

Development and Validation of a Motivational Persistence Scale

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The main goal of our research was to develop a new measure of persistence and to assess its construct validity and psychometric proprieties. First, we discuss the history of the psychological construct of persistence, defined here as the tendency to remain engaged in specific goal-related activities, despite difficulties, obstacles, fatigue, prolonged frustration or low perceived feasibility. The developed scale, measuring motivational persistence, contains three-factors: long-term purposes pursuing, current purposes pursuing and recurrence of unattained purposes. The results of the two validation studies conducted, employing both exploratory and confirmatory factor analysis, advocate the hypothesized structure. Also, the Pearson and canonical correlations between the three factors of the new self-report scale and other three related measures (and their factors) indicate good levels of convergent and divergent validity of the new scale.

Keywords: motivation, goal-related activities, persistence scale, validity.

Western cultures glorify persistence and hard work, discouraging easily giving up strivings (Hofstede, 2001). Consequence of the protestant work ethics, persistence is often conceptualized as a source of distinctiveness, a given, unalterable trait, that is diagnostic for a person's "calling". Nevertheless, people tend to persist more in some tasks than in others and differ in their ability to choose and pursue important, inciting goals. In this study, we briefly discuss the confusion surrounding the concept that affected the attempts for its understanding and measurement, and then we propose a new measure of persistence, which received support from the data, across two validation studies.

The variety of labels attached to the same construct, persistence, and the stability – specificity debate has contributed to the lack of unity in this field. Some authors see persistence as a temperamental dimension (Chess & Thomas, 1987; Cloninger, Przybeck, & Svrakic, 1991), other incorporate it into character models and name it *perseverance* (Londoner, 1972; Williams & De Steno, 2008); similar constructs are those of *grit* (Duckworth, Peterson, Matthews, & Kelly, 2007), *tenacity* (Gollwitzer, Parks-Stamm, Jaudas, & Sheeran, 2008; Brandtstädter & Renner, 1990), *industriousness* (Eisenberger, 1992) or *endurance*

(Rethlingshafer, 1942). The trait perspective was advocated in several studies (e.g. Baumeister, Gailliot, DeWall, & Oaten, 2006; Deater-Deckard, Petrill, Thompson, & DeThorne, 2006; Gusnard et al., 2003).

The paronymy *perseverance* – *perseveration* and the interchangeable use in research and clinical settings have generated more confusion regarding the concept. If the first term is similar to *tenacity* and *persistence*, the second refers to the inability to suppress repeated verbal or motor acts, caused by neurological conditions (Bjorkland & Harnishfeger, 1990). Consequently, the concept of *perseverance* borrowed some features of *perseveration*, such as rigidity, irrationality or inappropriateness. The phenomenon was also present in a study conducted in clinical setting (Serpell, Waller, Fearon, & Meyer, 2009). We detach the component of inflexibility, erroneously integrated in the definition of persistence, consequence of the similarity between the surface expressions of perseverance and perseveration and plead for the adaptive quality to the concept.

Employed as a convenient and versatile measure to test motivation models, in the experimental tradition, persistence was *operationalized* as the amount of time spent on difficult tasks, or as endurance to discomfort (Howells, 1933). Used to infer the subject's achievement motivation (Atkinson & Cartwright, 1964; Feather, 1961), conative ability (Downey, 1923), or the tension generated by unfulfilled needs (Lewin, 1935), persistence was explained as accessibility of information regarding unfinished tasks (Zeigarnik, 1927), reactance to obstacles (Wright & Brehm, 1989), an effort justification mechanism (Aronson & Mills, 1959), or a type of internal, controllable attribution (Weiner, 1985).

Persistence is also measured with specific scales (Lufi & Cohen, 1987; Mukherjee, 1974; Wang, 1932) or components of multiphasic questionnaires (*Temperament and Character Inventory*, Cloninger, Przybeck, & Svrakic, 1991; *Self-Control Measure*, Tangney, Baumeister, & Boone, 2004; *Action Control Scale*, Kuhl, 1994). All perspectives emphasize the following aspects: sustained involvement in an activity, renewal of commitment and intensification of effort when facing obstacles (lack of reward, presence of alternative desirable goals). We already suggested a model of motivational persistence as core component of the strength of goal striving (Constantin, 2008). Analyzing previous conceptualizations, we conclude that the inflation of terms and contexts where persistence is exploited without a clear and unequivocal definition lead to a perpetuation of its ambiguity. Our aim is to integrate aspects that were regarded separately into a single model of motivational persistence and test it empirically.

THE CONCEPT OF MOTIVATIONAL PERSISTENCE AND ITS DIMENSIONS

We conceptualize persistence as a three-dimensional trait, where the frame is constituted by the time-extension of goals. Due to the distinct properties and underlying motivational mechanisms conducting to persistence in differently temporally situated goals, we divide the concept based on of proximity of desired ends.

Most models treat persistence as a secondary factor, as in the *Achievement Motivation Inventory* (Schuler, Thornton, Frintrup, & Mueller-Hanson, 2003) or Kuhl's Action Control Model, with its corresponding scale, *ACS-90* (Kuhl, 1994). In terms of the Rubicon theory of action phases (Heckhausen & Gollwitzer, 1987), our model addresses the quality of post-decisional volitional and motivational processes that govern goal pursuits. We aim to isolate the elements that sustain to the durability of strivings, regardless of motivational contents, such as self motives, values, interests, needs, or self-regulatory strategies.

