Research Article

Alex Bertrams*, Thomas H. Dyllick , Chris Englert, Ann Krispenz

German Adaptation of the Subjective Vitality Scales (SVS-G)

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Abstract: Subjective vitality is a positive feeling of aliveness and energy, and it is a crucial aspect of well-being. The Subjective Vitality Scales (SVS) have been developed to measure subjective vitality both at the individual difference level and the state level in English-speaking samples. We translated the SVS into German (the SVS-G) and examined their psychometric properties. In Study 1 (*N*=260), we found that two correlated factors (Factor 1: individual difference level; Factor 2: state level) with five items each constituted a useful structure for the SVS-G. Moreover, the scores on the individual difference scale were more stable than the scores on the state scale. We also found partial evidence for the measurement invariance over a period of three weeks. Conforming to our expectations, Study 2 (*N*=296) revealed that the SVS-G scores were related to positive and negative affect but could still be distinguished from the affect variables. In line with previous findings, Study 3 (*N*=203) showed that SVS-G scores are related to well-being variables (happiness and joviality) and the perceived capacity to actively perform effortful tasks (attentiveness and capacity for self-control). Across all the studies, the SVS-G showed satisfying inner consistency, and the two consideration levels (individual differences vs. state) could be differentiated. The initial evidence suggests that overall, the SVS-G have good psychometric properties.

Keywords: aliveness, energy, German scale adaptation, intrinsic motivation, subjective vitality, well-being

Subjective vitality is defined as a positive-toned experience of aliveness and having energy available to or within the regulatory control of one's self (Ryan & Frederick, 1997). Its theoretical roots can be traced back to ancient Eastern philosophies (e.g., the Chinese concept of Chi) and to early psychodynamic theories on conflict-free subjective energy (e.g., Freud, 1923). In line with such early theorization, modern theories have linked subjective vitality to individuals' healthy functioning and well-being (Ryan & Deci, 2001). The standard for measuring subjective vitality in research is the Subjective Vitality Scales (Ryan & Bernstein, 2004). While the scales have been translated and validated for languages other than English (Castillo, Tomás, & Balaguer, 2017; Fayad & Kazarian, 2013; Kawabata, Yamazaki, Guo, & Chatzisarantis, 2017; Salama-Younes, Montazeri, Ismaïl, & Roncin, 2009), a validated German version has been lacking. In the present work, we aim to close this gap.

Ample research has provided evidence for the adaptive functions of subjective vitality (Ryan & Deci, 2008). For example, it has been demonstrated that people with more vitality are more active, attentive, and productive; they are also better at maintaining effortful self-control and coping with stress, and they report better mental health and well-being (e.g., Dubreuil, Forest, & Courcy, 2014; Kasser & Ryan, 1999; Martela &

***Corresponding author: Alex Bertrams,** University of Bern, Institute of Educational Science, Department of Educational Psychology, Fabrikstrasse 8, 3012 Bern, Switzerland. Email: alexander.bertrams@edu.unibe.ch
Thomas H. Dyllick, University of Mannheim, Department of Social Psychology, 68131 Mannheim, Germany
Chris Englert, Goethe University Frankfurt and University of Bern, Institute of Sport Sciences, Department of Sport Psychology, 60487 Frankfurt am Main, Germany
Ann Krispenz, University of Bern, Institute of Educational Science, Department of Educational Psychology, Fabrikstrasse 8, 3012 Bern, Switzerland

Ryan, 2016; Ryan & Frederick, 1997; Swencionis et al., 2013). These studies found no gender differences in subjective vitality.

Just like the presence of positive affect and the absence of negative affect, vitality is often considered an important aspect of subjective well-being (Ryan & Deci, 2001). In accordance with this view, subjective vitality has been found to be substantially related to higher positive affect and lower negative affect (e.g., Martela & Ryan, 2016; Ryan & Frederick, 1997). However, research has also shown that subjective vitality is not identical to global affect variables. As Martela, DeHaan, and Ryan (2016) pointed out, positive affect includes high-activation dimensions (e.g., feeling active, energetic, or vigorous) as well as low-activation dimensions (e.g., feeling content, satisfied, or pleased). In contrast, subjective vitality is more specific and includes only high-activation dimensions. Correspondingly, Nix, Ryan, Manly, and Deci (1999) demonstrated that subjective vitality is distinct from mere positive affect. Additionally, subjective vitality should also be distinguishable from negative affect, as the latter involves forms of negative activation, such as anger and anxiety (Martela et al., 2016; Ryan & Frederick, 1997).

A widely used measure of subjective vitality is the Subjective Vitality Scales (SVS), developed and first applied in the English language by Ryan and Frederick (1997) in the USA. The SVS consist of both an individual difference-level scale (referring to people's general subjective vitality) and a state-level scale (referring to subjective vitality at a specific moment). The two scales have parallel items with few deviations that clarify the respective consideration level (i.e., in general versus at a specific moment). For instance, one item may read, "I feel alive and vital" on the individual difference level, while its counterpart on the state scale reads, "At this moment, I feel alive and vital" (the full scales are available at http://selfdeterminationtheory.org/subjective-vitality-scale/). These respective consideration levels are also communicated via the scale instructions that precede the items. The original SVS consisted of seven items each; however, Bostic, McGartland Rubio, and Hood (2000) found a six-item version in which one negatively worded item had been deleted to provide a better factor solution. In 2004, Ryan and Bernstein considered the six-item version to be the most efficient measure of subjective vitality. It is notable, though, that even shorter versions have been successfully applied (e.g., a five-item version in Martela & Ryan, 2016). Meanwhile, a five-item version is used regularly by the first author of the original scale (Richard Ryan, personal communication, February 08, 2019).

In many studies, the English SVS have been determined as reliable and valid; thus, they became standard for measuring subjective vitality in research (Ryan & Bernstein, 2004). Consequently, translations and validations for languages other than English have been made, including Arabic (Fayad & Kazarian, 2013), French (Salama-Younes et al., 2009), Japanese (Kawabata et al., 2017), and Spanish (Castillo et al., 2017). A validated German version, however, has been lacking. Given that there are approximately 100 million native speakers of the German language (Swami et al., 2009), we found it useful to close this gap. For this reason, we translated the SVS into German and examined their psychometric properties in three German-speaking samples (one from Germany and two from the German-speaking part of Switzerland). In Study 1, we investigated the factor structure and stability of the translated SVS. In Studies 2 and 3, we tested the concurrent validity of the German SVS by demonstrating theoretically expectable relationships with other measures. In Study 2, we examined the associations with global positive and negative affect, that is, with quite basal and broad affective constructs. Moreover, in Study 2, we aimed to demonstrate that our new measures of subjective vitality can be distinguished from global positive and negative affect and are not redundant to them, meaning that subjective vitality as measured implies more than just feeling good or not bad. In Study 3, we investigated the relationships to more specific variables from the two relevant domains of subjective well-being and subjective performance capability. Across all three studies, we tested whether the two subscales of the German SVS actually reflect different and separable levels of consideration—the individual difference level and the state level (i.e., how intensely one tends to experience subjective vitality in general vs. the experience of subjective vitality at a given moment). We also examined whether the new scales are inner consistent measures.

