

# THE FACTOR STRUCTURE OF THE SHORT NEED FOR COGNITION SCALE

Ana-Maria CAZAN<sup>1</sup>

**Abstract:** *The aims of this research were to assess the psychometric properties of the Need for Cognition Scale, and to test its factor structure. Both exploratory and confirmatory factor analysis were used. The results suggest that the Need for Cognition Scale – the short form has good psychometric properties after its translation into Romanian. Alfa Cronbach coefficients showed high reliability and confirmatory factor analysis confirmed the original unidimensional structure of the scale. The present study highlighted the consistency and the validity of the scale, which is an argument for its future use in Romanian settings.*

**Key words:** *confirmatory factor analysis, construct validity, individual differences, need for cognition.*

## 1. Introduction

Need for cognition refers to individuals' tendency to engage in and enjoy effortful cognitive endeavours (Cacioppo, Petty, & Kao, 1984). The term 'need for cognition' was first used by Cohen, being defined as the need to structure relevant situations in meaningful, integrated ways, or the need to understand and make the experiential world reasonable (Cohen, Stotland, & Wolfe, 1955). The need for cognition describes individual differences in cognitive motivation, being also connected with how individuals process information (Dickhäuser, Reinhard, Diener, & Bertrams, 2009). Individuals with high need for cognition are better at remembering complex information, show a stronger need to search for new and complex information than individuals with low need for cognition, make judgments after an accurate balancing of all specific information, need strong arguments in order to be persuaded, and prefer complex to simple tasks (Cacioppo & Petty, 1982; Dickhäuser et al., 2009). Individuals with low need for cognition tend to use peripheral cues, such as source characteristics (Petty & Cacioppo, 1986), have a weaker tendency to engage in effortful cognitive endeavours, preferring simple to complex tasks (Cacioppo, Petty, Feinstein, & Jarvis, 1996).

Cacioppo and Petty (1982) defined the need for cognition as a stable individual difference and focused on the self-reward potential of cognitive activity, creating a scale to measure the need for cognition. The first version of the scale was a one-dominant factor scale with 34 items (Cacioppo & Petty, 1982); in the second version, the scale was reduced to 18 items and a single dominant factor (Cacioppo et al., 1984). The unidimensional model was supported by other authors (Hevey, Thomas, Pertl, Maher,

---

<sup>1</sup> *Transilvania* University of Braşov, [ana.cazan@unitbv.ro](mailto:ana.cazan@unitbv.ro).

Craig, & Chiuineagain, 2012; Sadowski, 1993). Sadowski (1993) revealed that Factor I accounted for 30.9%, and Factor II accounted for 9% of the overall variance. The cited authors concluded that the unidimensional Need for Cognition Scale model was more parsimonious than the model with two or three factors. Similar results were reported for the translated version of the scale. Culhane, Morera, and Hosch (2004) found a single factor solution for the Hispanic version of the scale. Cacioppo and his colleagues (1996) cited also two studies reporting the unidimensional factor structure of a 15-item Dutch translation of the scale (Verplanken, Hazenberg, & Palenewen, 1992).

Other studies report a two-factor solution for the scale. Forsterlee and Ho (1999) reported a two factor solution obtained through principal components analysis with oblique rotation: factor 1 comprised all the positively phrased items and factor 2 comprised the negatively phrased items. Bors, Vigneau and Lalande (2006) also present a two-factor model to reflect the positive and negative polarity items. There are also studies which indicate that there may be three subfactors of the Need for Cognition Scale (Tanaka, Panter, & Winborne, 1988). The cited authors found three factors: Cognitive Persistence, Cognitive Complexity, and Cognitive Confidence that accounted for 25% of the total variance and that were highly related to a higher order need for cognition construct. Tanaka et al. (1988) used a dichotomous forced-choice (true or false) response format. The Likert type response format confirmed the same structure (Waters & Zakrajsek, 1990).