In the conceptualization of the three persistence scales, we chose temporal topography of the goals as important dimensions of the quality of goal pursuits, operating differently on the subjective experience and efficiency of goal strivings. Vallacher and Wegner (1987) first made the distinction between concrete and abstract representation of goals, suggesting that the level on which an action is conceptualized affects the subsequent involvement, striving and monitoring. Also, recent neuroimagic studies suggest that abstract representations activate different regions than those recruited for concrete ones (Amodio & Frith, 2006). Evolved from the previously mentioned action identification theory, and combining mental temporal topography of goals with the feature regarding their level of abstractness, a more recent account describes the temporal construal of goals. This approach, known as the construal level theory (Trope & Liberman, 2003, 2010), suggests that activities that are mentally represented closer to present trigger different associations and require distinct self-regulatory mechanisms than long-term goals. To imagine future distant actions, people use abstract goals, while proximal actions are represented in concrete details (Liberman, Sagristano, & Trope, 2002); moreover, when they think about distant actions, people use global styles of processing, in contrast with local ones, employed for nearer events (Fujita, Henderson, Eng, Trope, & Liberman, 2006).

Goal proximity is important because it influences the allocation of resources: Brendl and Higgins (1995) suggest that perceived distance to goal attainment influences effort investment. Another related, already documented phenomenon, discusses goal gradient or the "goal loom larger" effect, which suggests that feed-back on progress toward attainment subjectively affects the motivational potency of the goal as the end state is perceived as closer (Kivetz, Urminsky, & Zheng, 2006). Thus, in the light of these accounts that suggest that framing of goals affect expectancy, desirability and invested effort, we theorize persistence in long and short-term endeavors, although correlated, to be dictated by different mechanisms, and assess them as separate psychological aspects. Therefore, considering the elaboration of our three-dimensional model, we hypothesize as the main structural feature of the goals, suspected to calibrate strivings and previously treated as trivial in alternative models, the goal-end proximity or temporal duration: we expect higher order or distal goals to be more abstractly represented than immediate intentions.

Two of the three proposed factors are set on a temporal range, one of them concerning distant goals – long-term purposes pursuing (**LTPP**) and the

other one referring to the „here and now” – current purpose pursuing (**CPP**); the third factor, recurrence of unattained purposes (**RUP**), addresses past, currently inactive commitments, in the same time reflecting the subjective consequence of the interplay between distinct pursuits. Distal goals help maintaining individual motivation by setting abstract standards such as primary goals, desired outcomes, states or values. Some of these goals are never fully attainable and generate a continuous striving as long as the individual is committed to them, such as moral values or spiritual ideals, which are, in terms used by Trope and Liberman (2003), formulated with a general focus on the “why” component of goals. On the other hand, current pursuits are concrete, expressed as actions in specific situations, they may serve several goals and function on different cognitive processing styles. Also, effortful persistence in short-term goals, although implying delay of gratification to some extent, is expected to yield contiguous feed-back or benefits, while strivings projected over long-term are accompanied by an anticipated longer delay of outcomes, thus generating greater levels of uncertainty. The expectancy and proximity of feed-back orients both expectations and commitment. LTPP is governed by psychologically distant, ideal standards, emanating motivational power in resource-consuming, prolonged pursuits; CPP on the other hand, is dependent on self-control, executive resources, through volitional (energetic) and motivational (recommitment) compensation of current depleted resources. We expect long-term strivings to be ineffective without an adequate management of transient endeavors; we also consider that myopia regarding the consequences of present strivings would deter the process of current goal striving. Given various situational factors, intentions are often put off and stored in an explicit or implicit form; they may be activated and this recurrence represents a subjective or passive, motivational facet of persistence, while LTPP and CPP are more volition-based. Because of the frictions between different purposes, RUP serves goal-protective functions, through a dynamic, chronic tendency of the motivational system to refresh goal-related data. We further detail the three dimensions.

Current purposes pursuing. CPP apprehends the volitional aspect of everyday persistence: the ability to remain focused on the goals at hand and to prolong effort in the face of boredom, fatigue or stress. A behavioral orientation for challenging tasks, combined with the ability to maintain focus and constant levels of energy over extended periods, despite distractions, frustration and setbacks are required for achieving current objectives. Another component of CPP is the need to complete started goals, or discharge the tension attached to the frustrated goal (Lewin, 1935). The combination of sustained attention, full involvement and energized focus is similar to the concept of flow (Csikszentmihalyi, 1990). The cognitive quality of CPP resembles the properties of the actional mindset, described by Gollwitzer and Brandtstätter (1997): resistance to disruptions, a closed-minded immersion in the execution of the goals. Compensation of efforts in the face of obstacles, failure and frustration is the most widely discussed aspect of persistence and a central feature of the current model.

The items generated to represent this hypothetical dimension, describe the ability to remain focused on quotidian activities that require voluntary control, by resisting distractions and temptations on one hand, and compensating depleted resources, on the other, coupled with a need to terminate ongoing tasks, once commenced.

Long-term purposes pursuing. We separately conceptualize the pursuit of the long-term goals in personally valued domains. *LTPP* refers to the ability to remain committed to resource-consuming, higher-order goals that require prolonged investment, despite failures or short-term hedonic costs. While *CPP* focuses on tenacious pursuit of difficult tasks, *LTPP* is more closely related to the concepts of *perseverance* (Williams & DeSteno, 2008) and *grit* (Duckworth et al., 2007). This dimension refers to the ability to refresh and reinforce the motivational value of distant goals. Current actions could be intermediary steps towards long-term endeavors, but in many cases, can hijack efforts and deteriorate commitment. Due to the inherent limitation of resources, different goals compete and may even be conflicting, altering the quality of each individual striving; the dissonance can be easily reduced by disengaging from the farthest goal.