Study 1

The first aim of Study 1 was to explore the factor structure of the SVS-G. For this reason, we applied exploratory factor analysis (EFA). The exploratory account seemed reasonable to us because this version of the SVS had not yet been investigated. It is possible that cultural and linguistic differences would lead to a greater number of factors compared to versions of the SVS in other languages. Moreover, in contrast to the other examinations of the SVS we were aware of, we intended to enter both the individual difference-level version items and the state-level version items of the SVS-G in one analysis. An EFA allowed us to directly compare the cross-loadings with regard to the two levels.

The second purpose of Study 1 was to determine the stability of the obtained factors by repeating their measurements with part of the same sample three weeks later. We hypothesized that individual difference-level factors would be more stable than state-level factors. Such a finding would suggest that the two different levels can be meaningfully separated. We also examined the measurement invariance over time for the obtained factors.

Method

Participants and procedure. The final sample for the initial measurement consisted of 260 participants (72% female and 28% male; M_{age} = 22.54, SD_{age} = 6.34). The participants were undergraduates recruited from two psychology lectures at a German university. We excluded another participant's data prior to the analysis because she indicated that she could not speak German fluently. Each participant received a sheet of paper with the translated German SVS-G individual difference-level and state-level versions (see the appendix for the measures and the detailed translation-backtranslation process) as well as socio-demographic questions. Moreover, each participant was asked to provide an anonymized code so that their responses at the two measurement times could be matched. At the time of the second measurement, a subsample of 169 students (76% female and 24% male; M_{age} = 22.74, SD_{age} = 7.10) participated again. These participants completed the same measures as they did at the time of the first measurement. At both the measurement times, the orders of the individual difference-level and state-level scales were counterbalanced randomly. There were no significant differences in age, gender and subjective vitality (individual difference or state) between the participants who participated also at the second time of measurement and those who participated only at the first time of measurement (ps > .13).

Results and Discussion

Revision of the number of items. We analyzed the responses to all 12 items of the SVS-G at the first time of measurement. Following Schmitt's (2011) recommendations, we used parallel analysis and fit indices to determine the number of factors, and applied maximum likelihood estimation with Geomin rotation to explore the factor structure and determine the loadings of each item. As fit indices to evaluate the model we used the Tucker-Lewis index (TLI), the comparative fit index (CFI), the root mean square error of approximation (RMSEA), and the standardized root mean square residual (SRMR). We applied cutoff values for acceptable model fit close to .95 for TLI and CFI, close to .06 for RMSEA, and close to .08 for SRMR (Hu & Bentler, 1998, 1999). The parallel analysis was performed with jamovi (version 0.9.5.12; jamovi project, 2018), and all other analyses with MPlus (version 7.2; Muthén & Muthén, 1998-2012). The parallel analysis and the fit indices (see Table 1) suggested a three-factor structure. However, this structure turned out to be problematic. Five individual difference items loaded clearly on the first factor, the individual difference item number 4 ("I look forward to each new day") loaded clearly on the second factor, and five state items loaded clearly on the third factor. The remaining state item number 4 ("I am looking forward to each new day") loaded most strongly on the first factor. The second factor would be useless for psychometric purposes, as it would consist of only one item, and the state item number 4 loaded most strongly on an individual difference factor. Moreover, there were only two eigenvalues ≥ 1. Therefore, we discarded the three-factor solution.

Table 1. Model Fit Estimators From the Exploratory Factor Analysis in Study 1

	χ^2	*df*	TLI	CFI	RMSEA RMSEA 90% CI	SRMR
SVS-G 12 items						
Single-factor model	563.523	54	.594	.668	.191 [.176, .205]	.199
Two-factor model	142.503	43	.901	.960	.094 [.077, .112]	.039
Three-factor model	70.129	33	.952	.976	.066 [.044, .087]	.026
SVS-G 10 items						
Single-factor model	405.473	35	.614	.700	.202 [.184, .220]	.215
Two-factor model	57.296	26	.956	.975	.068 [.044, .092]	.027

Note. $N = 260$. TLI = Tucker-Lewis index, CFI = comparative fit index, RMSEA = root mean square error of approximation, SRMR = standardized root mean square residual.

Examining the 12 items in the two-factor structure also did not lead to an optimal solution. All six individual difference items loaded strongly on the first factor, and five of the state items loaded strongly on the second factor. Moreover, for these 11 items, the cross loadings were rather low. Thus, the two factors were interpreted as the individual difference factor and the state factor. However, item 4 of the state scale loaded substantially on the individual difference factor.

We considered excluding the two number 4 items from the scales of both levels. This was due to two reasons; the first was because of the problematic blurring occurring between the individual difference level and the state level, and the second was because the item content may more strongly reflect positive affect per se than a positively toned experience of available energy. In this regard, the two items number 4 are clearly divergent from the other items (see also Kawabata et al., 2017 and the General Discussion). To avoid prematurely deleting items, we decided to first explore the factor structure further. We collected the data for Study 2 ($N = 296$; see below) in a somewhat different culture (German-speaking Switzerland) than Study 1 (Germany). We also had the opportunity to collect data regarding the English SVS (Ryan & Frederick, 1997) on a university campus in New Zealand ($N = 136$). In these samples, a two-factor structure was indicated, suggested either by parallel analysis or because there were only two eigenvalues ≥ 1. Again, except for item 4 of the state scale, the two-factor structure was unambiguous in both samples; while cross loadings were clearly lower, the six individual difference scale items loaded strongly on one factor, and five of the state scale items loaded strongly on the other factor. Item 4 of the state scale loaded strongly on the individual difference factor and weakly on the state factor in both the Swiss and the New Zealand samples.

Based on the reliable findings from the three samples and countries that the item 4 of the state-level scale did measure individual differences rather than states, we decided to delete this item from the scale. We also deleted item 4 from the individual difference-level scale, even though it was unproblematic with regard to the two-factor structure. This was done because we aimed for parallel scale versions on the individual difference and state levels, and in view of the above-mentioned deviation in content. Moreover, shortened versions of the English SVS with less than six items have sometimes been used (e.g., Martela & Ryan, 2016; Ryan et al., 2010). Later we learned that the five-item versions without the items number 4, which we examine in the following, are now also preferred by the first author of the original English scale (Richard Ryan, personal communication, February 08, 2019). Further on in this work, we will report the results obtained with the reduced scales (five items for subjective vitality as an individual difference variable, and five analogous items for subjective vitality as a state variable).

Factor structure of the reduced scales. Here, we report in detail the results of the EFA with the remaining ten items. The Kaiser-Meyer-Olkin value (.83) and the significant Bartlett's Test of Sphericity ($p <$

.001) indicated that the data were suitable for the EFA. The course of the initial eigenvalues was as follows: 4.98, 2.10, 0.67, 0.60, 0.39, 0.33, 0.28, 0.27, 0.20, and 0.19. The parallel analysis and the fit indices suggested a two-factor structure (see Table 1). Table 2 depicts the means, standard deviations, and factor loadings after extraction of two factors for the items. As can be seen there, the five individual difference-level items loaded substantially on one factor while the five state-level items loaded substantially on the other factor (see the bold numbers in Table 2); all cross loadings were small. Thus, the two-factor solution can be interpreted such that the SVS-G consist of two five-item sub-measures; one of them assesses individual differences in subjective vitality distinguishable from the momentary state of subjective vitality, and the other does the opposite.