Need for cognition is a construct which is widely used in international research. The short form of the need for cognition scale has been translated into German (Bless, Waenke, Bohner, & Fellhauer, 1994), Turkish (Guelgoez & Sadowski, 1995), Spanish (Gutierrez, Bajen, Sintas, & Amat, 1995), French (Ginet & Py, 2000), and Chinese (Kao, 1994). A search on several databases (Elsevier, Sage publications, Springer Link and Willey) revealed an impressive number of studies published in the last ten years which used the Need for Cognition Scale in its original format or a translated version. We intended to present also a synthesis of these studies. Most of the cited studies used the short version of the Need for Cognition Scale, both in the original format but also translated versions. Many of the studies reported high Alfa Cronbach coefficients, ranging between .75 and .90. The aims of the studies were very diverse, highlighting the fact that the scale was used in different psychological fields, like cognitive psychology (Curşeu, 2011), academic achievement (Bertrams & Dickhäuser, 2009; Bors et al., 2006; Coutinho, Wiemer-Hastings, Skowronski, & Britt, 2005), online learning (Amichai-Hamburger, Kaynar, & Fine, 2007; Nussbaum, 2005), advertising (Kuo, Horng, & Lin, 2012), social cognition and decision making (Carnevale, Inbar, & Lerner, 2011; Harman, 2011; Nair & Ramnarayan, 2000), false memories (Graham, 2007; Leding, 2011), and prejudice and stereotypes (Cárdaba, Briñol, Horca, & Petty, 2013). The variety of studies shows that need for cognition is relevant across many different areas of inquiry (Petty, Briñol, Loersch, & McCaslin, 2009). The large number of studies which report significant associations between need for cognition and constructs such as academic achievement, dogmatism, rational decisions, intellectual engagement, openness to experience, emotional stability, and goal orientation also highlights the convergent validity of the scale.

The current study aims to extend previous findings and to present the Romanian version of the Need for Cognition Scale and its psychometric properties in order to determine its relevance when used within the Romanian context. Thus, the purpose of this paper is to propose an instrument to measure need for cognition for the use of educators and researchers, which is valid and easy to administer.

## **2. Method**

### **2.1. Aims**

The aims of this research were the following:

- To assess the psychometric properties of the Need for Cognition Scale – the Romanian Version;

- To test, using confirmatory factor analysis, the factor structure of the questionnaire. We aimed to test mainly the unidimensional factor model, assuming that the NCS assesses a single construct (Cacioppo et al., 1984). We also aimed to test a unidimensional model with correlated errors among the negatively worded items. The model assumed that there was a single construct but that response bias produced correlated uniqueness among residual variances for the negatively worded items (Hevey et al., 2012).

- To test a two-factor model assuming that NCS comprised two factors: one factor comprising the positively phrased items and the other the negatively phrased items (Forsterlee & Ho, 1999).

### **2.2. Participants**

A convenience sampling procedure was used. A number of 297 first year Romanian psychology students were recruited, 215 female, 82 male, with a mean age of 18.16.

### **2.3. Measures**

The Need for Cognition Scale was administered (Cacioppo et al., 1984). The first section of the questionnaire recorded demographic details such as age and gender. The second section consisted of the Need for Cognition Scale NCS was translated into Romanian and adapted for the Romanian students. We used the short form of the questionnaire. The 18-item measure asks participants to indicate whether or not each statement is characteristic of them on a scale of 1 ('extremely uncharacteristic') to 5 ('extremely characteristic'). Higher scores on the scale represent more favourable attitudes towards cognitive effort, with a possible range from 0 to 72.

The participants were informed about the study aims and its confidentiality. Participants responded to the questionnaires in large-group settings, after completing the informed consent forms. Participants were compensated with extra credits.

## **3. Results**

### **3.1. Psychometric Properties of the Need for Cognition Scale – the Romanian Version Reliability of the Need for Cognition Scale**

The Alfa Cronbach coefficient for the entire scale is .804, highlighting a high internal consistency of the short form scale, although inferior to the original 18-items scale with an Alfa Cronbach of .90, reported by Cacioppo and his colleagues (1984). Previous research reported similar Alfa Cronbach coefficients for the translated versions: .83 for a Dutch version (Pieters, Verplanken, & Modde, 1987 cited in Cacioppo et al., 1996), .81 for the French version (Bors et al., 2006).

The test-retest reliability is high, the Pearson correlation coefficient obtained between the total scores of the scale in two distinct moments, was  $r(109) = .75, p < .001$ . The post-test was administered three months later than the pre-test. These data support the temporal stability of people's scores on the NCS.