The content of the items corresponding to this scale describe the long-term orientation of individuals: a valorization of stability and continuity of strivings in medium to long-term projects, ranging from months to years. The items in this dimension reflect not only the habit of setting future objectives and developing projects for extended periods, but also the ability to persevere in order to achieve them.

Recurrence of unattained pursuits. While the previous factors reflect the strength of current and long-term goal strivings, this one refers, in terms of the Rubicon model proposed by Heckhausen and Gollwitzer (1987), to a post-intentional, automatic process that buffers against the decline of commitment to blocked or suspended pursuits. The recurrence of automatic cognitions referring to unaccomplished goals protects past intentions and is symptomatic for an active motivational adherence to them; transcending the present prevents premature disengagement in the face of tempting alternatives and also helps detecting opportunities serving those valued goals.

Returning to past goals permits people to evaluate progress and restore commitment to valued self-views. The overarching motive of self-verification determines a behavioral tendency towards self-consistency (Swann, Rentfrow, & Guinn, 2003). Rediscovery and idealization of past goals may serve as a cognitive strategy to ensure the sense of continuity and derogate costly, less self-defining current pursuits. Although generally presented as reactive intrusive phenomena that affect the engagement with the tasks at hand, Martin, Tesser and McIntosh (1993) argued that ruminations are future oriented, related to higher-level goals. They serve goal attainment, encourage mental simulations of desirable outcomes and finding intermediary routes; an instance of the Zeigarnik effect (Zeigarnik, 1967), ruminations persist until goal attainment or complete disengagement and

are attempts for finding alternative means or reprioritization (Martin & Tesser, 1996). Studies have shown that unattained goals have two major motivational features: accessibility of the information related to unfinished tasks (Goschke & Kuhl, 1996; Zeigarnik, 1927) and a tendency to conquer executive resources (Lewin, 1935; Masicampo & Baumeister, 2011). Goschke and Kuhl (1996) argue that commitment to a goal improves recognition of goal-related stimuli. The recurrent quality of unattained purposes serves goal striving process by focusing attention, devaluing alternatives and enhancing sensitivity to elements that would serve the attainment of the goals.

The corresponding items reflect the tendency to continue the pursuit of past, unaccomplished goals, also known as the “persistence-until” hypothesis. This is reflected in different ways, such as the recurrence of ideas and representations related to that abandoned projects or enhanced availability of information regarding opportunities that would support the achievement of those projects.

THE PRESENT RESEARCH

In the absence of adequate existing measures incorporating all the aspects mentioned above, we developed and validated a self-report questionnaire of motivational persistence called the Persistence Scale (PS). In the process of developing the PS, we elaborated distinct scales for the three phenomena described above. To verify their psychometric properties, we carried two sets of studies, the first one concerned with the development of the tridimensional PS, the second one aiming to test the factorial structure, through both exploratory and confirmatory analyses, and construct validity of the new self-report measure.

STUDY 1

The purpose of our first study was to develop a measure of persistence, according to its three presumed dimensions (*CPP*, *LTPP* and *RUP*), to refine it through item analysis and exploratory factor analysis, as well as to document its psychometric properties.

Method

Participants. A total of 667 participants (257 males and 310 females), ranging from 19 to 67 years of age ($M = 39.8$ years, $SD = 10.5$), were recruited from the general population from different regions of the city of Iasi, Romania. 35 (5.4%) had completed only low secondary school, 249 (38.5%) – high school, 257 (39.7%) – higher education, and 106 (16.4%) – postgraduate studies. The scale was distributed by the authors, completed at home by participants, and then returned to us in a few days. They were ensured that their participation in the study was anonymous and confidential.

Instrument. PS is a self report measure designed to assess the three dimensions of persistence: the ability to persist in short-term, daily tasks despite obstacles *CPP* – 21 items; the capacity

to sustain long-term actions, resisting the temptation to give up in the face of failure – *LTPP* – 22 items; and the tendency to resume prior important goals – *RUP* – 20 items. The initial item pool consisted of 63 items, formulated as first-person statements regarding one's involvement and mental dynamics in relation to personal purposes. Participants were required to indicate the measure that they think each item describes them, on a 5-point scale, ranging from *in a very low degree* to *in a very high degree*.

Analyses. Firstly, we explored the psychometric properties of each item. Then, we examined the factorial structure of the scale by means of principal component analyses. Subsequently, correlations among subscales were calculated. The reliability and homogeneity of the PS questionnaire and its subscales were also assessed.

Results

Exploratory factor analysis. Based on the review of descriptive statistics for each item, six items were removed because of their low item-total correlations. The remaining 56 items were submitted to an exploratory factor analysis using the Principal Components extraction method and the Direct Oblimin rotation, since we expected a certain degree of correlation between the factors.

The appropriateness of factor analysis was verified by Keiser–Meyer–Olkin (KMO) measure of sampling adequacy (.923) and Bartlett's test ($p < .001$), both in favor of using this analysis. Also, each item's measure of sampling adequacy (MSA) was examined. The lowest individual MSA was 0.88, also indicating a good degree of factorability.

As the presumed structure of the instrument comprised three subscales, we employed a theory-driven factor analysis, by imposing a three-factor solution on the data. However, results show that the fourth factor has an eigenvalue lower than 1 (.92), and it explains a small amount of variance (5.8%), therefore providing support for a three-factor structure.