Table 2. Descriptive Item Statistics and Factor Loadings From the Exploratory Factor Analysis with the Remaining Ten Items in Study 1

Item in German / in English	*M*	*SD*	L_{F1}	L_{F2}
Ich fühle mich lebendig und vital. / I feel alive and vital. (vit_ind_diff_1)	5.31	1.11	**.83**	.01
Manchmal fühle ich mich so lebendig, dass ich platzen könnte. / Sometimes I feel so alive I just want to burst. (vit_ind_diff_2)	4.55	1.53	**.63**	-.04
Ich habe Energie und Lebensfreude. / I have energy and spirit. (vit_ind_diff_3)	5.50	1.12	**.83**	-.04
Ich fühle mich nahezu immer aufmerksam und wach. / I nearly always feel alert and awake. (vit_ind_diff_5)	4.21	1.16	**.50**	.27
Ich fühle mich gerade energiegeladen. / I feel energized. (vit_ind_diff_6)	4.72	1.19	**.77**	.15
In diesem Moment fühle ich mich lebendig und vital. / At this moment, I feel alive and vital. (vit_state_1)	4.15	1.42	.12	**.85**
Gerade fühle ich mich so lebendig, dass ich platzen könnte. / Currently I feel so alive I just want to burst. (vit_state_2)	2.76	1.41	.28	**.67**
Ich habe im Moment Energie und Lebensfreude. / At this time, I have energy and spirit. (vit_state_3)	4.34	1.40	.24	**.73**
In diesem Moment fühle ich mich aufmerksam und wach. / At this moment, I feel alert and awake. (vit_state_5)	4.14	1.43	-.06	**.86**
Ich fühle mich gerade energiegeladen. / I feel energized right now. (vit_state_6)	3.68	1.41	-.06	**.92**

Note. $N = 260$. Abbreviations for reference in the following tables: vit_ind_diff_# = specific item to measure subjective vitality at the individual difference level. vit_state_# = specific item to measure subjective vitality at the state level. L_{F1} = loading on Factor 1, L_{F2} = loading on Factor 2.

Descriptive statistics on the scale-level at the first time of measurement. Each of the two factors, or scales, respectively, was an internally consistent, homogenous measure. For the individual differences factor, Cronbach's alpha was .84 and the corrected item-total correlations lay between .53 and .77. For the state factor, Cronbach's alpha was .89 and the corrected item-total correlations were between .63 and .81. Next, we built overall scores by averaging the responses on the five items of each factor. The mean of the individual difference factor was 4.86 ($SD = 0.96$), and of the state factor, 3.81 ($SD = 1.18$). The possible values lay between 1 and 7; thus, there was no indication of a floor or ceiling effect. The two factors were correlated ($r = .43$, $p < .001$, 95% CI [.33, .52]). This correlation makes sense insofar that the two factors represent measures of the same construct on different levels of consideration. Still, the correlation is not perfect, which is understandable given the various fluctuating influences on the momentary experience of vitality (Nix et al., 1999; Ryan & Frederick, 1997).

Stability and distinction of consideration levels. In the next step, we examined the stability of the two scales in a subsample. The averaged individual difference scores for the two measurement times did not statistically differ from each other ($n = 169$, $M = 4.87$, $SD = 0.87$ vs. $M = 4.88$, $SD = 0.86$, $t = -0.10$, $p = .92$,

d_z = -0.01) and were highly correlated (r = .63, p < .001, 95% CI [.55, .70]). In contrast, the corresponding state means were significantly different (n = 169, M = 3.80, SD = 1.14 vs. M = 4.25, SD = 1.20, t = -4.63, p < .001, d_z = -0.36) and the correlation for the two state scores was of medium size (r = .42, p < .001, 95% CI [.31, .52]). The test-retest correlation for the individual difference scale was significantly higher than the test-retest correlation for the state scale (z = 2.88, p = .004; formula of Silver, Hittner, & May, 2004). This finding is in line with the distinction between the assessment of a relatively stable individual difference on one hand and less stable momentary states on the other. It should be noted that the individual difference scores were less stable than, for instance, core traits of personality such as extraversion or neuroticism. This result corresponds to previous research that used the SVS in other languages (Castillo et al., 2017; Ryan & Frederick, 1997). Therefore, in contrast to more basal personality traits, the general tendency to experience a given degree of energy and aliveness appears to be easier to change. This provides a basis for interventions to increase health and well-being (e.g., Canby, Cameron, Calhoun, & Buchanan, 2015; Kinnafick, Thøgersen-Ntoumani, Duda, & Taylor, 2014).

As an additional aspect of stability, we tested measurement invariance over time (i.e., across the two points of measurement) in confirmatory factor analysis models (Hoffman, 2015). We examined the longitudinal measurement invariance separately for the individual difference and the state level applying maximum likelihood estimation with MPlus (version 7.2; Muthén & Muthén, 1998-2012). Following the recommendations of Chen (2007) we used the comparative fit index (CFI) and the standardized root mean square residual (SRMR) to determine measurement invariance. We concluded configural invariance (i.e., invariance of model form over time) according to the following cutoff values: > .90 (acceptable fit) and > .95 (excellent fit) for the CFI, and values close to .08 for the SRMR (Hu & Bentler, 1998; March, Parker, & Morin, 2016). Metric invariance (i.e., additional invariance of factor loadings over time) was considered given when the decrease in fit of the more constrained model was less than .005 for the CFI and less than .025 for the SRMR, and scalar invariance (i.e., additional invariance of item intercepts over time) when the decrease in fit of the even more constrained model was less than .005 for the CFI and less than .005 for the SRMR (Chen, 2007). The analyses were performed with single latent factors, each with five items as observed indicators. We specified a configural invariance model with two correlated factors (i.e., the respective subjective vitality scale at the first and the second time of measurement). The loading of the second item was fixed to 1 and its intercept was fixed to 0 for each factor to identify the model; all factor variances, covariances, and means were then estimated. Residual covariances between the same items across time were estimated as well. As shown in Table 3 (see CFI and SRMR), the configural invariance model showed acceptable fit for the individual difference level and excellent fit for the state level. Next, we assessed the equality of the unstandardized indicator factor loadings across occasions in a metric invariance model. The factor variance was fixed to 1 at the first time of measurement but was freely estimated at the second time of measurement. All factor loadings were constrained equal across time; all intercepts (except for the second item) and residual variances were still permitted to vary across time. Factor covariances and residual covariances were estimated as described previously. Neither for the individual difference scale nor the state scale did the metric invariance model fit meaningfully worse than the configural invariance model (see ΔCFI and ΔSRMR in Table 3). Finally, we examined the equality of the unstandardized indicator intercepts across time in a scalar invariance model. For identification, the factor variance was fixed to 1 and the mean was fixed to 0 at the first time of measurement; at the second time of measurement they were freely estimated. All factor loadings and indicator intercepts were constrained equal across time; all residual variances were permitted to differ across time. Factor covariances and residual covariances were estimated as described previously. For the state level, the scalar invariance model did not fit meaningfully worse than the metric invariance model (see ΔCFI and ΔSRMR in Table 3); however, for the individual difference level the fit of the scalar invariance model was worse than the fit of the metric invariance model (see ΔCFI in Table 3). Thus, configural and metric invariance—but not scalar invariance—could be established for the individual difference level scale. At the state level scale, there was configural, metric, and scalar invariance. For interested readers, Table 4 shows the correlation matrix of the items within and across time; Table 5 displays the intercepts and factor loadings of each invariance model.

