Revised-Attitudes Toward Research Scale (R-ATR); A First Look at its Psychometric Properties

Elena C. Papanastasiou, Ph.D.
University of Nicosia

University of Nicosia
46 Makedonitissas Avenue,
1700 Nicosia, Cyprus

Correspondence concerning this article should be addressed to Dr. Elena C. Papanastasiou, University of Nicosia, Cyprus (+357-220461566) papanastasiou.e@unic.ac.cy

Abstract

The purpose of this study was to establish the psychometric properties of the Attitudes Toward Research scale (ATR), including the validity of the scale through confirmatory factor analysis. After slightly altering the scale by deleting 19 items, and by narrowing down the subscales to four, the fit of the model was established. The revised version of the ATR scale (R-ATR) includes 13 items, which measure Research usefulness, Research anxiety, and Positive predisposition towards research. Overall, the analyses performed on the R-ATR suggest that it has strong psychometric properties, and that it can prove helpful to researchers interested in examining issues related to research methods attitudes, as well as to practitioners to be used for evidence-based practice.

Given that evidence-based practices are a cornerstone of the accountability movement, professionals need to demonstrate both their ability to access research-based knowledge as well as their ability to apply that knowledge in real world situations. Consequently, during the last decade, special attention has been paid to exposing undergraduate students to research experiences and research courses (Lopatto, 2007; Seymore, Huner, Laursen, & Deantoni, 2004). In the field of education, drawing teachers into the research process appears to provide a vital foundation for the development of teaching as an evidence-based profession (Karagiorgi & Papanastasiou, 2012). Teacher research has been viewed as a tool enabling the transformation of educational practice, while making important contributions to the knowledge base in education. Practitioner research in particular, appears to hold the potential to contribute to school improvement (Briggs & Coleman, 2007).

However, combining the role of the teacher as well as the researcher is not an easy endeavor (Ruthven, 2005). According to West (2011), the divide between research and practice has emerged since the 1930s when University professors began distinguishing themselves as teacher educators or as researchers. Even today, teachers are criticized as being research averse (Fusarelli, 2008) while the role of the teacher as a research-based professional still resembles an ideal (Westbury, Hansen, Kansanen & Bjorkvist, 2005).

In an attempt to strengthen the link between teachers and research, many Universities, especially in Europe, require from undergraduate students in the field of education to enroll in research methods courses. However, despite the great importance of such courses, research methods always tend to be one of the least favorite courses for most students who often perceive them as an obstacle in their studies (Onwuegbuzie, Leech, Murtonen & Tähtinen, 2005). Others dislike research because they do not see themselves as researchers, while

others do not feel empowered to understand and use research (Lodico, Spaulding & Voegtle, 2004). Students also frequently complain that research methods are very demanding, overwhelming and difficult courses (Lodico, Spaulding & Voegtle, 2004; Onwuegbuzie, Slate, Patterson, Watson & Schwartz, 1998). What makes matters worse is that many students tend to confuse research with statistics, which leads many of them to conclude that poor quantitative skills will prevent them from doing well in the course, although quantitative skills are relevant to only part of a research course. Therefore, students in research methods courses carry with them many of the fears and anxieties that are associated with statistics. In turn, these attitudes that are related to statistics may interfere with the student's learning in research and may prevent them from being able to understand, or become involved in research in their daily lives or in their future professional careers.

Although numerous studies have examined issues related to statistics attitudes, anxiety and achievement (Nasser, 2004; Onwuegbuzie, 2003; Onwuegbuzie & Wilson, 2003; Pan & Tang, 2004), very little research has specifically examined where students stand in relation to research methods courses. Some of the few studies that have grappled with research attitudes have dealt with quantitative methods courses (Murtonen, 2005; Murtonen & Lehtinen, 2003). In these cases however, it is hard to disassociate the quantitative component of the course with the attitudes of students toward research per se.

A relatively new trend in the research literature has focused on the effects of research experiences on undergraduate students (Korkmaz, Cole & Buckley, 2010; Russell, Hancock, McCullogh, 2007; Seymour, Hunter, Laursen & Deantoni, 2004). However, the results of such studies are difficult to generalize to the wider undergraduate student population due to the fact that such students a) are enrolled in STEM majors (Technology, Engineering and Mathematics) instead of education, and b) in most cases voluntarily agree to participate in such programs. Therefore, the experiences of such students vary significantly from students who are obliged to enroll in research methods classes as part of their undergraduate degree program in teacher education. The current study will move beyond these limitations by examining the psychometric properties of an instrument measuring teacher-education undergraduate student's attitudes towards research.