The item selection for the final version of the scale involved two analyses. First, we inspected whether the omission of each item would increase Cronbach's Alpha of the whole instrument. Results indicated seven items which reduced the internal consistency of the scale, and consequently, were removed from the set of candidates for the final version.

Second, the pattern matrix for the three-factor solution was examined. We retained the items with the highest loadings on each subscale, unless they had high loadings on multiple factors. In these cases, if such loadings were less than .10 apart, the items were discarded. 16 items were selected for the final scale, all factor loadings exceeding .60. For them, the factor eigenvalues prior to rotation were 4.03, 2.60, and 1.59, respectively (3.30, 2.85, and 3.05, after rotation) and the cumulative common variance accounted for was 48.2%. Communalities ranged from 0.32 to 0.70. In the selection of items for the final version, we analyzed both the structure matrix and the pattern matrix coefficients, which yielded the same results in terms of higher factor coefficient for each of items selected. In the final version of the PS, two of the subscales (*LTPP* and *RUP*) have six items, while the third (*CPP*) has only four, since there were no other item with a loading on this factor higher than .3, which would not have a

high cross-loading on another. Factors were fully in accord with the *a priori* assignment of items to the scales. The final 16 PS items and their factor loadings are presented in Table 1.

Table 1. *Persistence Scale factor loadings*

Item	LTPP	RUP	CPP
Long-term purposes motivate me to surmount day to day difficulties.	.71	.13	-.31
Even though it doesn't matter anymore, I keep thinking of personal aims that I had to give up.	.02	.78	.06
Once I decide to do something, I am like a bulldog: I don't give up until I reach the goal.	.30	.10	-.83
I make sure that what I set myself to obtain in several months or years is realistic.	.63	.07	-.20
I often find myself thinking about older initiatives that I had abandoned.	.28	.63	-.13
I continue a difficult task even when the others have already given up on it.	.30	.01	-.81
I purposefully pursue the achievement of the projects that I believe in.	.72	.06	-.44
It's hard for me to detach from an important project that I had given up in favor of others.	.05	.68	-.13
The more difficult a task is, the more determined I am to finish it.	.39	.17	-.69
I remain motivated even in activities that spread on several months.	.62	-.01	-.30
From time to time I imagine ways to use opportunities that I have given up.	.01	.62	-.05
I have a high capacity to focus on daily tasks.	.39	-.06	-.61
I can easily realize when to stop in the pursuit of important personal objectives.	.57	.06	-.29
I often come up with new ideas on an older problem or project.	.28	.63	-.13
I keep on investing time and effort in ideas and projects that require years of work and patience.	.60	-.20	-.38
I keep track of the things I promised myself to acquire at some point.	.19	.60	-.23

The correlation between the factor scores indicate low associations of the recurrence of unattained purposes measure both to the long-term purposes pursuing subscale (.16) and to the current purposes pursuing subscale, as well as a stronger correlation (.57) between the measures of LTPP and CPP. These results are in accordance with the theoretical assumptions concerning the higher level of positive association between these last two dimensions of perseverance, as individuals who efficiently pursue short-term, quotidian goals are also more likely to be attached to their long-term goals.

Reliability and homogeneity. The indexes of reliability and homogeneity (Cronbach's α and average inter-item correlations) for the PS and its three factors are presented in Table 2.

Table 2. Reliability and homogeneity

	Persistence Scale	CPP	RUP	LTPP
Cronbach's α	.79	.75	.76	.72
Average inter-item correlation	.19	.42	.34	.30

Table 2 reveals acceptable indexes of reliability and homogeneity for the PS as a whole, as well as for its three factors. Examining the inter-item correlation matrixes, we found all the correlations to be in the .15 – .50 interval, for each of the four set of items, thus indicating proper pair-wise associations between them, while the corrected item – total correlations range from .27 to .50.

Overall, the results of the first study support the three-factor structure of this new measure of persistence, mirroring the theoretical taxonomy of the concept which was employed in the item-generation stage, and indicate reasonable psychometric qualities of the scale and its factors.

STUDY 2

The purpose of our second research was twofold: on the one hand, to test the factorial structure of the PS that emerged from the previous study through confirmatory factor analysis. On the other, we examined the construct validity of the PS scale, focusing on the relationship between PS and other individual differences variables, self-report measures of related self-regulatory and personality variables. On the basis of previous studies of persistence, we hypothesized that the subscales should be significantly correlated with theoretically related constructs such as action orientation, temperamental persistence and grit.

Method

Participants. Three hundred eighteen participants (53 males and 265 females), ranging from 20 to 54 years of age ($M = 25.3$ years, $SD = 6.76$), were recruited from the general population of the city of Iasi, Romania. Concerning their studies, 231 (72.6%) had completed high school, 71 (22.3%) – university studies, and 16 (5%) – postgraduate studies. Subjects were ensured that their participation in the study was anonymous and confidential.

Instruments. The set of instruments we employed were:

1. The new 16-item Persistence Scale developed in the first described study.
2. *ACS90.* To assess action orientation, we administered the ACS-90 Scales (Kuhl & Beckmann, 1994), a validated psychometric measure of action orientation, a construct referring to the ability to start and maintain actions, which predicts success of self-regulatory attempts (Diefendorff, Hall, Lord, & Streat, 2000). High scorers on the scale are action oriented: they can easily transform intentions into actions, in contrast to state-oriented individuals, that have difficulties in initiating and maintaining behaviors. The scale has three dimensions, with 12 items each: (a) *Preoccupation* dimension indicates how able is an individual to concentrate intentions in contrast to explicitly processing information related to past, future or present states; (b) *Hesitation* indicates the efficiency in initiating goal-directed activities, without procrastination; (c) *Volatility* refers to the ability to remain focused on tasks and resist

distractions. The items are dichotomous, one option illustrating action oriented tendency and the other option reflecting the state oriented response.