Table 3. Model Fit Estimators for Examining Measurement Invariance Over a Period of Three Weeks in Study 1

	χ^2	*df*	CFI	SRMR	ΔCFI	ΔSRMR
Individual difference level						
Configural invariance (equivalence of model form)	96.775	29	.937	.050		
Metric invariance (equivalence of model form and factor loadings)	97.123	33	.941	.051	.004	.001
Scalar invariance (equivalence of model form, factor loadings, and item intercepts)	112.341	37	.930	.053	-.011	.002
State level						
Configural invariance (equivalence of model form)	87.401	29	.960	.048		
Metric invariance (equivalence of model form and factor loadings)	91.911	33	.960	.058	0	.010
Scalar invariance (equivalence of model form, factor loadings, and item intercepts)	101.484	37	.956	.058	-.004	0

Note. $N = 260$. CFI = comparative fit index, SRMR = standardized root mean square residual.

Summary. In sum, Study 1 demonstrated that the SVS-G can be empirically subdivided into five items that refer to subjective vitality as an individual difference variable (i.e., how intensely one tends to experience subjective vitality in general) and another five items that refer to the experience of subjective vitality at a given moment. Both of these scales were internally consistent and homogenous, and they were substantially related to each other. Furthermore, there were no indications of a floor or ceiling effect. The individual difference scale showed moderate stability over time, while, as expected, the stability of the state scale was lower. Finally, our analyses revealed configural and metric measurement invariance over a three-week period for the individual difference level scale. For the state level scale, we found configural, metric, and even scalar measurement invariance. The missing scalar invariance for the individual difference level indicates that temporal changes in the self-perception of aspects of one's general vitality are possible, and that further research is needed in this respect. In two additional studies, we sought further evidence for the psychometric properties of the SVS-G.

Study 2

In this study, we investigated the association between the SVS-G and affect. Previous studies have found the English SVS to be positively related to positive affect and negatively related to negative affect (Martela & Ryan, 2016; Ryan & Frederick, 1997). We hypothesized that would also be true for the German version of the SVS. The theoretical reason underlying these predictions (Ryan & Frederick, 1997) was that on one hand, subjective vitality reflects a positive-toned experience of energy; thus, it should overlap with positive affect. On the other hand, subjective vitality should be counteracted by negative affect, because negative affect is associated with negative arousal and conflict. Finding the expected associations would speak to the validity of the scale. Analogous to subjective vitality, we assessed positive and negative affect as individual difference variables as well as state variables.

Another aim of this study was to demonstrate that affect measures and the SVS-G do not assess identical constructs. If they did, the concept of subjective vitality and its measurement could be considered redundant. Therefore, we aimed to show differences in the correlates of subjective vitality and global affect measures. For instance, if the strength of the subjective vitality–negative affect relationship was different from the strength of the positive affect–negative affect relationship, subjective vitality could not be the same as positive affect. The reason behind this is that identical constructs should have identical correlates.

We also sought further evidence for that the individual difference level and the state level scale of the SVS-G can be distinguished and that each one measures subjective vitality at its respective level. This would be true if subjective vitality as an individual difference compared to a momentary state was more strongly related to established individual difference measures of affect. Moreover, subjective vitality as an individual difference should be more strongly related to individual difference measures of affect than to

Table 4. Correlations (in Brackets: p-Values) of the SVS-G Items in Study 1

Item	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1. vit_ind_diff_1 (t1)	-																		
2. vit_ind_diff_2 (t1)	.51 (< .001)	-																	
3. vit_ind_diff_3 (t1)	.71 (< .001)	.45 (< .001)	-																
4. vit_ind_diff_5 (t1)	.41 (< .001)	.33 (< .001)	.42 (< .001)	-															
5. vit_ind_diff_6 (t1)	.65 (< .001)	.53 (< .001)	.62 (< .001)	.61 (< .001)	-														
6. vit_state_1 (t1)	.40 (< .001)	.24 (< .001)	.29 (< .001)	.20 (.001)	.32 (< .001)	-													
7. vit_state_2 (t1)	.16 (.009)	.35 (< .001)	.11 (.09)	.22 (< .001)	.27 (< .001)	.61 (< .001)	-												
8. vit_state_3 (t1)	.44 (< .001)	.28 (< .001)	.40 (< .001)	.28 (< .001)	.41 (< .001)	.71 (< .001)	.56 (< .001)	-											
9. vit_state_5 (t1)	.29 (< .001)	.14 (.03)	.27 (< .001)	.23 (< .001)	.25 (< .001)	.66 (< .001)	.39 (< .001)	.60 (< .001)	-										
10. vit_state_6 (t1)	.31 (< .001)	.21 (.001)	.29 (< .001)	.29 (< .001)	.39 (< .001)	.70 (< .001)	.62 (< .001)	.66 (< .001)	.72 (< .001)	-									
11. vit_ind_diff_1 (t2)	.33 (< .001)	.21 (.006)	.33 (< .001)	.33 (< .001)	.38 (< .001)	.25 (.001)	.18 (.02)	.35 (< .001)	.19 (.01)	.26 (.001)	-								
12. vit_ind_diff_2 (t2)	.26 (.001)	.48 (< .001)	.31 (< .001)	.26 (.001)	.38 (< .001)	.05 (.53)	.24 (.002)	.12 (.13)	-.004 (.95)	.15 (.05)	.45 (< .001)	-							
13. vit_ind_diff_3 (t2)	.47 (< .001)	.32 (< .001)	.51 (< .001)	.35 (< .001)	.48 (< .001)	.20 (.009)	.15 (.06)	.30 (< .001)	.13 (.08)	.27 (< .001)	.74 (< .001)	.50 (< .001)	-						
14. vit_ind_diff_5 (t2)	.24 (.002)	.24 (.002)	.26 (.001)	.60 (< .001)	.48 (< .001)	.09 (.25)	.10 (.22)	.11 (.17)	.11 (.14)	.20 (.01)	.46 (< .001)	.34 (< .001)	.38 (< .001)	-					
15. vit_ind_diff_6 (t2)	.40 (< .001)	.33 (< .001)	.46 (< .001)	.46 (< .001)	.52 (< .001)	.11 (.17)	.17 (.03)	.22 (.005)	.14 (.06)	.28 (< .001)	.63 (< .001)	.53 (< .001)	.64 (< .001)	.64 (< .001)	-				
16. vit_state_1 (t2)	.28 (< .001)	.13 (.08)	.22 (.005)	.35 (< .001)	.37 (< .001)	.36 (< .001)	.25 (.001)	.37 (< .001)	.38 (< .001)	.44 (< .001)	.46 (< .001)	.18 (.009)	.38 (< .001)	.32 (< .001)	.41 (< .001)	-			
17. vit_state_2 (t2)	.33 (< .001)	.28 (< .001)	.28 (< .001)	.37 (< .001)	.42 (< .001)	.29 (< .001)	.36 (< .001)	.30 (< .001)	.29 (< .001)	.45 (< .001)	.31 (< .001)	.33 (< .001)	.27 (< .001)	.36 (< .001)	.42 (< .001)	.69 (< .001)	-		
18. vit_state_3 (t2)	.34 (< .001)	.20 (.008)	.31 (< .001)	.39 (< .001)	.38 (< .001)	.28 (< .001)	.21 (.008)	.39 (< .001)	.28 (< .001)	.37 (< .001)	.43 (< .001)	.21 (.003)	.46 (< .001)	.28 (< .001)	.42 (< .001)	.74 (< .001)	.62 (< .001)	-	
19. vit_state_5 (t2)	.15 (.06)	.02 (.79)	.10 (.20)	.28 (< .001)	.25 (.001)	.22 (.004)	.09 (.23)	.24 (.002)	.40 (< .001)	.39 (< .001)	.35 (< .001)	.16 (.02)	.29 (< .001)	.29 (< .001)	.35 (< .001)	.73 (< .001)	.53 (< .001)	.66 (< .001)	-
20. vit_state_6 (t2)	.14 (.07)	.09 (.26)	.09 (.23)	.36 (< .001)	.26 (.001)	.21 (.007)	.18 (.02)	.27 (< .001)	.28 (< .001)	.38 (< .001)	.38 (< .001)	.16 (.03)	.29 (< .001)	.31 (< .001)	.42 (< .001)	.78 (< .001)	.65 (< .001)	.71 (< .001)	.78 (< .001)