One of the few psychometric measures that currently exist that measure undergraduate students' attitudes towards research is the Attitudes Toward Research scale (ATR) (Papanastasiou, 2005). Since the Attitudes Toward Research scale is a new measure, very little information is known about its psychometric properties. Therefore, the purpose of this study is to validate the scores of the ATR scale through confirmatory factor analysis. The factor structure of a scale is an essential aspect in establishing its construct validity. The validation of the scores of such a scale can prove helpful to researchers who might be interested in using this scale to examine issues related to research methods attitudes more carefully, as well as to professors of educational research in an effort to understand students' difficulties and find ways to overcome the multiplicity of reasons behind these difficulties. The importance of such studies lies in increasing the impact of research methods courses so as to get a step closer to the ultimate goal of training research-oriented teachers. This is especially significant nowadays where teachers are urged to use evidence-based practices.

Attitudes towards research scale (ATR)

Attitudes in general, according to the tripartite framework originally presented by McGuire (1969), may be defined as the cognitive, affective and behavioral predispositions toward a concept, a situation, an object, a course, etc, although these three components cannot always be separated. Based on this framework, the Attitudes Toward Research Scale is a self report measure of students' attitudes towards the field of research, regardless of their research orientation (quantitative, qualitative or mixed methods). This measure that exists in both Greek and English, consists of 32 Likert scale items whose scales range from 1 to 7. The value of 1 stands for strongly disagree, while 7 stands for strongly agree. An exploratory factor analysis of the data in a previous sample has identified the existence of five factors, those of "Research usefulness" (α=.919), "Research anxiety" (α=.918), "Positive research predisposition" (α=.929), "Relevance to life" (α=.767), and "Research difficulty" (α=.711) (Papanastasiou, 2005). The factor of Research usefulness measures the student's perceptions in reference to how useful they perceived that research would be in their professional lives. The Research anxiety factor measures the negative feelings of stress and anxiety felt by the students in relation to research. The third factor of Positive research predispositions, measures the existence of positive feelings and interest towards research. The factor of Relevance to life measures the student's perceptions of whether research can be applied in the student's daily lives. Finally, the factor of Research difficulty identifies the problems that students face with various aspects of research.

A more recent study examining the psychometric properties of the ATR scale with the use of Rasch analysis has identified two items that do not have adequate fit compared to the rest of the items of the ATR scale (Papanastasiou & Schumacker, 2010). More specifically, Item 6 stating, "I feel insecure concerning the analysis of research data", and item 11 stating "I have trouble with arithmetic" did not have adequate fit. By taking a closer look at items 6 and 11 it is clear that both items are related to the statistical analysis of data rather than attitudes toward research. Consequently, a decision was made to drop these items from the current scale since the instrument pertains to research methods courses as a whole regardless of their focus (quantitative, qualitative or mixed) 1[1]. Since two items had to be dropped from the scale though, the construct validation as well as the reliability of the scores from the scale had to be re-examined. The results of a confirmatory factor analysis could strengthen the construct validity of the ATR scale and encourage more researchers, research instructors and practitioners to utilize this scale.

Methods

The sample of this study consisted of 317 undergraduate students who had been taking an educational research methods course at a European University in the Republic of Cyprus. The specific course that the students were enrolled in was a three credit course titled 'Methodology of Educational Research' and was a compulsory course for all students studying elementary education, or kindergarten education at this University. All students in

[1] Efforts are underway to create ATR subscales that will focus on the orientation of research methods courses.

the above majors were required to enroll in this research methodology course, which typically occurs during the sophomore year of their studies. This course was offered by the same instructor both, in the spring and fall semesters of every academic year. The sample of this study included the students who had enrolled in this course in a period of four semesters.

The questionnaire was administered on a volunteer basis to all students enrolled in the course. The data were collected towards the end of each semester, and all students that had attended the class on each day that the questionnaire was administered had participated in the study. Of the sample, 89.8% were female which is representative of the gender breakdown of the students in the college of education at this University. The main reason for the discrepancy in the gender breakdown is due to the large majority of female students who follow the majors of elementary and kindergarten education. The majority of the students were sophomores (69.84%), 20.66% were juniors, 6.98% were seniors, and another 1.97% were in their 5+ year of their studies. For the purpose of this study the data were analyzed with the use of the structural equation modeling software AMOS 18 (Arbuckle, 2009), as well as with the use of SPSS.