3. *Grit scale*. The Grit-O (Duckworth et al., 2007) is a 12-item, two-factor self report scale measuring the personality trait of grit. Compared to the construct of persistence, the authors argue that grit adds the idea of passion for the goals that fuels the ability to sustain effort necessary to achieve those goals. One scale measures *consistency of passions* (e.g., “I have been obsessed with a certain idea or project for a short time but later lost interest”), the other – *persistence of effort* (e.g., “Setbacks don’t discourage me”).

4. *Persistence scale* from the Temperament and Character Inventory (*TCI*, Cloninger, Pryzbeck, Svrakic, & Wetzell, 1994). In this model, persistence is conceptualized as an inherited, temperamental trait and measured with 8 items that have a dichotomous scale attached (true/false choices). We extracted only these eight items that measure the capacity to sustain actions over extended periods, despite frustration and fatigue; according to the authors, persistent individuals perceive fatigue and obstacles as personal challenges.

Analyses. The factorial structure of the PS was tested through a first – order confirmatory factor analysis using maximum likelihood estimation via AMOS 18.0. Target factor loadings, factor variances and covariances, and measurement error terms were freely estimated, while in each factor one of the target loadings was fixed to 1. All other parameters were fixed to 0. Model fit was evaluated through the following indexes: chi-square statistic, the Goodness of Fit Index (GFI), the Comparative Fit Index (CFI), adjusted goodness-of-fit statistic (AGFI) and the Root Mean Square Error of Approximation (RMSEA). We also took into account the model misspecification indexes – namely the standardized residuals and the modification indexes – and the squared multiple correlations of each item. In order to assess the associations of PS to the other measures employed, Pearson-correlations and canonical correlations were computed.

Results

Confirmatory factor analysis. The testing of the three-factor structure yielded results indicating a relatively poor fit of the hypothesized model to the data: $\chi^2_{101} = 254.49$, $p < .01$; CFI = .88, AGFI = .88, although others were indicative of a reasonable fit: GFI = .91; RMSEA = .069. Analyzing the parameter estimates, we noticed two items with squared multiple correlations lower than .20, namely .09 for the item “I make sure that what I set myself to obtain in several months or years is realistic.” and .10 for the item „I can easily realize when to stop in the pursuit of important personal objectives”. Both items had also low (<.30) standardized regression weights from their presumed factor – *LTPP*. Analyzing their wording, we concluded that both are more concerned with one’s realism in goal setting and pursuing than with the actual long-term investment in one’s purposes. In order to eliminate this contamination of the general scope of the PS, we decided to exclude these two items, proceeding with a post-hoc approach, by re-specifying the model with the two items excluded.

The model fit results of this second stage of data analysis were: $\chi^2_{74} = 205.00$, $p < .01$; CFI = .91, GFI = .92, AGFI = .89, RMSEA = .068. They indicate an increase in overall model fit, yet the adequacy of the factorial structure remains disputable. Analyzing the modification indexes, we noticed one large source of misfit, namely the high crossloadings of the item “I keep track of the

things I promised myself to acquire at some point” (presumably belonging to the RUP subscale) on the other two factors, as indicated by its high regression weights from these factors (.42 and .41, respectively). Taking into account the low squared multiple correlation of this item (.21), we decided to eliminate it from the scale.

The third stage of data analysis yielded the following model fit indexes: $\chi^2_{62} = 150.47$, $p < .01$; CFI = .94, GFI = .94, AGFI = .91, RMSEA = .056 (with a 90% confidence interval .043 – .074). Taking into account the recommended thresholds of these values (Byrne, 2001), the fact that all estimated parameters were of acceptable magnitude and significant of the .05 level, as well as the absence of any significant modification indexes or standardized residuals, we consider this model to fit in a satisfactory degree to the data. Also, estimated factor loadings and factor correlations were comparable to the results of the principal component analysis from the first study.

The SEM diagram of the standardized estimates of this final model is shown in Figure 1.

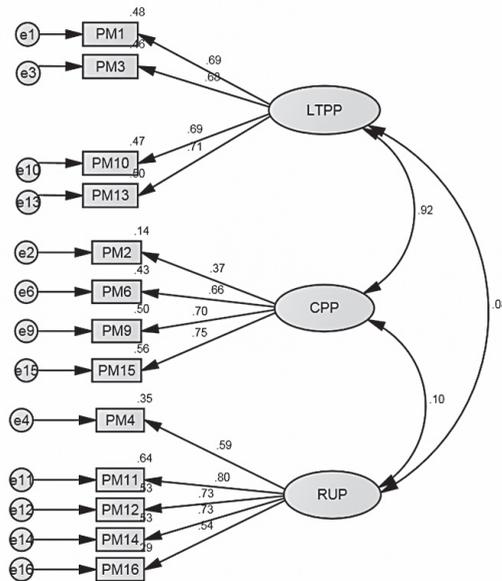


Figure 1. SEM diagram of the standardized estimates of the final PS model

Pearson correlations. The Pearson correlation coefficients between the ACS90 scale, Grit and Cloninger’s Persistence scale and the PS scale (in its final version of 13 items, supported by the analysis described above) are shown in Table 3. The three PS subscales of the new instrument were significantly correlated

with one another. Overall, the persistence variables showed the expected pattern of correlations, but the relations between the RUP and the other measures are intriguing. LTPP and CPP factors were significantly correlated with all of these measures. RUP was predominantly unrelated with all the other scales, except two: TCI Persistence and Grit – persistence of effort.