Note. vit_ind_diff_# = item to measure subjective vitality at the individual difference level. vit_state_# = item to measure subjective vitality at the state level. t1 = first time of measurement. t2 = second time of measurement (three weeks after t1).

Table 5. Intercepts and Factor Loadings From the Analysis of Measurement Invariance Over a Period of Three Weeks in Study 1

	Configural				**Metric**				**Scalar**			
Item	I_{t1}	I_{t2}	L_{t1}	L_{t2}	I_{t1}	I_{t2}	L_{t1}	L_{t2}	I_{t1}	I_{t2}	L_{t1}	L_{t2}
vit_ind_diff_1	0.98	0.81	0.95	0.96	0.96	0.82	0.90	0.90	5.27	5.27	0.89	0.89
	(0.88)	(0.76)	(.81)	(.79)	(0.87)	(0.77)	(.81)	(.80)	(4.77)	(4.94)	(.81)	(.79)
vit_ind_diff_2	0.00	0.00	1.00	1.00	0.00	0.00	0.94	0.94	4.57	4.57	0.94	0.94
	(0.00)	(0.00)	(.61)	(.64)	(0.00)	(0.00)	(.61)	(.65)	(2.98)	(3.33)	(.61)	(.65)
vit_ind_diff_3	1.29	1.14	0.93	0.92	1.30	1.13	0.87	0.87	5.45	5.45	0.87	0.87
	(1.17)	(1.14)	(.79)	(.81)	(1.17)	(1.13)	(.78)	(.82)	(4.92)	(5.42)	(.78)	(.82)
vit_ind_diff_5	0.90	0.98	0.73	0.75	0.87	1.03	0.69	0.69	4.29	4.29	0.69	0.69
	(0.78)	(0.91)	(.60)	(.61)	(0.76)	(0.95)	(.60)	(.61)	(3.72)	(3.95)	(.60)	(.60)
vit_ind_diff_6	-0.01	-0.29	1.04	1.10	-0.11	-0.12	1.00	1.00	4.75	4.75	1.00	1.00
	(-0.01)	(-0.26)	(.83)	(.86)	(-0.09)	(-0.11)	(.83)	(.85)	(3.96)	(4.27)	(.83)	(.85)
vit_state_1	0.60	0.73	1.29	1.14	0.81	0.49	1.20	1.20	4.12	4.12	1.19	1.19
	(0.43)	(0.53)	(.85)	(.90)	(0.58)	(0.36)	(.85)	(.90)	(2.93)	(3.01)	(.85)	(.90)
vit_state_2	0.00	0.00	1.00	1.00	0.00	0.00	0.99	0.99	2.85	2.85	1.02	1.02
	(0.00)	(0.00)	(.67)	(.77)	(0.00)	(0.00)	(.69)	(.75)	(1.96)	(2.05)	(.70)	(.76)
vit_state_3	1.06	1.57	1.20	0.95	1.40	1.19	1.06	1.06	4.35	4.35	1.06	1.06
	(0.76)	(1.22)	(.80)	(.81)	(1.03)	(0.89)	(.78)	(.82)	(3.19)	(3.26)	(.78)	(.82)
vit_state_5	0.85	0.76	1.19	1.11	0.98	0.62	1.14	1.14	4.10	4.10	1.12	1.12
	(0.59)	(0.52)	(.78)	(.81)	(0.67)	(0.44)	(.78)	(.82)	(2.83)	(2.98)	(.78)	(.82)
vit_state_6	0.10	0.36	1.30	1.14	0.33	0.08	1.21	1.21	3.69	3.69	1.21	1.21
	(0.07)	(0.26)	(.86)	(.89)	(0.23)	(0.06)	(.86)	(.89)	(2.63)	(2.62)	(.86)	(.89)

Note. $N = 260$. vit_ind_diff_# = item to measure subjective vitality at the individual difference level. vit_state_# = item to measure subjective vitality at the state level. I_{T1} = unstandardized (in brackets: standardized) intercepts at the first time of measurement, I_{T2} = unstandardized (in brackets: standardized) intercepts at the second time of measurement. L_{t1} = unstandardized (in brackets: standardized) factor loadings at the first time of measurement, L_{t2} = unstandardized (in brackets: standardized) factor loadings at the second time of measurement.

state measures of the same affect. The reversed pattern should be observed when subjective vitality as a state is the focus. For this procedure, see, for example, Grös, Antony, Simms, and McCabe (2007).

Method

Participants and procedure. The final sample consisted of 296 university students (60% female and 40% male; M_{age} = 24.00, SD_{age} = 7.01). Prior to the analysis, we excluded all data regarding three additional participants who indicated that they do not speak German fluently. The students were approached in various faculty buildings of a university as well as in an education university in the same city in German-speaking Switzerland and asked to participate. Of the 329 persons approached, 30 refused to participate, indicating a participation rate of 91%.

The following measures were presented and responded to using a tablet computer. Subjective vitality was assessed as displayed in the appendix; however, the two items number 4 were not included in the analyses (see Study 1). In addition, the participants completed the short form of the Positive and Negative Affect Schedule (PANAS; Mackinnon et al., 1999; German: Krohne, Egloff, Kohlmann, & Tausch, 1996). This form of the PANAS measures with five items positive affect (e.g., "inspired") and with another five items negative affect (e.g., "afraid"). As usual for this measure, the responses were given on scales from 1 (*not at all*) to 5 (*extremely*). The participants filled out the PANAS twice; guided by differing instructions, they indicated the one time how they felt in general, and the other time how they felt at that moment (Watson, Clark, & Tellegen, 1988). In the present work, we applied the conceptualization of positive affect and negative affect as separable rather than bipolar constructs (Watson et al., 1988), as has been done in previous work on subjective vitality (e.g., Ryan & Frederick, 1997). Thus, there were three measures at the individual difference level (subjective vitality, positive affect, and negative affect) and the same three measures at the state level. Per random assignment, the participants first completed either the block of individual difference measures or the block of state measures. Each of the different consideration levels was assessed en bloc in order to minimize the likelihood of response errors occurring due to inattention to changing instructions. Finally, the participants provided their socio-demographic information.