The hypothesized model that was originally analyzed in AMOS, included the 30 items from the ATR scale that were treated as observed variables, and are represented in the measurement model with rectangles. Five latent variables were also created to represent the five factors of the scale. All latent variables are represented with ovals. The arrows pointing to each rectangle/observed variable represent the errors in the measurement of each of those observed variables. These error terms are very important to be included in the model since no assumptions are made that the variables used in this study are perfectly reliable. Finally, the two-headed arrows in the model represent the correlations between the five factors.

The estimation method that was used for the analysis of the model was the maximum likelihood estimation procedure. The maximum likelihood estimation was preferred to that of the generalized least squares estimation since it leads to less biased parameter estimates and more accurate fit indices (Olsson, Foss, Troye, & Howell, 2000). Both absolute and incremental fit indices were used in this study, in addition to a parsimony adjusted index. The absolute fit indices that were used, that assess how well the model reproduces the sample matrix, were the chi-square (χ^2), and the chi square divided by the degrees of freedom ratio (χ^2/df). The incremental fit indices that were used, that assess model fit relative to a baseline model, were the Normed Fit Index (NFI), the Relative Fit Index (RFI), the Tucker-Lewis Index (TLI), the Comparative Fit Index (CFI), the Incremental Fit Index (IFI). Finally, a parsimony adjusted index, the Akaike Information Criterion (AIC), was used to be able to compare models with differing numbers of latent variables.

Results

Psychometrically, the score distributions statistics on all items should be checked to ensure that they are normally distributed, with no floor or ceiling effects. Table 1 presents the means and standard deviations of the 30 items included in the ATR scale. Some items were recoded however, so that a higher response on each question corresponded to more positive attitudes toward research. All of the items had an average score between 3.31 and 5.22 on a 7 point scale. The standard deviations of all items were reasonable and ranged from 1.33 to 1.86, indicating that no item had a strong floor or ceiling effect. Overall, all items were approximately normally distributed with their skewness ranging from 0.02 to -0.67, and their kurtosis ranging from 0.06 to -0.95.

Confirmatory factor analysis

The hypothesized 30-item, five-factor model was originally examined to test whether the model fit the data. The results of this analysis did not support the fit of the model since only the χ^2/df ratio was in the acceptable range (χ^2/df=2.98) based on Hu and Bentler's cut-off criteria (1999). Therefore, the scale had to be re-examined in order to improve the quality of the factors. In an attempt to remove the items with large amounts of error variance, a decision was made to delete any items with standardized coefficients that fell below 0.70 due to their low levels of reliability. This allowed for the error variances for the remaining items to be below 0.50 for each observed variable. Based on this criterion, 17 items were deleted from the scale. A consequence from this process is that two factors were deleted, those of Relevance to life and Research difficulty. The resulting model included three latent variables; those of 'Research usefulness' which included 4 items, 'Research anxiety' which included 5 items, and 'Positive research predispositions' which included 4 items. The latent variables were also allowed to correlate with each other since no assumptions are made that these three factors are not related to each other. The revised version of the ATR scale is presented in Figure 1.

Once the revised model was analyzed, the fit indices had to be examined to determine whether the data fit this revised measurement model. The results that are presented in Table 2 were very encouraging since most of the fit indices supported the fit of the model. With the exception of the χ^2 (that is influenced by sample size), the other fit indices supported the fit of the model. The TLI (TLI=0.95), the IFI (IFI=0.97), the NFI (NFI=0.95) as well as the CFI (CFI=0.97) all had values equal or higher than 0.95 which strongly support the fit of the model. The RFI with a value of 0.92 was slightly below the 0.95 cutoff, but still supported the fit of the model since this value ranged between 0.90 and 0.95 (Hu & Bentler, 1999). In addition, the AIC had a lower value in the revised model, thus supporting the revised ATR scale (R-ATR) as the more parsimonious model. A chi-square difference test ($\Delta\chi^2$) was calculated between the original and revised factor models to determine whether the revised model was significantly better than the original one. Overall, the fit of the revised model was significantly better than the original model ($\Delta\ \chi^2$= 1015.60, Δdf =333, $p<0.0001$).