Table 3. Means, standard deviations and correlation coefficients among the variables (N=296)

	M	SD	1	2	3	4	5	6	7	8
1. PS – LTPP	3.42	.725	-							
2. PS – CPP	3.34	.702	.702	-						
3. PS – RUP	3.16	.612	.189	.156	-					
4. ACS Preoccupation	.43	.268	.271	.363	-.085	-				
5. ACS Hesitation	.60	.271	.578	.570	.052	.469	-			
6. ACS Volatility	.73	.186	.255	.261	-.071	.147	.320	-		
7. Grit – consistency of interests	3.28	.685	.476	.360	-.113	.150	.454	.244	-	
8. Grit – persistence of effort	3.51	.657	.617	.589	.177	.200	.477	.129	.296	-
9. Persistence (TCI)	3.31	.517	.517	.484	.202	.099	.439	.203	.287	.475

Small to moderate correlations were found across the LTPP, the CPP and the following constructs: *Preoccupation* ($r=.271$, respectively $r=.363$), *Volatility* ($r=.255$ and $r=.261$) and *Consistency of interests* ($r=.476$ and $r=.360$). Higher correlations were observed with *Hesitation* scale ($r=.578$ and $r=.57$), *Grit Persistence of effort* ($r=.617$ and $r=.598$) and *TCI-R Persistence* ($r=.517$ and $r=.484$). Like the other two scales measuring persistence of effort (Grit-perseverance of effort and TCI – persistence), CPP and LTPP were more highly related to prospective action orientation, the ability to initiate actions and avoid procrastination.

Canonical correlations. In order to analyze the multivariate relationships between the set of the three PS scales and each of the set of scales comprising the other three instruments, we computed the canonical correlations between these variables. As such, we employed three statistical analyses, each focusing on the relationships between two networks of variables: the PS scales, on one side, and the scales of each of the other three instruments, on the other.

The canonical correlation procedure first computes two synthetic scores (latent variables), one for each set of original variables (Thompson, 1991). Then, the correlation between these synthetic distributions is computed. In the process of building these latent variables, each original variable is weighted in its set; the importance (statistical weight) of each original variable for the latent dimension which synthesizes the set it belongs to is reflected by the canonical loadings (canonical variate-variable correlations). Another issue to consider is the potential redundancy of an original variable, its high overlap with another variable from its set. The parameter relevant for this matter is the standardized canonical coefficients of each variable. Low absolute values of this coefficient

indicate the redundancy of that original variable, hence its low actual importance for the synthetic variable despite its high canonical loading on it. Similar to other studies employing canonical correlations analysis in the assessment of the construct validity of psychological instruments (Masters & Wallston, 2005), we considered as relevant in the interpretative process of the canonical correlations results only the coefficients (both canonical loadings and standardized canonical correlations) above .30.

a. PS and ACS. Standardized canonical coefficients are displayed in Table 4 and canonical variate-variable correlations (canonical loadings) are presented in Table 5. Only the first two canonical correlations were significant.

Table 4. Standardized canonical coefficients summary table for PS scales and ACS scales

Scale	Canonical variates		
	1	2	3
PS			
LTPP	-.542	.801	-1.031
CPP	-.560	-.818	.995
RUP	.158	.757	.663
ACS			
ACS Preoccupation	-.143	-1.020	.469
ACS Hesitation	-.858	.792	.179
ACS Volatility	-.169	-.419	-.954

Table 5. Canonical variate-variable correlations summary table for PS scales and ACS scales

Scale	Canonical variates		
	1	2	3
PS			
LTPP	-.906	.370	-.206
CPP	-.917	-.138	.375
RUP	-.032	.781	.624
ACS			
ACS Preoccupation	-.570	-.711	.413
ACS Hesitation	-.979	.180	.094
ACS Volatility	-.464	-.315	-.828

The first $R^C = .628$, $p < .01$, accounting for 39.44% of the variance. The most influential PS factors on the relevant latent variables were LTPP and CPP, both with similar standardized canonical coefficients (see the first column of Table 5) and canonical loadings (negative in valence – see the first column of Table 4). On the other side of the correlation, the Hesitation scale of the ACS emerged as the most important factor, with the same negative valence as the correspondent PS scales.

The second $R^C = .202$, $p = .014$, accounting for 4.08% of the variance. On the PS side, the most important factors for the synthetic variables in this correlation were RUP and, in a lesser degree (with a lower canonical variate-variable correlation, of .370) LTPP, both positively related. On the ACS side, the Preoccupation scale is the defining factor, negatively related to its correspondent latent variable.

Overall, the results of the canonical correlations analysis are in line with those of the Pearson correlations analysis, presented above. They emphasize and bring further statistical support to the positive relationships between the first two PS scales (LTPP and CPP) and the ACS Hesitation scale, as the most consistent link between the two instruments. Furthermore, a second, less important (in terms of shared variance), but nevertheless significant canonical correlation emerged. This points to the negative relationships between the RUP scale of the PS and the ACS Preoccupation scale – a relationship which the Pearson correlation analysis revealed also as a negative one, but non-significant.

b. PS and Grit. Standardized canonical coefficients are displayed in Table 6 and canonical variate-variable correlations are presented in Table 7. Both canonical correlations were significant.