Regarding gender differences, we did not perform a comparison test, given the small numbers of boys in this study and because previous research in the field also highlighted that NCS is gender neutral (Cacioppo et al., 1996). Nevertheless, for the Romanian version with 34 items, Curşeu (2004) found significant differences between boys and girls, but the author is skeptical, concluding that the difference is due to the large number of girls included in the study.

### 3.2. Construct validity of the Need for Cognition Scale

From the beginning, it has been asserted that the NCS was unidimensional (Cacioppo et al., 1984). Recent research suggested that NCS is bidimensional (Bors et al., 2006; Forsterlee & Ho, 1999). Thus, using exploratory factor analysis we found that the one-factor solution accounts for 24.54% of variance. The two-factor solution accounts for 37% of variance, after the Varimax rotation. The items segregated into positive and negative polarity items, revealing two distinct factors, the first factor comprising positive items, and the second, negative items (see Table 1).

Table 1

#### *Two factor structure of NCS, using exploratory factor analysis*

Items	Factorial saturation		Communalities
	Factor 1	Factor 2	
nc_02	.725	.244	.584
nc_14	.654		.429
nc_01	.646	.162	.444
nc_11	.642	.204	.453
nc_15	.639		.409
nc_06	.613		.377
nc_10	.609	.162	.397
nc_13	.575		.331
nc_18	.391		.153
nc_05	.104	.701	.503
nc_04	.122	.669	.463
nc_12	.196	.651	.462
nc_09	.149	.622	.409
nc_07		.561	.315
nc_08		.536	.288
nc_03		.502	.257
nc_16		.486	.237
nc_17		.445	.207
Eigenvalues	4.418	2.300	
% of variance	19.567	17.755	
Alfa Cronbach	.755	.797	

*Note.* Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

This suggests the possibility of a two-factor solution, even for the short form version. A possible explanation is that there are aspects present in the negative polarity items, but missing in the positive polarity items (Bors et al., 2006). Alfa Cronbach for the two factors is high, demonstrating a good reliability. The correlation between the positive and the negative factor is  $r(295) = .29, p < .001$ . Both factors correlate strongly with the total score: for the positive dimension, we obtained  $r(295) = .791, p < .001$ , and for the negative dimension  $r(295) = .818, p < .001$ . These results represent an argument for the assessment of the two-factor model, using confirmatory factor analysis. Given the small correlation between the two dimensions, it is necessary to test two models, one with uncorrelated factors, and the other with correlated factors.

### 3.3. Factor Structure of the Need for Cognition Scale – the Romanian Version

In order to test the factor structure of the scale we tested several models, assuming that the Need for Cognition Scale assesses a single construct. Assessment of normality and outliers suggests the following results: z-statistics of 7.94 shows a slightly non-normality of the sample. Although, there are no multivariate outliers, Mahalanobis distance showed minimal evidence of multivariate outliers.

The first model included uncorrelated errors; the other included correlated errors mainly among the negatively worded items, as suggested by the modification indices. Thus, we tested a unidimensional model with correlated errors among the negatively worded items, assuming that there is a single construct but that response bias produces correlated uniqueness among residual variances for the negatively worded items (Hevey et al., 2012). The results showed a better fit than the previous models, supporting recent research in the field (Hevey et al., 2012) (see Table 2). The standardized factor loadings for the final model can be observed in Figure 1.

Table 2

*Goodness-of-fit measures for the tested models – First order CFA for Need for Cognition Scale*

Model	$\chi^2(df)$	GFI	CFI	AIC	RMSEA (90% CI)
1. One factor – uncorrelated errors	553.772 (135) $p < .001$	.780	.632	625.772	.102 (.094-.111)
2. One factor –correlated errors	176.198 (99) $p < .001$	.940	.932	320.198	.051 (.039-.064)

*Note.* GFI: Goodness-of-Fit Index, CFI: Comparative Fit Index, AIC: Akaike Information Criterion, RMSEA: Root Mean Square Error of Approximation, 90% CI: 90% confidence interval for RMSEA.