Once the fit of the model was established, it was possible to pay closer attention and interpret the path coefficients of the final model. As presented in Table 3, all unstandardized coefficients were statistically significant at the 0.001 level. Moreover, no standardized regression weights were lower than 0.70 which further strengthened the validity of the scale's results. In terms of the factor of Research usefulness, this factor had the strongest effect on items q20 "The skills I have acquired in research will be helpful to me in the future" since the factor explained 69% of its variance. The factor Research usefulness had the second largest effect on item q8 "Research is useful for my career" since it explained 62% of its variance. The factor Research anxiety had the strongest effects on item q16 "Research courses are stressful" explaining 79% of its variance and on item q18 "Research courses make me nervous" explaining 77% of its variance. Finally, the Positive research predisposition factor had the strongest effect on item q3 "I enjoy my research course(s)" (79%) and on item q12 "I love research courses" (75%).

Correlations between the ATR factors

Table 3 presents the correlations between the three factors of the revised model. The highest correlation was between the factors of "Research anxiety" and "Positive research predisposition" (r=0.62). The smallest correlation was between the factors of "Research usefulness" and "Research difficulty" (r=0.18). The correlation between "Positive research predispositions" and "Research usefulness" was equal to 0.54. The low to moderate correlations between the three factors provide discriminant validity evidence among the three factors.

Reliability Results

Once the factor structure of the revised version of the ATR scale was established, the estimates of internal consistency were also calculated by using Cronbach's coefficient alpha. The results of these analyses show that the reliability of the three factors was slightly lower than the results reported for the original 32-item version of the scale. However, the latest reliability coefficients of the R-ATR were still in the very good to excellent range. More specifically, the reliability of the Research usefulness scale was in the excellent range (α=0.90) even though it dropped from 0.92 to 0.90 (Table 5). The reliability of the Positive research predisposition factor was also in the excellent range (α=0.92). The Research anxiety factor had the largest decrease in size (α=0.86) although its reliability was still in the very good range.

Discussion and Implications

The Attitudes Toward Research scale, which currently exists in Greek and in English, is one of the few instruments created with a focus on measuring student attitudes towards the subject area of research methods. Since the creation of the scale however, its results have not been cross validated with samples of undergraduate students in the field of education. Therefore, the purpose of this study was to establish the psychometric properties of the ATR scale, including the validity of the scores of the scale through confirmatory factor analysis. The original version of the questionnaire included 32 items that were broken down into five factors. The confirmatory factor analysis that was performed on the original version of the questionnaire showed that the fit of the model was not adequate. After deleting 19 items in total due to their amounts of errors variance, and by narrowing down the factors to three distinct factors, the fit of the model was established. The revised version of the questionnaire includes 13 items, which measure Research usefulness, Research anxiety, and Positive research predisposition. These items were all normally distributed and did not show any strong floor or ceiling effects.

The reliability of the scores from the revised version of the ATR scale (R-ATR) was high, although it dropped slightly compared to the original full version of the ATR scale. This is a very small setback when taking into consideration that 19 items have been eliminated from the revised version of the scale, especially since this allowed for the parsimony of the model to improve.

At this point it is important to acknowledge some of the limitation of the study. The main limitation lies in the fact that a larger proportion of females than males have participated in

this study, mainly due to the fact that the teaching profession tends to be dominated by female teachers. Once more data are collected from male students in the field of education, future research could involve the examination of group differences (invariance tests) to determine whether attitudes toward research are related to variables such as gender or age.

Despite the limitation mentioned above however, the overall analyses performed on the R-ATR suggest that it has strong psychometric properties. Therefore, a conclusion can be reached that the R-ATR is a promising self-report measure that can be used to assess college student's attitudes towards the field of research, and more specifically in assessing positive predispositions towards the field of research, research anxiety and research usefulness within the context in which the data were obtained from. This scale can therefore be utilized within this context by researchers examining the concepts of research methods attitudes, or by professors of educational research who might want to look deeper into the attitudes of their students on this issue. Further analyses of the scale, to determine its degree of construct validity within the USA are also underway in an effort to broaden its use, for research and teaching purposes.

In conclusion, through a systematic research agenda, future studies could try to establish links between research attitudes and teacher involvement in research in the workplace in an attempt to strengthen the development of teaching as an evidence-based profession. Research attitudes could be examined as a predictor of further research activities in an attempt to make further progress in the establishment of the educational field as an evidence-based profession. This is especially important nowadays due to the push that exists towards accountability, school effectiveness and school improvement.