Table 6. Standardized canonical coefficients summary table for PS scales and Grit scales

Scale	Canonical variates	
	1	2
PS		
LTPP	-.719	-.646
CPP	-.367	.597
RUP	.073	.906
Grit		
Grit – Consistency of interests	-.653	-1.380
Grit – Persistence of effort	-1.173	1.075

Table 7. Canonical variate-variable correlations summary table for PS scales and Grit scales

Scale	Canonical variates	
	1	2
PS		
LTPP	-.963	-.056
CPP	-.861	.285
RUP	-.120	.877
Grit		
Grit – Consistency of interests	-.676	-.737
Grit – Persistence of effort	-.904	.428

The first $R^C = .715$, $p < .01$, accounting for 51.12% of the variance. The canonical variate was negatively loaded by LTPP and CPP from the PS set, and by both Grit scales on the other, with a higher importance of the Persistence of effort scale (its variate-variable correlation being $-.904$, compared to the $-.676$ correlation of the Consistency of interests scale).

The second $R^C = .265$, $p < .01$, accounting for 7.02% of the variance. On the PS side, the RUP scale had the strongest influence on the latent variable, with a positive loading, while on the Grit side, Consistency of interests emerged as the most important factor, with a high negative loading ($-.737$); the latent variable also had a lower positive loading (.428) for the other Grit scale – Persistence of effort.

Again, the results of the canonical correlation analysis match the profile of the Pearson correlations between the four variables, both in valence and in magnitude. The first canonical correlation revealed the relatively strong relationship between the LTPP and CPP scales of the PS and the two Grit scales, especially with the Persistence of effort scale. The second, lower, canonical correlation deals with the opposite associations of RUP to the Grit scales: negative to the Consistency of interests scale and positive to the Persistence of effort scale.

c. PS and Persistence (TCI). Standardized canonical coefficients are displayed in Table 8 and canonical variate-variable correlations are presented in Table 9. The canonical correlation was significant: $R^C = .553$, $p < .01$, accounting for 30.58% of the variance. The first two scales of the PS (LTPP and CPP) had similar positive loadings on the latent variable, while RUP had a low standardized canonical coefficient (below .3). These results match the profile of the associations between the two scales sketched by the Pearson correlations, with relatively strong relationships between the LTPP and CPP scales of the PS and the Persistence (TCI) scale.

Table 8. Standardized canonical coefficients summary table for PS scales and Persistence (TCI) scales

Scale	Canonical variates
	1
PS	
LTPP	.602
CPP	.423
RUP	.185
Grit	
Persistence (TCI)	1

Table 9. Canonical variate-variable correlations summary table for PS scales and Persistence (TCI) scales

Scale	Canonical variates
	1
PS	
LTPP	.934
CPP	.875
RUP	.365
Grit	
Persistence (TCI)	1

DISCUSSION

First, the results of the confirmatory approach cross-validated the factorial structure of the Persistence Scale which emerged from Study 1. Overall, the combination of exploratory and confirmatory factor analysis led to the design of three meaningful and internally consistent Persistence subscales.

The correlations patterns of these subscales with the other instruments support the convergent and divergent validity of the Persistence scale. As expected, all three PS factors correlate with *TCI-persistence* and *Grit-persistence of effort*, constructs with which they have most overlapping features. Given the range of the Pearson correlations, results suggest that the scales measure similar, still distinct constructs. Of the three PS scales, only *LTPP* shows a higher correlation with *Grit-consistency of interests* facet, since updating commitment in protracted endeavors requires stability of concerns. In relation to action control, correlations indicate that regardless of the length of goal trajectories, forces that sustain engagement segregate from those that promote disengagement. For instance, *CPP* and *LTPP* scales show weak to moderate positive associations with *ACS-volatility/persistence scale*, and, in turn, stronger correlations with *ACS-hesitation*. Although divergent from initial expectations, these results underline our idea that *LTPP* and *CPP* are more related to the executive processes, that also control prioritization, enactment of intentions, and management of energy resources; at the same time, closely analyzing the content of the *ACS-volatility* scale, we concluded that the factor is more dependent upon the directional forces involved in intention protection from distractions. These processes dictate the variations in interest, concentration and enthusiasm and are supposedly distinct from those that sustain intention formation and enactment. The third facet of volitional action control, referring to emotional shielding from unwanted feelings and thoughts, also correlates poorly to the capacity to implement lasting or fleeting courses of actions, as showed by the correlations between *LTPP*, *CPP* and the *ACS-preoccupation* scale. This result is accordant with an idea proposed in a validation study of the ACS scale, where low scorers on *preoccupation*, although state-oriented, are described as presumably “more cautious, diligent and thoughtful” (Diefendorff et al., 2000, p. 260). Moreover, the *preoccupation* scale tends to associate negatively, but not on a significant level, to *RUP*. While the former refers to emotional control or inhibition of unwanted states, the latter is conceptualized by our model as serving the goal of signaling abandoned intentions. In the development of the *RUP* scale, we only maintained the aspects referring to the motivating characteristics of important, still unattained goals, not to the failure-related information related to those pursuits, which hinder persistence. This goal-signaling mechanism, derived from the multiplicity of human endeavors, and ignored by other persistence models, may also predispose to another trade-off: the vacillation between recently chosen goals and the abandoned ones, as implied by the negative correlation between *RUP* and *consistency of interest*. The result is also suggesting that the drive to explore old engagements is not related to the tendency to seek new interests.