The second aim was to assess a two-factor structure for the Romanian version of the Need for Cognition Scale. The two factors, as suggested by Forsterlee and Ho (1999) and by Hevey and his colleagues (2012), comprise: one factor - positive items and the other - negative items. We tested two models: two-factor uncorrelated and two-factor correlated. The modification indexes suggest a misspecification regarding the uncorrelated factors (NCS Negative↔NCS Positive, MI = 33.522). The model fit was also better for the model with correlated factors, which lead to the conclusion that NCS has a two correlated factors structure. The modification indexes analysis also suggests evidence of misspecification associated with the pairing of error terms associated with several items,

as suggested in Table 3. The later model has better fit indicators and it is the well-fit model. The two-factor model with correlated errors and correlated factors is superior to all the other solutions, the goodness-of-fit measures being more appropriate. The results confirm previous research (Bors et al., 2006). The cited authors highlighted that the two-factor model is superior to the one-factor model, but inferior to the trait-method model. These results are reported for the French version of the scale. Thus, the one-factor model is not the best fit for the pattern of relations among the NCSS items. There are no sufficient reasons to conclude that there is not a single factor common to all items and to promote the two-factor model, contrary to Cacioppo and his colleagues' findings (1984).

Table 3

*Goodness-of-fit measures for the tested models: two factors – uncorrelated and correlated*

Model	Correlated errors	$\chi^2(df)$	GFI	CFI	AIC	RMSEA (90% CI)
1. Two factor uncorrelated	-	316.521 (135) $p < .001$	.897	.841	388.521	.067 (.058-.077)
2. Two correlated factors	-	280.560 (134) $p < .001$	.906	.871	354.560	.061 (.051-.071)
3. Two correlated factors and correlated errors	err9↔err4 err2↔err1 err17↔err16 err11↔err10 err16↔err4	187.939 (129) $p = .001$	.936	.948	271.939	.039 (.026-.051)

Note. GFI: Goodness-of-Fit Index, CFI: Comparative Fit Index, AIC: Akaike Information Criterion, RMSEA: Root Mean Square Error of Approximation, 90% CI: 90% confidence interval for RMSEA.

Previous research also tested a three-factor model, comprising cognitive persistence, cognitive complexity, and cognitive confidence (Tanaka et al., 1988). In order to test Tanaka et al.'s (1988) three-factor model, which assumes that the NCS assesses three constructs, the short form of the scale is not sufficient.

#### 4. Discussion

The results suggest that the Need for Cognition Scale – the Short Form has good psychometric properties after its translation into Romanian. The cross-cultural validity of the Need for Cognition Scale was demonstrated in previous research (Gülgöz, 2005). Although the scale is extensively used in international research, in the Romanian literature it is a rather new research instrument. An extremely relevant aspect is the test-retest reliability of the scale demonstrated for the Romanian short version. As the need for cognition is a motivational trait, its relative stability over time is critical. Only a few studies reported the test retest reliability for the short form of the NCS (Sadowski & Gulgoz, 1992, Verplanken, 1991). For the 34-item Romanian version, Curşeu (2004) reported a correlation coefficient of .812, after a period of four weeks. The convergent validity of the scale was highlighted by the large number of studies which reported significant association between need for cognition and constructs such as academic achievement, dogmatism, rational decisions, intellectual engagement, openness to experience, emotional stability, and goal orientation. An aspect which needs further

exploration is the predictive validity of the scale. The literature in the field suggests the existence of a mediated relationship between academic adjustment and need for cognition. Bertrams and Dickhäuser (2009) stated that self-control capacity mediates parts of the relation between NCS and school achievement. Future research must focus on other modalities to demonstrate the predictive validity of the scale, taking into account other variables such as intrinsic motivation, verbal abilities, and logical reasoning abilities.

Future research must also take into account the educational level of the participants and the type of tasks performed in the workplace. As Curşeu (2004) stated, it is possible that people with jobs including mainly cognitive activities have a higher level of need for cognition compared with those whose professions are not based on cognitive activities.

