these outcomes’ within-subject variation), and a smaller intraindividual effect on NA, whereas the intraindividual effects of autonomy were negligible. We further explored autonomy x competence interactions, to test the possibility that the effect of autonomy fulfillment on well-being might only be present if the need for competence is fulfilled as well. However, when adding the interaction of time varying autonomy and competence in predicting the three SWB markers, none of the effects was statistically significant, $p > .398$ for all.

It may also be noted that modeling random slopes of the intraindividual scores of competence and autonomy did not change these results considerably, hence we report the respective fixed effects models for reasons of parsimony (all respective random variances were minor, reaching statistical significance only once, for the random effect of autonomy predicting NA). Thus, predictions made by SDT were only partially supported by the data, in that only competence revealed intraindividual effects on the participants’ current LS, PA, and to a lower extent NA.

In supplementary analyses, we explored whether these results held after accounting for relocation into long-term care facilities and controlling for relatedness: As to the former question, 15 participants lived in long-term care facilities at one or more measurement occasions. To control for possible effects of living in these facilities, we included a time-varying covariate (living in long-term care facility vs. not) in the analyses. Results remained largely unchanged with the exception that the intraindividual effect of competence on NA was only marginally significant, $b = -.089$, $p = .086$. As to the impact of relatedness, only a proxy measure for this need was available in this data set since the LateLine study did not specifically target the need for relatedness. Participants were asked how the quality of their social relationships had changed since the last measurement occasion, and they were instructed to answer on a 5-point Likert scale ranging from “a lot has become worse” (coded “−2”) to “a lot has improved” (coded “+2”). When this measure was included as a time-varying (level-1) control measure for relatedness fulfillment, the results reported here did not change.

**Discussion**

SDT (Deci & Ryan, 1985, 2000; Ryan & Deci, 2000) argues that there are three fundamental and universal psychological needs that are common to all human beings: the needs for autonomy, competence, and relatedness. Fulfillment of all three needs is a necessary condition for SWB. We tested whether the need for competence and the need for autonomy are related to SWB in very old adults—a question that has not received much attention so far. We approached this issue from both a between-person perspective and a within-person perspective. Interindividual differences in SWB were predicted by both needs: Although the effect of competence was found for all three SWB components, autonomy was related to NA only.

However, considering the importance of the three psychological needs as prerequisite of well-being in very old age, the critical test for the predictions made by SDT is the within-person association of need fulfillment and SWB because SDT describes within-person processes (Hamaker, 2012; Molenaar, 2004). In these analyses, only competence emerged as significant predictor of intraindividual variability in all three SWB components: At times when participants indicated higher scores on the environmental mastery scale, LS and PA were higher and NA was lower than at times when these scores were lower. Thus, feeling effective in mastering one’s environment is associated with higher SWB in old age, which is in line with the motivation theory of life-span development suggested by Heckhausen and colleagues (2010) and its emphasis on the need to strive for primary control until the end of life. Contrary to postulates by SDT, fulfillment of the need for autonomy did not predict SWB at the intraindividual level. Autonomy has generally received the least attention of the three needs, and it is also less widely acknowledged in theoretical accounts other than SDT and Carol Ryff’s (1989a) theory of psychological well-being. While autonomy in the context of SDT is explicitly different from independence, Ryff’s approach summarizes both self-determination and independence under the umbrella-term autonomy. Thus, although the scale used in this study is called autonomy, it does not perfectly capture the need for autonomy as it has been specified in SDT. This deviation might at least partially explain why several other studies found that autonomy (as conceptualized by SDT) predicts SWB (Kasser & Ryan, 1999; Sheldon, Ryan, & Reis, 1996; Vansteenkiste et al., 2006), but the current study did not.