Results and Discussion

Reliability and relation to affect. As is evident in Table 6, all scale measures showed sufficient internal consistency. The Cronbach's alpha values for the two subjective vitality measures were high, speaking to the reliability of the SVS-G. Subjective vitality had significant correlations with affect observed at both the individual difference level and the state level (see Table 6). A strong positive correlation was seen between subjective vitality and positive affect, and a moderately strong negative correlation was seen between subjective vitality and negative affect. These correlations are in line with the assumptions and mirror the correlations that were recently found with the English SVS (Martela & Ryan, 2016).

Distinction from affect. As a demonstration of the distinction between the measures of subjective vitality and affect, we found that on the individual difference level, subjective vitality was more strongly related to negative affect than positive affect was to negative affect (z = 2.31, p = .02), and subjective vitality was more strongly related to positive affect than negative affect was to positive affect (z = 8.64, p < .001). The same pattern emerged at the state level, where subjective vitality was more strongly related to negative affect than positive affect was to negative affect (z = 2.07, p = .04), and subjective vitality was more strongly related to positive affect than negative affect was to positive affect (z = 8.58, p < .001). For these analyses, we used the absolute values of the correlation coefficients shown in Table 6 (i.e., we ignored the minus signs where present) and the formula of Meng, Rubin, and Rosenthal (1992). Notably, equal correlations would not have meant that two constructs are identical. In contrast, differences in the correlates suggest that two constructs are not identical. According to this view, the present findings suggest that subjective vitality, as measured by the SVS-G, is distinct from affect. This means that subjective vitality and its measures are not redundant in this regard.

Table 6. Descriptive Statistics and Correlations (in Square Brackets: 95% Confidence Intervals) of the Applied Measures in Study 2

					Correlations						
Measure	Level of consideration	α	*M*	*SD*	1	2	3	4	5	6	7
1. Subjective vitality	Individual difference	.80	4.89	0.96	-						
2. Positive affect	Individual difference	.74	3.36	0.63	.70 $p < .001$ [.64, .75]	-					
3. Negative affect	Individual difference	.74	1.73	0.54	-.32 $p < .001$ [-.42, -.21]	-.22 $p < .001$ [-.33, -.11]	-				
4. Subjective vitality	State	.89	4.25	1.22	.51 $p < .001$ [.42, .59]	.42 $p < .001$ [.32, .51]	-.25 $p < .001$ [-.35, -.14]	-			
5. Positive affect	State	.74	2.91	0.70	.43 $p < .001$ [.33, .52]	.55 $p < .001$ [.47, .63]	-.13 $p = .02$ [-.24, -.02]	.70 $p < .001$ [.64, .75]	-		
6. Negative affect	State	.71	1.45	0.52	-.18 $p = .002$ [-.29, -.07]	-.20 $p < .001$ [-.31, -.09]	.52 $p < .001$ [.43, .60]	-.31 $p < .001$ [-.41, -.20]	-.22 $p < .001$ [-.33, -.11]	-	
7. Age	-	-	24.00	7.01	.002 $p = .97$ [-.11, .12]	-.04 $p = .49$ [.40, .57]	.09 $p = .14$ [-.02, .20]	-.02 $p = .78$ [-.13, .09]	-.10 $p = .09$ [-.21, .01]	.16 $p = .008$ [.05, .27]	-
8. Gender	-	-	-	-	.08 p = .17 [-.03, .19]	.09 $p = .12$ [-.02, .20]	-.08 $p = .15$ [-.19, .03]	.10 $p = .09$ [-.01, .21]	.11 $p = .07$ [-.004, .22]	.01 $p = .86$ [-.10, .12]	-.004 $p = .95$ [-.12, .11]

Note. $N = 296$. Overall scores of a psychometric scale were obtained by averaging the responses to the scale items. Coding for gender: 1 = female, 2 = male.

Distinction of consideration levels. Finally, we compared correlations (Meng et al., 1992) from Table 6 to seek further support for the distinction between the individual difference and the state level of the SVS-G. Individual differences in subjective vitality were more strongly related to individual differences in positive affect than state subjective vitality was to individual differences in positive affect ($z = 6.32$, $p < .001$). This distinction between subjective vitality as an individual difference and as a state was not found with regard to individual differences in negative affect ($z = 1.28$, $p = .20$). Moreover, subjective vitality as an individual difference was more strongly related to individual differences in positive affect than to state positive affect ($z = 6.36$, $p < .001$). Subjective vitality as an individual difference was also more strongly related to negative affect as an individual difference than to negative affect as a state ($z = 2.55$, $p = .01$). Regarding momentary experiences of vitality, state subjective vitality was more strongly related to state positive affect ($z = 6.13$, $p < .001$) and state negative affect ($z = 2.34$, $p = .02$) than were individual differences in subjective vitality. Furthermore, state subjective vitality was more strongly related to state positive affect than to individual differences in positive affect ($z = 6.56$, $p < .001$), but state subjective vitality was not more strongly related to state negative affect than to individual differences in negative affect ($z = 1.10$, $p = .27$). The overall picture of these findings suggests that the individual difference-level scale and the state-level scale of the SVS-G actually measure subjective vitality at the intended level.

Summary. To summarize, Study 2 again found the two scales of the SVS-G to be internal consistent measures. In line with the theory of subjective vitality and previous findings (Martela & Ryan, 2016; Ryan & Frederick,

1997), both scales were related to the measures of positive and negative affect. Further analyses revealed that subjective vitality measured using the SVS-G is not redundant to affect. Moreover, we found further evidence that the SVS-G individual difference scale actually measures at the individual difference level, whereas the SVS-G state scale measures at the state level. In our third study, we continued the validation process.

Study 3

The correlations with affect measures in Study 2 showed that the SVS-G are related to other constructs in a meaningful, theory-based manner. In Study 3, we extended the examination of this aspect of validity. In addition to the SVS-G, we assessed two individual difference-level variables (general subjective happiness and attentiveness) and two state-level variables (momentary joviality and capacity for self-control) that should be positively related to subjective vitality. On each level, one variable reflected subjective well-being (happiness and joviality) and the other expressed the perceived capacity to actively perform effortful tasks (attentiveness and capacity for self-control). The assumed positive relationships are theoretically based on the fact that subjective vitality is considered to be a crucial aspect under the umbrella term of subjective well-being as well as an expression of high intrinsic motivation and experienced self-competence (Longo, Coyne, & Joseph, 2017; Martela & Ryan, 2016; Ryan & Frederick, 1997). According to these considerations, previous studies with the SVS actually found subjective vitality to be positively related to perceived happiness and joy, concentration and attentiveness, and self-control capacity (e.g., Akin, 2012; Ciarocco, Twenge, Muraven, & Tice 2007; Dubreuil et al., 2014; Martela & Ryan, 2016; Muraven, Gagné, & Rosman, 2008; Zhang, Howell, & Stolarski, 2013). We assumed that such relationships would also be found with the SVS-G. In addition, we again tested the distinction between the individual difference-level and the state-level measurements of the SVS-G. This was done analogously to Study 2.