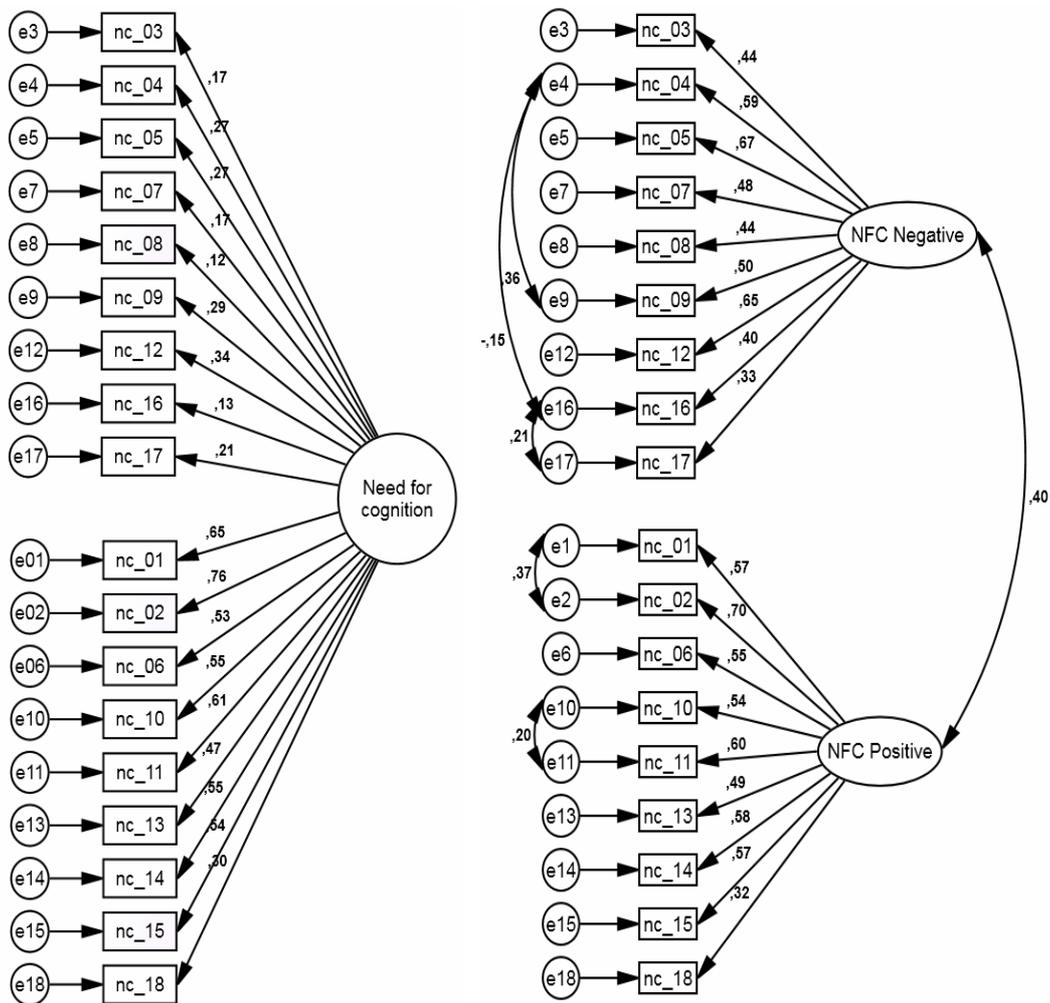


Fig. 1. *Confirmatory Factor Model of NCS: a. Unidimensional correlated errors for negative items (covariances not shown); b. Two factors model – correlated errors. Standardized estimates.*

The present study highlighted the consistency and the validity of the scale, which is an argument for its future use in Romanian settings. A similar study was conducted in Romania in 2004 and suggested similar results (Curşeu, 2004). The majority of studies have revealed that the Need for Cognition Scale has a factorial structure with a single factor explaining a considerable proportion (20% - 37%) of the variation and that all items of the scale (both the 34-item version and in the 18-item version) correlate significantly with the main factor (Curşeu, 2004). However, our study suggested that for the Romanian version, the one-factor model is not the best fit for the pattern of relations among the NCS items and that the two-factor model is superior to the one-factor solution, the goodness-of-fit measures being more appropriate. Only a few studies have reported multifactorial solutions for the NCS, which suggests the necessity to replicate the solution on a more diverse sample of participants.