The explicit consideration of the particularities of very old age yields speculative explanations of the absent effect of autonomy on ups and downs in well-being across the observation period. As already mentioned in our introductory considerations, losses of autonomy may have been accepted as unavoidable consequence of advanced old age, facilitating ways to generate well-being independent of the need to feel self-determined. Moreover, needs for autonomy might have to be abandoned to gain acceptance
of the impending end of life. In light of the motivational theory of life-span development (Heckhausen et al., 2010), our results could be interpreted as support for the primacy of primary control strivings exerted via secondary control strategies: Effectively mastering one’s environment is prioritized over autonomy in the face of age-related losses as a means to sustain primary control over the attainment of prioritized goals. In particular, devaluing autonomy may become a kind of secondary control strategy in advanced old age, decoupling autonomy need fulfillment from well-being. Counting only on our findings, this reasoning remains speculative, yet it seems worth further consideration because it leads to a fundamental question concerning SDT: Can—and how do—individuals adapt to deficits in basic psychological need fulfillment? Going back to “classic” concepts of psychological adaptation in terms of reduced reactivity to continuing aversive conditions (Bevan, 1965), the dependency of well-being on the fulfillment of basic needs may decline under “chronic” deprivations of these needs. The late life period may hence be seen as a kind of developmental test case to study individuals who typically suffer from such continuous and irreversible lack of need fulfillment.

Our results further suggest that FTP predicts intraindividual fluctuations in LS but not in PA or NA. Intuitively, if FTP promotes LS, this may appear at odds with our reasoning that the very old adults might have abandoned needs for autonomy to gain acceptance of the end of life and thus possibly also acceptance of a limited FTP. However, whereas the ability to accept the impending end may be crucial for the very old adults in order to prevent negative thoughts and feelings dampening SWB, maintaining a FTP may still have a supportive effect on people’s evaluations of their current life circumstances. Also, given that this measure requires cognitive reflection about one’s future, it seems comprehensible that FTP predicts the cognitive component of SWB (LS) but not its more affective parts (PA and NA). However, because this was not a target of our study, these interpretations should be considered post hoc, and we invite future research to explore the role of FTP in predicting SWB in more detail.

Moreover, the between-person associations between needs and SWB deserve consideration. Interindividual differences in need fulfillment in our very old sample are possibly a result of accumulated life experiences: Both genetic effects and effects of one’s environment and learning history accumulate over the course of human development, which could lead to a stabilization of interindividual differences in relatively healthy very old adults (Lodi-Smith, Turiano, & Mroczek, 2010). For instance, if well-off economic conditions or beneficial personality characteristics promote high fulfillment of autonomy needs among middle-aged persons, good relative positions in these conditions may be maintained even in case of age-related losses, consistently facilitating a relative high degree of autonomy even in very old age. Thus, persons’ everyday sense of need fulfillment may fluctuate around rather stable levels, in terms of high rank-order consistency of these levels despite slow developmental changes that might occur across the life span. These subtle changes in need fulfillment over and above stable interindividual differences might therefore not have a pronounced impact. According to SDT, consistent levels of need fulfillment should then be consistently associated with interindividual differences of SWB at each time of the old age period. Regarding autonomy, this was only revealed in terms of a significant respective between-person effect on NA, but not so on LS and PA, whereas individual levels of competence appeared predictive for all three components of SWB, pointing again at a more prominent role of competence as prerequisite of SWB in very old age. This line of reasoning might also add to the explanation of why prior cross-sectional research (Kasser & Ryan, 1999; Vallerand & O’Connor, 1989) found autonomy to be predictive of well-being in old adults, but the current study with its core focus on intraindividual variability did not. However, an evident note of caution might be added here, in that the between-person effects revealed in our analyses do not allow inferences about causality: While the need fulfillment–SWB association is consistent with the assumption of need fulfillment impacting on SWB, the alternative explanation that both components are influenced by a common cause cannot be ruled out by the current design. Experimental data (e.g., Sheldon & Filak, 2008) are needed to shed light on the causal role of need fulfillment on well-being.