Method

Participants and procedure. The sample consisted of 203 university students (68% female and 32% male; M_{age} = 24.28, SD_{age} = 4.64). All participants indicated that they speak German fluently, and no participants were excluded from the analysis. The students were approached and asked to participate in the buildings of the same institutions as in Study 2, meaning that the study took place in German-speaking Switzerland. As in Study 2, the number of approached students who refused to participate was counted; however, this information unfortunately was lost.

The participants completed the applied measures on a tablet computer. As in Study 2, the measures were presented in a block of individual-difference scales and a block of state scales. The order of the two blocks was randomly assigned. Subjective vitality was assessed as in Study 1 and Study 2 (see appendix). Again, the two items number 4 were excluded from the analysis (see Study 1). Moreover, we applied the scales outlined in Table 7; all these measures had been determined as reliable and valid in previous research. After completing the scales, the participants provided their socio-demographic information.

Results and Discussion

Reliability and relation to validity criteria. All scale measures, including the SVS-G, demonstrated sufficient internal consistency (see Table 8). Table 8 also shows the correlations between the two subjective vitality measures and the validity criteria. In line with the expectations and comparable to previous research, subjective vitality on both levels of consideration was positively related to subjective happiness, attentiveness, joviality, and capacity for self-control. These findings suggest that the SVS-G are reliable and valid measures. Interestingly, a small correlation was seen between subjective vitality as an individual difference and gender, such that men feel less vital than women in general. However, given that this relationship did not occur in the Study 2 sample, which stemmed from the same population as Study 3, we do not consider this to be a reliable finding. Furthermore, in the past, no relationship was typically found between subjective vitality and gender (e.g., Ryan & Frederick, 1997).

Table 7. Applied Measures for Validation in Study 3

Variable	Applied measure	Number of items	Sample item	Response scale	References
Subjective happiness (individual difference level)	Subjective Happiness Scale – German adaption	4	"In general, I consider myself…"	1 (e.g., *not a very happy person*)–7 (e.g., *a very happy person*)	Lyubomirsky & Lepper (1999); German: Spörrle, Welpe, Ringenberg, & Försterling (2008)
Attentiveness (individual difference level)	Scale *Attentiveness* [*Aufmerksamkeit*] of the Inventory for Acquisition of Learning Strategies in Tertiary Education [Inventar zur Erfassung von Lernstrategien im Studium]	6	"When I study, I notice that my thoughts wander." (reverse scored)	1 (*does not apply at all*)–4 (*completely applies*)	Wild & Schiefele (1994)
Joviality (state level)	Joviality scale of the Expanded Form of the Positive and Negative Affect Schedule (PANAS-X)	5	"joyful"	1 (*not at all*)–5 (*extremely*)	Watson & Clark (1992); German: Egloff & Krohne, (1996)
Self-control capacity (state level)	Short version of the State Self-Control Capacity Scale – German adaption	10	"I feel like my willpower is gone." (reverse scored)	1 (*does not apply at all*)–7 (*completely applies*)	Ciarocco et al. (2007); German: Bertrams, Unger, & Dickhäuser (2011)

Note. The participants were instructed to indicate "the degree to which the statement is true for you in general in your life" for the individual difference-level measures, and to indicate "how you feel right now, that is, at the present moment" for the state-level measures.

Table 8. Descriptive Statistics and Correlations (in Square Brackets: 95% Confidence Intervals) of the Applied Measures in Study 3

					Correlations						
Measure	Level of consideration	α	*M*	*SD*	1	2	3	4	5	6	7
1. Subjective vitality	Individual difference	.78	4.91	0.92	-						
2. Subjective happiness	Individual difference	.80	5.08	1.08	.64 $p < .001$ [.55, .72]	-					
3. Attentiveness	Individual difference	.91	2.41	0.60	.36 $p < .001$ [.23, .47]	.28 $p < .001$ [.15, .40]	-				
4. Subjective vitality	State	.88	4.18	1.16	.38 $p < .001$ [.26, .49]	.34 $p < .001$ [.21, .46]	.25 $p < .001$ [.12, .38]	-			
5. Joviality	State	.90	3.08	0.86	.44 $p < .001$ [.32, .55]	.40 $p < .001$ [.28, .51]	.32 $p < .001$ [.19, .44]	.68 $p < .001$ [.60, .75]	-		
6. Self-control capacity	State	.86	4.80	0.98	.45 $p < .001$ [.33, .55]	.34 $p < .001$ [.21, .46]	.46 $p < .001$ [.34, .56]	.58 $p < .001$ [.48, .67]	.59 $p < .001$ [.49, .67]	-	
7. Age	-	-	24.28	4.64	.03 $p = .66$ [-.11, .17]	-.04 $p = .59$ [-.18, .10]	.05 $p = .51$ [-.09, .19]	-.04 $p = .54$ [-.18, .10]	-.13 $p = .07$ [-.26, .008]	.03 $p = .63$ [-.11, .17]	-
8. Gender	-	-	-	-	-.19 $p = .008$ [-.32, -.05]	-.14 $p = .05$ [-.27, -.002]	.08 $p = .26$ [-.06, .22]	-.01 $p = .88$ [-.15, .13]	-.08 $p = .26$ [-.22, .06]	.04 $p = .57$ [-.10, .18]	.02 $p = .75$ [-.12, .16]

Note. N = 203. Overall scores of a psychometric scale were obtained by averaging the responses to the scale items. Coding for gender: 1 = female, 2 = male.

Distinction of consideration levels. As in Study 2, we examined whether the SVS-G individual difference-level scale, compared to the state-level scale, was more strongly related to the other individual difference measures and vice versa (based on the correlations shown in Table 8, and using the formula of Meng et al., 1992). In comparison to state subjective vitality, individual differences in subjective vitality were more strongly correlated with individual differences in subjective happiness ($z = 4.67$, $p < .001$), but not with individual differences in attentiveness ($z = 1.49$, $p = .14$). Furthermore, compared to individual differences in subjective vitality, state levels of subjective vitality were more strongly related to state joviality ($z = 4.03$, $p < .001$) and to state self-control capacity ($z = 2.05$, $p = .04$). The overall picture of these findings indicates that the SVS-G individual difference-level and state-level measures can be differentiated and capture subjective vitality at their respective levels.

Summary. This study revealed once again that the SVS-G are reliable measures in terms of inner consistency. In addition, the SVS-G were related to other constructs in a theoretically reasonable way (e.g., Ciarocco et al., 2007; Martela & Ryan, 2016; Muraven et al., 2008; Zhang et al., 2013), supporting the view that they are valid measures. As in Study 2, we again found evidence that the SVS-G validly distinguishes between the individual difference level and the state level.

General Discussion

In the present work, we introduced the German adaptation of the SVS, the SVS-G, to measure subjective vitality at the individual difference level and at the state level. Across three studies, we found evidence that the two levels of the SVS-G (individual difference and state) can be distinguished and that the scale for each of them has good psychometric properties. Thus, our studies suggest that the SVS-G are useful measures for German-speaking samples. However, given that validation is a continuous process, we consider our findings to be initial and preliminary.