Given the novel and multidimensional structure of persistence construct, and the asymmetric contributions of the three factors, we considered that the multivariate technique of canonical correlations may provide useful clues for describing the nature of the construct and its relations with similar variables. As shown in the results section, both the Pearson coefficient and the first canonical correlation between the PS and the ACS scales indicate that effortful investment in current and time-consuming, chronic goals are highly associated with the readiness to engage in actions and deflect procrastination. Of the three analyzed pairs, the highest degree of overlap was observed between PS and Grit scales, both focused on investments over timely endeavors. Weaker relationships were observed between PS scales and Persistence subscale from TCI on one hand, and ACS on the other, both capturing the dynamics of action regulation in short-term endeavors. Interesting suggestions are also offered by the results concerning the associations of the RUP factor with the canonical variates, indicating that the mechanisms responsible for signaling resumption or continuance of focal higher order goals may interact with the continuity of present interests, since this tendency might generate conflicts with current endeavors, revision of goal hierarchies and corresponding priorities or even signal conative failures. At the same time, the pattern of associations between RUP and the preoccupation tendencies scale suggest a more reflective disposition toward thoughtful consideration of alternative goals and attached investments (table 5, column 2), already considered in the previous discussion of the Pearson correlations.

Another interesting observation concerns the patterns of canonical loadings of the CPP and LTPP in the second sets of canonical variate-variable correlations between PS and both ACS and grit scales (the second column in tables 5 and 7), suggesting different contributions of the two hypothesized scales and further advocating for the distinctions between the current and long-term endeavors. Nevertheless, since the total percent of variance involving these relations is modest (ranging between 4.08% and 7.02%), a bolder interpretation of the patterns observed in these second pairs is questionable and additional research is needed. It should be noted that a problem with the employed multivariate explanatory method for construct validity concerns the interpretability of the results, since the canonical correlations offer only descriptive information regarding the sets of data. To put it briefly, as already partly suggested in the section analyzing the Pearson correlations between the variables, the canonical correlations reveal that the cognitive and motivational factors involved in stimulating motivation and the affective and volitional ones responsible for its sustainability, all assuring persistence over longitudinal pursuits, may operate on different mechanisms and even act antagonistically. Further analyses of how persistent individuals manage and resolve goal conflicts in order to protect their focal, self-defining strivings might elucidate this pattern of relations and support the presumed conceptual distinctions.

Overall, results indicate that persistence in short and long-term endeavors is more closely related to the initiative and decisiveness aspects of action control, than to distractibility facet. Demand-related action control, or volitional action

under unpleasant conditions, such as difficulty, time pressure or uncertainty, refers to an ability to promptly decide about opportunities and implement them. We consider that the *ACS volatility* scale relies on a more attention-based form of action regulation, rather than the effortful control of behavior, dependent on volitional compensation of resources in the face of obstacles, the basic feature of persistent behaviors.

The conceptual tension between the persistence and action orientation is suggested by some studies that indicate that, given the confusion they make between self – ascribed goals and those imposed by others, state oriented individual may be more persistent in unattractive, boring tasks (Koole & Jostmann, 2004) and show a frustration tolerance in performing unattractive tasks (Koole, Kuhl, Jostmann, & Vohs, 2005). As can be observed, the persistence scale from ACS modestly correlated with Cloninger’s *TCI persistence* scale, *Grit persistence of effort* measure and all the scales in our questionnaire.

In the attempt to define persistent behaviors, researchers face the greatest challenge when faced with the task of distinguishing between motivated, engaged behaviors and non-motivated, passive and inertial actions. Escalation of non-productive actions even when facing minimal odds is not a feature of functional, motivated behavior. This study suggests that there may be two facets of the persistence phenomenon, one related to the effortful, volitional control of action and the other to the quality of attention and interest.

CONCLUSION

Drawing on existing theoretical models of persistent behavior, we have proposed a model that includes volitional and cognitive-motivational aspects. Previous models ignore the quality of recurrence that define past, important commitments, or even dismiss it, considering a source of inter-goal conflicts that subsequently diminishes focus on current pursuits and generates negative affectivity. Our data grants that the cognitive-motivational quality of suspended pursuits is an important component of continuity of behaviors, which protects against volatility of strivings and is distinct from other phenomena such as unwanted ruminations.

Our operationalization of the concept and structure of persistence into the Persistence Scale received empirical support, across the two validation studies conducted on large samples of participants. Regarding its factorial structure, our multi-staged data analysis led to a coherent and statistically adequate model, derived from the three distinct facets of the concept – *CPP*, *RUP*, *LTPP*. The second study provided support for the construct validity of the instrument, through the associations of the Persistence scale and its factors to the other three instruments employed. Future investigations are needed in order to assess the criterion validity of the Persistence scale across various types of long-term behaviors, as well as in relation to objective behavioral data.

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Appendix – Persistence scale

1. I often come up with new ideas on an older problem or project.^c
2. I remain motivated even in activities that spread on several months.^a
3. I have a good capacity to focus on daily tasks.^b
4. From time to time I imagine ways to use opportunities that I have given up.^c
5. Long term purposes motivate me to surmount day to day difficulties.^a
6. Once I decide to do something, I am like a bulldog: I don't give up until I reach the goal.^b
7. Even though it doesn't matter anymore, I keep thinking of personal aims that I had to give up.^c
8. I purposefully pursue the achievement of the projects that I believe in.^a
9. I continue a difficult task even when the others have already given up on it.^b
10. I often find myself thinking about older initiatives that I had abandoned.^c
11. I keep on investing time and effort in ideas and projects that require years of work and patience.^a
12. The more difficult a task is, the more determined I am to finish it.^b
13. It's hard for me to detach from an important project that I had given up in favor of others.^c

^a. *Long-term purposes pursuing*

^b. *Current purposes pursuing*

^c *Recurrence of unattained purposes*