Overall, the results presented here only partially support SDT: Competence, but not autonomy, predicted intraindividual ups and downs of SWB in a sample of very old adults and was related interindividually with all SWB components. Following the within-person perspective, our results suggest that people are more reactive toward subtle changes in competence than to changes in autonomy, pointing at a crucial role of competence needs under late life conditions: Competence refers to core demands of everyday life conduct more directly than autonomy, in that it denotes the very old person’s perceived ability of successful engagement in activities of basic goal achievement. This notion confirms with currently established views of developmental adaptation such as the SOC model (Baltes & Baltes, 1990), proposing that aging individuals use compensating strategies or activities that aim at fulfilling the need for competence when they objectively lost competencies. That is, once the need for competence gets thwarted by age-related losses in functionality, aging individuals need to selectively optimize activities that are able to fill this “competence ‘void’”. This would also be suggested by the motivational theory of life-span development (Heckhausen et al., 2010) and its assumption of primacy of primary control striving throughout adult life. Competence might hence be seen as the dominant psychological need at the end of the human life span, the one that remains crucial for the individual’s well-being until the latest life. In other words, competence is an important ingredient in
the recipe for “late” successful aging, and once competence is thwarted and cannot be reestablished by means of “new” activities, SWB is diminished. Future research should consider the additional inclusion of constructs, which may arguably be important for need fulfillment in very old age, such as measures of life review contents and tone of ego-integrity. As a side note, the differences in the effects predicting NA as compared with LS and PA deserve mentioning: Whereas only for NA the two needs revealed significant between-person effects, the within-person effect of competence on NA was notably weaker than on PA or LS (in terms of the R’s). However, empirical evidence suggests that NA should be considered as a more dispositional component of emotional well-being, altogether less reactive to situational impacts (Baker, Cesa, Gatz, & Mellins, 1992; Clark & Watson, 1991). Thus, varying states of need fulfillment may be less predictive for NA, but stable levels of dispositional NA may be more related with interindividual differences in the two needs. Going further, this reasoning also leads to the question whether the between-person effects mirror causal impacts or rather represent evidence for a common cause explanation at the between-person level of analysis.

Limitations
A number of limitations of this study have to be acknowledged. First, we focused on only two of the three needs postulated by SDT. This was due to the argument that relatedness has already been targeted as a major source of well-being in very old age from both a theoretical (Carstensen et al., 1999) and an empirical (Carstensen, 2006) perspective. Moreover, there was no clear-cut indicator of relatedness in our data set; when using a proxy of relatedness, however, the general pattern of the results reported remained unchanged, when we controlled for this proxy measure for relatedness. Second, the current sample probably lacks representativeness in that it included only participants who, at the time of initial screening in 2002, were still living alone. Therefore, these participants might be better off in terms of health, financial situation, and well-being than a representative sample. This fact limits generalizability of the findings presented here. Third, the operationalization of some of the variables deserves critical evaluation: Although the PANAS is probably the gold standard for assessing PA and NA, this measure has been criticized for including high-arousal affect items only (Kessler & Staudinger, 2009). Therefore, any effect on these measures is a combination of effects on high pleasantness and high arousal (PA) and low pleasantness and high arousal (NA), respectively. Because the affect measure reported here includes almost exclusively high-arousal affective states (Watson, Wiese, Vaidya, & Tellegen, 1999), the role of arousal in the effects of need fulfillment on SWB among very old adults remains a task for future research. Additionally, although the needs for autonomy and competence were assessed by scales consisting of 9 items each, these scales might by current standards not be the best operationalization for need fulfillment. However, we are not aware of any scale that has been validated to assess need fulfillment in very old age. The scales provided by Ryff (1989a), on the other hand, have been used frequently in this population. A promising task for future research is to investigate the psychometric properties of scales designed to assess need fulfillment in the SDT framework (Gagné, 2003; Sheldon & Hilpert, 2012) in the population of old adults.

Conclusion
This study investigated inter- and intraindividual differences in SWB in very old adults. The study’s results cast doubts on the universality of the need for autonomy as postulated by SDT and point to the need for life-span differentiation in terms of very old individuals: Whereas fulfillment of the need for autonomy did not predict intraindividual differences in well-being, fulfillment of the need for competence was consistently associated with higher well-being. Perceived competence seems to play a particularly important role for well-being in this age-group. Finally, our results suggest that developmental dynamics in very old age, that is, a highly vulnerable phase of life affect the relative importance of needs for experiencing well-being.

Supplementary Material
Supplementary material can be found at: http://psychsocgerontology.oxfordjournals.org/

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