References

Arbuckle, J. L. (2009). *Amos 18.0* [Computer software]. Chicago: SmallWaters.

Briggs, A., & Coleman, M. (2007). *Research Methods in Educational Leadership and Management*. London: Sage.

Fusarelli, L. D., (2008). Flying partially blind: School leaders' use of research in decision making. *Phi Delta Kappan,* 365-368.

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural equation modeling, 6,* 1-55.

Korkmaz, A., Cole, J. S., & Buckley, J.A. (2010, May). *The effects of undergraduate research experience for STEM majors: A longitudinal study.* Paper presented at the annual meeting of the American Educational Research Association Conference, Denver: CO.

Lodico, M. G., Spaulding, D., & Voegtlee, K. H. (2004). *Promising practices in the teaching of educational research.* Paper presented at the American Educational Research Association Conference, San Diego, CA, April, 2004.

Lopatto, D. (2007). Undergraduate research experiences support science career decisions and active learning. *Life sciences education, 4,* 297-306. Doi: 10.1187/cbe.07-06-0039

McGuire, W. J. (1969). The nature of attitudes and attitude change. In G. Lindzey, & E Aronson (Eds.*), The Handbook of Social Psychology,* (2nd ed. Vol. 3, pp. 136-314). Reading, MA: Addison-Wesley.

Murtonen, M. (2005). University students' research orientations: Do negative attitudes exist toward quantitative methods? *Scandinavian Journal of Educational Research, 49*, 263-280.

Murtonen, M., & Lehtinen, E. (2003). Difficulties experienced by education and sociology students in quantitative methods courses. *Studies in Higher Education, 28*, 171-185.

Nasser, F. M. (2004). Structural model of the effects of cognitive and affective factors on the achievement of Arabic-speaking pre-service teachers in introductory statistics. *Journal of statistics education, 12*(1). Retrieved from www.amstat.org/publications/jse/v12n1/nasser.html

Olsson, U. H., Foss, T., Troye, S. V., & Howell, R. D. (2000). The performance of ML, GLS & WLS estimation in structural equation modeling under conditions of misspecification and nonnormality. *Structural equation modeling, 7,* 557-595.

Onwuegbuzie, A. J. (2003). Modeling statistics achievement among graduate students. *Educational and psychological measurement, 63*, 1020-1038.

Onwuegbuzie, A. J., Leech, N., Murtoner, M., & Tahtinen, J. (2005, August). *Utilizing mixed methods in teaching environments to reduce statistics anxiety*. Paper presented at the annual meeting of the European Association for Research on Learning and Instruction, Cyprus.

Onwuegbuzie, A. J., Slate, J. R., Paterson, F. R. A., Watson, M. H., & Schwartz, R. A. (2000). Factors associated with achievement in educational research courses. *Research in the schools, 7,* 53-65.

Onwuegbuzie, A. J. & Wilson, V. A. (2003). Statistics anxiety: nature, etiology, antecedents, effects and treatments- a comprehensive review of the literature. *Teaching in higher education, 8*, 195-209.

Pan, W. & Tang, M. (2004, April). *Students' perspectives on factors of statistics anxiety and intervention strategies.* Paper presented at the American Educational Research Association Conference, San Diego, CA.

Papanastasiou, E. C. (2005). Factor structure of the 'Attitudes towards research' scale. *Statistics Education Research Journal, 4*, 16-26.

Papanastasiou, E. C. (2010). *Research attitudes in the context of distance learning and face-to-face environments.* Paper presented at the Annual conference of the American Educational Research Association, Denver, CO.

Papanastasiou, E. C. & Karagiorgi, Y. (2012, April). *The Research-Oriented Professional Teacher: An Illusion or a Possibility? – The Case of Secondary Schoolteachers in Cyprus.* Paper presented at the annual meeting of the American Educational Research Association, Vancouver, British Columbia, Canada.

Papanastasiou, E. C., & Zembylas, M. (2008). Anxiety in undergraduate research methods courses: Its nature and implications. *International Journal of Research and Method in Education, 31,* 155-167.

Russel, S.H., Hancock,M. P., & McCullough, J. (2007). Benefits of undergraduate research experiences. *Science, 316* (5824), 548-549. Retrieved from www.sciencemag.org

Ruthven, K. (2005). Improving the development and warranting of good practice in teaching. *Cambridge Journal of Education, 35*, 407-426.