Another issue that provides an important basis for future empirical research is the relationship between the need for cognition and personality traits and intelligence. Recent research showed that need for cognition mediated the relationship between openness to experience and intelligence, and suggested that need for cognition might mediate the relationship between neuroticism and intelligence (Furnham & Thorne, 2013). The relation between age and need for cognition can also be examined. Although need for cognition is a relatively stable trait, some authors suggest that it can be influenced best in youth, when thinking habits are less fixed (Bertrams & Dickhäuser, 2009). A longitudinal design could offer the answer to questions regarding the stability over time of the need for cognition or the possibility to improve need for cognition by effective training.

There are some limitations to this study. The survey nature of the study makes it difficult to verify if students are accurately reporting their need for cognition, this issue being very important as there are studies reporting that the need for cognition is significantly correlated with social desirability (Cacioppo, Petty, & Kao, 1984; Hunt, Stevens, Chatterjee, & Kernan, 1994). The cited authors reported that subjects may feign a high need for cognition in a socially-desirable effort to appear more intelligent. The second study highlighted that the older the student, the greater the temptation of social desirability. The unequal number of boys and girls in the sample and the homogeneity of the sample regarding age and educational level remain problematic for this study.

## References

- Amichai-Hamburger, Y., Kaynar, O., & Fine, A. (2007). The effects of need for cognition on Internet use. *Computers in Human Behavior*, 23(1), 880-891.
- Bertrams, A., & Dickhäuser, O. (2009). High-school students' need for cognition, self-control capacity, and school achievement: Testing a mediation hypothesis. *Learning and Individual Differences*, 19(1), 135-138.
- Bless, H., Waenke, M., Bohner, G., & Fellhauer, R. F. (1994). Need for cognition: A scale measuring engagement and happiness in cognitive tasks. *Zeitschrift für Sozialpsychologie*, 25, 147-154.
- Bors, D. A., Vigneau, F., & Lalonde, F. (2006). Measuring the need for cognition: Item polarity, dimensionality, and the relation with ability. *Personality and Individual Differences*, 40, 819-828.

- Cacioppo, J. P., Petty, R. E., Feinstein, J. A., & Jarvis, W. B. (1996). Dispositional differences in cognitive motivation: The life and times of individuals varying in need for cognition. *Psychological Bulletin*, *119*(2), 197-253.
- Cacioppo, J. T., Petty, R. E., & Kao, C. F. (1984). The efficient assessment of need for cognition. *Journal of Personality Assessment*, *48*, 306-307.
- Cacioppo, J. T., & Petty, R. E. (1982). The need for cognition. *Journal of Personality and Social Psychology*, *42*, 116-131.
- Cárdaba, M., Briñol, P., Horca, J., & Petty, R. E. (2013). The effect of Need for Cognition on the stability of prejudiced attitudes toward South American immigrants. *Psicothema*, *25*(1), 73-78.
- Carnevale, J. J., Inbar, Y., & Lerner, J. S. (2011). Individual differences in need for cognition and decision-making competence among leaders. *Personality and Individual Differences*, *51*(3), 274-278.
- Cohen, A. R., Stotland, E., & Wolfe, D. M. (1955). An experimental investigation of need for cognition. *Journal of Abnormal and Social Psychology*, *51*(2), 291-294.
- Coutinho, S., Wiemer-Hastings, K., Skowronski, J. J., & Britt, A. (2005). Metacognition, need for cognition and use of explanations during ongoing learning and problem solving. *Learning and Individual Differences*, *15*(4), 321-337.
- Culhane, S. E., Morera, O. F., & Hosch, H. M. (2004). The factor structure of the Need for Cognition–Short Form in a Hispanic sample. *The Journal of Psychology*, *138*, 77-88.
- Curşeu, P. L. (2004). Nevoia de stimulare cognitivă. Delimitări conceptuale și considerații privind evaluarea [Need for cognitive stimulation. Conceptual delimitations and considerations regarding the evaluation]. *Cognition, Brain, Behavior*, *2*, 121-139.
- Curşeu, P. L. (2011). Need for cognition and active information search in small student groups. *Learning and Individual Differences*, *21*(4), 415-418.
- Dickhäuser, O., Reinhard, M.-A., Diener, D., & Bertrams, A. (2009). How need for cognition affects the processing of achievement-related information. *Learning and Individual Differences*, *19*, 283-287.
- Forsterlee, R., & Ho, R. (1999). An examination of the short form of the need for cognition scale applied in an Australian sample. *Educational and Psychological Measurement*, *59*, 471-480.
- Furnham, A., & Thorne, J. D. (2013). Need for cognition: Its dimensionality and personality and intelligence correlates. *Journal of Individual Differences*, *34*(4), 230-240.
- Ginet, A., & Py, J. (2000). A French scale for children and its consequences on a sociocognitive level. *Année Psychologique*, *100*, 585-628.
- Graham, L. M. (2007). Need for cognition and false memory in the Deese–Roediger–McDermott paradigm. *Personality and Individual Differences*, *42*(3), 409-418.
- Guelgoez, S., & Sadowski, C. J. (1995). Turkish adaptation of the Need for Cognition Scale and its correlation with academic performance measures. *Turek Psikoloji Dergisi*, *10*(35), 15-24.
- Gülgöz, S. (2005). Need for Cognition and Cognitive Performance From a Cross-Cultural Perspective: Examples of Academic Success and Solving Anagrams. *The Journal of Psychology: Interdisciplinary and Applied*, *135*(1), 100-112.
- Gutierrez, M. J., Bajen, M. J., Sintas, F., & Amat, M. (1995). An assessment of the tendency to exert cognitive effort. *Anuario de Psicología*, *58*(3), 53-67.
- Harman, J. L. (2011). Individual differences in need for cognition and decision making in the Iowa Gambling Task. *Personality and Individual Differences*, *51*(2), 112-116.

