

**ДЕНОВАН ЭНДРЮ
ДЭГНОЛЛ НИЛ
ХИЛЛ-АРТАМОНОВА ЕЛЕНА
МУСИЕНКО ТАМАРА ВИКТОРОВНА**

МЕНТАЛЬНАЯ УСТОЙЧИВОСТЬ: РУССКАЯ ВЕРСИЯ ШКАЛЫ ИЗМЕРЕНИЙ (MTQ18)

АННОТАЦИЯ

Особую роль в исследовании проблем и управлении рисками безопасности личности играет изучение психологической и ментальной устойчивости, развитие которых предполагает умение личности сосредоточиться на одном занятии без распыления своих сил, способность доводить любое начатое дело до завершения, преодоление боязни нового, адекватное отношение к своим ошибкам, умение мыслить в позитивном ключе, устойчивость к форс-мажорным ситуациям и умение не поддаваться импульсам, стрессоустойчивость и другие качества.

В статье авторами предложен опросник ментальной выносливости из 18 пунктов (MTQ18), который представляет собой краткий вариант широко используемой шкалы измерения ментальной выносливости. MTQ18 базируется на более развернутой шкале измерений MTQ48, которая включает в себя четыре независимых, но взаимосвязанных фактора (Вызов, Приверженность, Контроль и Уверенность). Несмотря на выборку элементов из разных измерений MTQ48, MTQ18 (как и предполагалось) обеспечивает целостную одномерную оценку.

В настоящей статье MTQ18 переведен на русский язык, а также в ней представлены результаты проведенной оценки валидности и надежности MTQ18 (факториальной, внутренней и конвергентной) в рамках исследования на основе общей выборки из 1150 участников (432 мужчины и 718 женщин).

Подтверждающий факторный анализ (CFA) показал, что MTQ18 обладает дополнительной дисперсией по сравнению с тем, что объясняется одномерным решением. Более того, анализ с помощью исследовательского моделирования структурных уравнений показал, что модель данных лучше подходит для четырехфакторной модели, чем CFA. Однако факторы Контроля и Вызова продемонстрировали несогласованность индикаторов. Тесты конвергентной валидности показали, что MTQ18 коррелирует с теоретически связанными показателями.

В целом авторы приходят к выводу, что, хотя MTQ18 был психометрически приемлемым показателем, проблемы с факторной структурой требуют дополнительной проработки и решения в будущих исследованиях.

Ключевые слова: управление рисками безопасности, безопасность личности, ментальная устойчивость, психологическая выносливость, психометрическая валидация, MTQ18, исследовательское моделирование структурных уравнений, подтверждающий факторный анализ.

**DENOVAN A.
DAGNALL N.
HILL-ARTAMONOVA E.
MUSIENKO T. V.**

MENTAL TOUGHNESS QUESTIONNAIRE (MTQ18): A RUSSIAN VERSION

ABSTRACT

A special role in the study of personal security problems is played by the study of psychological stability and mental toughness, the development of which involves the ability of a person to focus on one occupation without dispersing their forces, the ability to bring any business started to completion, overcoming the fear of the new, an adequate attitude to their mistakes, the ability to think in a positive way, resistance to force-majeure situations and the ability do not give in to impulses, stress resistance and other qualities.

In the article, the authors proposed a Mental Toughness Questionnaire.

The 18-item Mental Toughness Questionnaire (MTQ18) is a brief, widely used measure of mental toughness. The MTQ18 derives from the longer MTQ48, which comprises four independent but correlated factors (Challenge, Commitment, Control and Confidence). Despite sampling items from across MTQ48 dimensions, the MTQ18 (as intended) provides a global, unidimensional score. The current paper translated the MTQ18 into Russian, and consequently assessed validity and reliability (factorial, internal

and convergent) in a general population sample of 1150 participants (432 male and 718 female). Confirmatory factor analysis (CFA) revealed the MTQ18 possessed additional variance to that accounted for by a unidimensional solution. Moreover, analyses via exploratory structural equation modelling demonstrated better data-model fit for a four-factor model than CFA. However, factors of Control and Challenge demonstrated inconsistent item loadings. Tests of convergent validity revealed the MTQ18 correlated with theoretically related measures. Overall, although the MTQ18 was a psychometrically acceptable measure, issues with factorial structure require reconciliation in future research.

Keywords: security risk management, personal security, mental toughness, psychological stability, mental toughness, psychometric validation, MTQ18, exploratory structural equation modelling, confirmatory factor analysis.

Introduction

The MTQ18 is an abridged version of the Mental Toughness Questionnaire 48-item (MTQ-48) [1]. The parent scale is one of the most widely used, psychometrically validated measures of mental toughness. The MTQ48 derives from Clough's model of mental toughness. This draws heavily on the hardiness traits of Commitment (inclination to engage in life activities and be curious about life and the world), Challenge (view that change is a normal aspect of life that provides opportunities for personal growth), and Control (belief in one's ability to influence outcomes) [2]. Observing that hardiness was a personality style that protected against the negative effects of stress by facilitating resistance and active engagement in transformational coping, Clough extended the construct to produce a model of mental toughness [3-5]. To ensure that the new model was applicable to athletic performance, Confidence was added to Commitment, Challenge, and Control to form the 4Cs [6]. The inclusion of Confidence was a significant development because it acknowledged that self-belief plays an important role in competitive success. A further advance within the 4C model was the division of Control (emotional and life) and Confidence (own ability and interpersonal). This partitioning resulted in some researchers referring to the Clough model as the 6Cs [1].