Seymore, E., Huner, A., Laursen, S.L., & Deantoni, T. (2004). Establishing the benefits of research experiences for undergraduates in the sciences: First findings from a three-year study. *Science education, 88,* 493-534.

Westbury, I., Hansen, B., Kansanen, P., & Bjorkvist, O. (2005). Teacher Education for Research-based Practice in Expanded Roles: Finland's experience. *Scandinavian Journal of Educational Research, 49,* 475-485.

West, C. (2011). Action Research as a Professional Development Activity. *Arts Education Policy Review, 112*, 89–94.

Table 1.
Descriptive statistics of the ATR scale

Factor	Items	Mean	SD	Skewness	Kurtosis
Research usefulness					
	q8 Research is useful for my career.	5.13	1.39	-0.67	0.06
	q14 Research is connected to my field of study.	4.76	1.61	-0.51	-0.51
	q20 The skills I have acquired in research will be helpful to me in the future	5.22	1.33	-0.67	0.24
	q24 Research should be indispensable in my professional training	4.77	1.48	-0.30	-0.51
Anxiety					
	q1 Research courses make me anxious. *	3.31	1.79	0.36	-0.86
	q7 Research courses scare me. *	4.01	1.81	-0.10	-1.02
	q16 Research courses are stressful. *	3.64	1.86	0.15	-1.12
	q18 Research courses make me nervous. *	4.02	1.84	-0.09	-1.08
	q28 Research courses are difficult. *	3.65	1.67	0.02	-0.95
Positive research predispositions					
	q3 I enjoy my research course(s).	3.53	1.56	0.11	-0.73
	q12 I love research courses.	3.38	1.60	0.28	-0.63
	q13 I find research courses interesting.	4.23	1.46	-0.23	-0.48
	q30 Research courses are pleasant.	3.62	1.49	0.12	-0.52

* Recoded items

Table 2.
Fit indices of the structural models

	Hypothesized model	Revised model (R-ATR)	Model difference
χ^2	1175.83 (df=395, p<0.000)	160.23 (df=62, p<0.000)	$\Delta\chi^2$= 1015.60
χ^2/df ratio	2.98	2.58	Δdf =333, p<0.0001
NFI	0.82	0.95	
RFI	0.79	0.92	
CFI	0.87	0.97	
IFI	0.88	0.97	
TLI	0.85	0.95	
AIC	1375.83	244.23	

Table 3.
Path coefficients of final Revised-ATR scale

Factor	**Path**	**Items/Factors**			
			Standardized Estimates	Unstandardized Estimates	S.E.
Research usefulness	←→	Pos. predisposition	0.54	0.76**	0.11
Research anxiety	←→	Pos. predisposition	0.62	0.99**	0.13
Research anxiety	←→	Research usefulness	0.18	0.24**	0.09
Research usefulness	→	q20	0.83	1.01**	0.07
Research usefulness	→	q8	0.79	1.00	
Research usefulness	→	q14	0.73	1.07**	0.08
Research usefulness	→	q24	0.74	0.99**	0.08
Research anxiety	→	q18	0.88	1.29**	0.08
Research anxiety	→	q16	0.89	1.32**	0.08
Research anxiety	→	q7	0.83	1.20**	0.08
Research anxiety	→	q1	0.86	1.23**	0.08
Research anxiety	→	q28	0.75	1.00	
Pos. predisposition	→	q12	0.87	1.09**	0.06
Pos. predisposition	→	q30	0.85	1.00	
Pos. predisposition	→	q13	0.82	0.94**	0.05
Pos. predisposition	→	q3	0.89	1.09**	0.05

** $p<0.001$

Table 4.
ATR item correlations

	q3	q12	q13	q30	q1	q7	q16	q18	q28	q8	q14	q20
q3												
q12	.77											
q13	.73	.72										
q30	.76	.72	.71									
q1	.48	.40	.39	.39								
q7	.46	.45	.44	.45	.69							
q16	.49	.40	.39	.39	.78	.70						
q18	.49	.41	.40	.40	.74	.71	.80					
q28	.41	.43	.42	.42	.66	.65	.66	.67				
q8	.38	.39	.39	.39	.12	.14	.12	.12	.13			
q14	.35	.37	.36	.36	.11	.13	.11	.11	.12	.56		
q20	.40	.43	.42	.42	.13	.15	.13	.13	.14	.66	.61	
q24	.36	.37	.36	.36	.11	.13	.11	.11	.12	.56	.52	.61