Given our results from Study 1, we recommend using the five-item versions of the SVS-G. There are two reasons for this. First, we reliably found that item 4 on the state level scale ("I am looking forward to each new day") represented subjective vitality as an individual rather than state difference (even in the English version of the SVS). This may lower the precision of the state scale. It may also increase the likelihood of a Type II error occurring when changes in momentary subjective vitality within minutes should be captured, because item 4 may be insensitive to actual changes in state subjective vitality. This is not problematic for the individual difference level measure of the SVS-G; however, we preferred the individual difference level and state level scales to be parallel, as is the case for the original English scales (Ryan & Frederick, 1997). Second, we had concerns regarding the content validity of the two items number 4 ("I look forward to each new day" [individual difference level] and "I am looking forward to each new day," [state level]). To us, they seemed to refer to positive affect rather than vitality. In line with this idea, Richard Ryan, one of the originators of the SVS, meanwhile believes that "looking forward to each new day" may not be a good indicator of subjective vitality from a content validity perspective, and accordingly does not use the items number 4 any more (personal communication, February 08, 2019; see also the personal communication to Kawabata et al., 2017, p. 1794). As Ryan's and our views have developed independently from each other, we are particularly convinced that the five-item versions of the SVS-G are superior to the six-item versions. Thus, in agreement with Richard Ryan (personal communication, February 08, 2019) and Kawabata et al. (2017), we recommend using the five-item SVS as the standard.

Our studies have some limitations and should be extended and expanded upon in several ways. We examined the psychometric properties in convenience samples of university students. This was useful insofar as many previous studies that used the SVS were conducted with university students, including correlative studies, experiments, intervention studies, and studies for the development of the SVS as well as the validation of SVS adaptations in languages other than English (e.g., Akin, 2012; Bostic et al., 2000; Canby et al., 2015; Kawabata et al., 2017; Martela & Ryan, 2016; Shalev, 2014). Thus, our results can be directly compared to many already existing findings. However, at present, our knowledge regarding the SVS-G is limited to German-speaking university students. Further research should test the usefulness of the

SVS-G in samples from other populations in which vitality or changes therein are particularly relevant (e.g., athletes, older people, or people with clinical diagnoses).

Furthermore, our studies relied on self-report measures. In future research, other-reports or objective indicators of vitality could be used to gather further information regarding the validity of the scales. To date, there exist no objective indicators of vitality, but they could take the form of physiological indicators (e.g., Barrett, Della-Maggiore, Chouinard, & Paus, 2004) or of an implicit measure (see Nosek, Hawkins, & Frazier, 2011, for a review of implicit measures).

Further research should also explore why the individual difference scale did not show scalar measurement invariance over time (e.g., due to changed environmental conditions). In addition, future studies may examine the cross-cultural measurement invariance of the SVS-G (Danner et al., 2016; Vandenberg & Lance, 2000). Moreover, future work could investigate the scales using a latent variable approach (Geiser, Götz, Preckel, & Freund, 2017; Tisak & Tisak, 2000). A latent state-trait approach can be applied to further clarify the state- and trait-related variance components (e.g., Steyer, Mayer, Geiser, & Cole, 2015).

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Appendix

SVS-G individual difference-level measure:

Bitte geben Sie für jede der folgenden Aussagen an, wie sehr sie **im Allgemeinen in Ihrem Leben** zutrifft.

1. Ich fühle mich lebendig und vital.

❒	❒	❒	❒	❒	❒	❒
1	2	3	4	5	6	7
trifft gar nicht zu			trifft etwas zu			trifft sehr zu

2. Manchmal fühle ich mich so lebendig, dass ich platzen könnte.

❒	❒	❒	❒	❒	❒	❒
1	2	3	4	5	6	7
trifft gar nicht zu			trifft etwas zu			trifft sehr zu

3. Ich habe Energie und Lebensfreude.

❒	❒	❒	❒	❒	❒	❒
1	2	3	4	5	6	7
trifft gar nicht zu			trifft etwas zu			trifft sehr zu

4. Ich freue mich auf jeden neuen Tag.

❒	❒	❒	❒	❒	❒	❒
1	2	3	4	5	6	7
trifft gar nicht zu			trifft etwas zu			trifft sehr zu

5. Ich fühle mich nahezu immer aufmerksam und wach.

❒	❒	❒	❒	❒	❒	❒
1	2	3	4	5	6	7
trifft gar nicht zu			trifft etwas zu			trifft sehr zu

6. Ich fühle mich energiegeladen.

❒	❒	❒	❒	❒	❒	❒
1	2	3	4	5	6	7
trifft gar nicht zu			trifft etwas zu			trifft sehr zu

SVS-G state-level measure:

Bitte geben Sie für jede der folgenden Aussagen an, wie sehr sie **jetzt, d.h. in diesem Moment**, auf Sie zutrifft.

1. In diesem Moment fühle ich mich lebendig und vital.

❒	❒	❒	❒	❒	❒	❒
1	2	3	4	5	6	7
trifft gar nicht zu			trifft etwas zu			trifft sehr zu

2. Gerade fühle ich mich so lebendig, dass ich platzen könnte.

❒	❒	❒	❒	❒	❒	❒
1	2	3	4	5	6	7
trifft gar nicht zu			trifft etwas zu			trifft sehr zu

3. Ich habe im Moment Energie und Lebensfreude.

❒	❒	❒	❒	❒	❒	❒
1	2	3	4	5	6	7
trifft gar nicht zu			trifft etwas zu			trifft sehr zu

4. Ich freue mich gerade auf jeden neuen Tag.

❒	❒	❒	❒	❒	❒	❒
1	2	3	4	5	6	7
trifft gar nicht zu			trifft etwas zu			trifft sehr zu

5. In diesem Moment fühle ich mich aufmerksam und wach.

❒	❒	❒	❒	❒	❒	❒
1	2	3	4	5	6	7
trifft gar nicht zu			trifft etwas zu			trifft sehr zu

6. Ich fühle mich gerade energiegeladen.

❒	❒	❒	❒	❒	❒	❒
1	2	3	4	5	6	7
trifft gar nicht zu			trifft etwas zu			trifft sehr zu

Note. Items and item order correspond to Ryan and Frederick (1997, p. 540); however, their item *b* was omitted (see Bostic et al., 2000). Wording on response scales: 1 (*not at all true*)–4 (*somewhat true*)–7 (*very true*). None of the items is to recode. We recommend using five-item scales (i.e., omitting the number 4 items "Ich freue mich [gerade] auf jeden neuen Tag").

Translation Process:
The first author translated the English SVS (retrieved from http://selfdeterminationtheory.org/subjective-vitality-scale/) into German. Afterwards, an English-German bilingual back-translated the German formulations into English. Next, the first author (being knowledgeable of the theory of subjective vitality) and the bilingual (being knowledgeable of linguistic meaning) discussed the differences between the original scale and the back-translation while referencing the preliminary German translation. After making several adjustments, the second author (being knowledgeable of the theory of subjective vitality) inspected the latest German translation and made notes on it. Then, another English-German bilingual reviewed the original wording, the German translation, and the second author's notes. She approved the translation; however, she recommended the deletion of a superfluous word. We followed this recommendation, which led to the version of the German Subjective Vitality Scales (SVS-G) that is shown in the appendix. We obtained permission from Dr. Richard Ryan to publish our translated German adaptation of the SVS (personal communication, February 03, 2019).