- Hevey, D., Thomas, K., Pertl, M., Maher, L., Craig, A., & Chuinneagain, S. (2012). Method Effects and the Need for Cognition Scale. *The International Journal of Educational and Psychological Assessment*, 12(1), 20-33.
- Hunt, J. M., Stevens, K. M., Chatterjee, A., & Kernan, J. B. (1994). Socially desirable responses in the measurement of need for cognition. *Advances in Consumer Research*, 21, 543-546.
- Kao, C. (1994). The concept and measurement of need for cognition. *Chinese Journal of Psychology*, 36, 1-20.
- Kuo, J. C., Horng, D. J., & Lin, C. L. (2012). The causal relationship between need for cognition and advertising recall. *Social Behavior and Personality*, 40(6), 1025-1032.
- Leding, J. K. (2011). Need for Cognition and false recall. *Personality and Individual Differences*, 51(1), 68-72.
- Nair, K. U., & Ramnarayan, S. (2000). Individual differences in need for cognition and complex problem solving. *Journal of Research in Personality*, 34(3), 305-328.
- Nussbaum, E. M. (2005). The effect of goal instructions and need for cognition on interactive argumentation. *Contemporary Educational Psychology*, 30(3), 286-313.
- Petty, R. E., Briñol, P., Loersch, C., & McCaslin, M. J. (2009). The need for cognition. In M. R. Leary, & H. R. Hoyle, *Handbook of individual differences in social behavior* (pp. 318-329). New York: New York: Guilford Press.
- Petty, R. E., & Cacioppo, J. T. (1986). *Communication and persuasion: Central and peripheral routes to attitude change*. New York: Springer-Verlag.
- Sadowski, C. J. (1993). An examination of the Short Need for Cognition Scale. *Journal of Psychology*, 127, 451-454.
- Sadowski, C. J., & Gulgoz, S. (1992). Internal consistency and test-retest reliability of the Need for Cognition Scale. *Perceptual and Motor Skills*, 74, 610.
- Tanaka, J. S., Panter, A., & Winborne, W. C. (1988). Dimensions of the need for cognition: Subscales and gender differences. *Multivariate Behavioral Research*, 23, 35-50.
- Verplanken, B. (1991). Persuasive communication of risk information: A test of cue versus message processing effects in a field experiment. *Personality and Social Psychology Bulletin*, 17, 188-193.
- Verplanken, B., Hazenberg, P. T., & Palenewen, G. R. (1992). Need for cognition and external information search effort. *Journal of Research in Personality*, 26, 128-136.
- Waters, L. K., & Zakrajsek, T. (1990). Correlates of need for cognition total subscale scores. *Education and Psychology Measurement*, 50, 213-217.