Table 5.
Reliability estimates of ATR scale

	Reliability		Number of Items	
Factor	Standardization sample	Current sample	Standardization sample	Current sample
Research usefulness	0.92	0.90	9	4
Research anxiety	0.92	0.86	8	5
Positive research predisposition	0.93	0.92	8	4
Research difficulty	0.71	--	3	--
Relevance to life	0.77	--	4	--

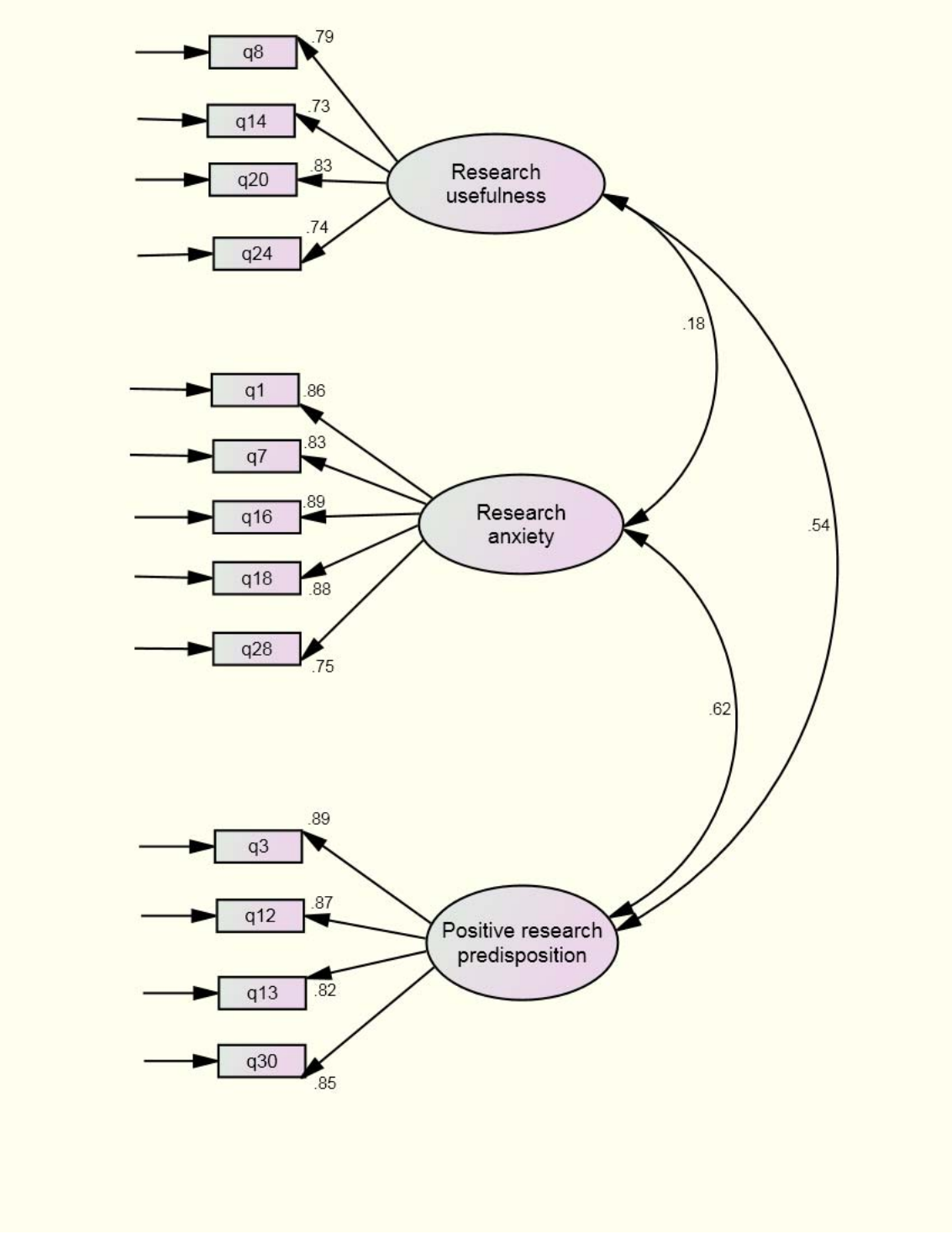

Figure 1.

Factor structure of the Revised- Attitudes Toward Research Scale (R-ATR)