Conceptually, the MTQ48 reflects the notion that mental toughness acts as a resistance resource, or protection against the adverse effects of stress [7]. Accordingly, mental toughness aids the ability to deal effectively with pressures and challenges [1]. The operationalisation of the dimensions of the 4/6C model is consistent with this definition [see 8]. Thus, Commitment reflects deep involvement in pursuits and activities, particularly the ability to successfully complete tasks through perseverance when confronted

by problems/obstacles. Challenge represents the degree to which difficulties are perceived as developmental opportunities. Control refers to the ability to manage anxieties and arousal in pressure situations, explicitly to manage external perceptions of emotions (emotions), and the belief that one, not others, is influential in determining outcomes (life). Finally, Confidence signifies self-assurance, specifically belief in personal capability to achieve goals and be less dependent on external influences (own), and the ability to be assertive and resist intimidation in social contexts (interpersonal).

Several studies have provided support for the Clough model. For instance, Perry, Clough, Crust, Earle, Nicholls using a large sample ($n = 8207$) composed of managers (senior, lower and middle), clerical/administrative workers, athletes, and students endorsed the factorial validity of the MTQ48. The authors believed that this sample represented the full domain of possible MT expressions, and therefore evidenced the generalizability of the MTQ48 across contexts. Analysis, involving a range of confirmatory factor analysis (CFA) and exploratory structural equation modelling (ESEM) fit indices, indicated that the MTQ48 generally was a robust psychometric instrument. Moreover, Perry observed very good model fit in all samples (i.e., occupation, sport, and educational). Overall, these findings specified that the MTQ48 was a robust psychometric instrument [see 9].

One area of concern was that the emotion subscale of control demonstrated weak factor loadings and correspondingly poor internal consistency. Despite these limitations, Perry recommended retention of the subscale based on important role that emotional control played in the development of the 4C model. Moreover, the inclusion of the subscale facilitates debate regarding the appropriateness of emotional control. Noting this,

researchers should use the emotional control subscale with caution (i.e., ensure internal consistency). Consistent with Perry [see 9], studies have used the 4C model effectively across a range of settings. Notably, in education, health [11], occupational [12] and sport [13] settings. These findings, concomitant with performance on criterion measures [e.g., lower ratings of exertion, [see 1]; physical endurance, suggest that the 4C model is a valid conceptualisation of mental toughness [14].

Not all studies, however, have replicated the 4C/6C structure. Vaughan, Hanna, and Breslin using a sample comprising elite, amateur and non-athletes found that while the six-factor model demonstrated acceptable levels of fit, the four-factor model failed to produce good fit. Further analysis of the six-factor model across sample subgroups also indicated large degrees of misspecification. Based on their findings, Vaughan suggested that refinement of the MTQ48 at the subscale level was necessary and advised against using the scale with elite athletes [15]. Likewise, Birch, Crampton, Greenlees, Lowry, and Coffee using moderate ($n = 480$) and large ($n = 1206$) independent student athlete samples also provided little support for the 4 and 6C models. These outcomes, according to indicated that the MTQ48 may not be a valid measure of mental toughness when applied to student athletes [16].

Noting failures to reproduce the 4/6C structure, Gucciardi, Hanton, and Mallett questioned the appropriateness of the Clough model. Specific problems being item loadings and pertinency to sample groups. In this context, CFA and ESEM have revealed poor data fit in athlete and workplace samples. Critics view these results as a manifestation of mismatch between the 4C/6C model and the MTQ48. Observing findings such as these, Gucciardi questioned the validity of the 4C/6C model and advocated that mental toughness was best conceptualised as a unidimensional concept. Furthermore, concluded that mental toughness was state-like; varying within individuals across situations and over time. These criticisms, however, are not universally accepted [6].

These debates are important because researchers and practitioners need to possess keen awareness of important conceptual deliberations about mental toughness before using measurement instruments.

Thus, although the Clough [1] 4/6C model is widely accepted, users should be cognizant that this approach is not without criticism and reflects one particularly theoretical perspective. That stated, total scores on the MTQ48 and Sports Mental Toughness Questionnaire (SMTQ; Sheard, Golby, & Van Wersch) are highly positively correlated [17]. This provides some evidence for high order construct and content validity. Issues arise at the dimensional level as evidenced by the finding that inter-scale relationships, although significant, were weaker at the subscale level. Background to MTQ48 is important because the measures content directly informs MTQ18 content. Indeed, the shortened measure includes items from the each of the four MTQ48 dimensions (three Challenge, three Commitment, five Control, and seven Confidence) [18].

The rationale for the MTQ18 was to provide researchers and practitioners with an expedient assessment of mental toughness. This is useful to investigators who are measuring mental toughness within questionnaire batteries comprising multiple scales as the shortened version is more easily accommodated due to brevity, which concomitantly reduces the likelihood of respondent fatigue. The MTQ-18 is also advantageous when testing time is constrained, or accessibility is an issue. For example, when the participant group possesses cognitive limitations (i.e., young respondents are prone to distraction, and shorter attention spans). These factors together with the wealth of empirical support for the MTQ48, explain why researchers view the MTQ-18 as an attractive index of mental toughness. Indeed, the scale has appeared in myriad published papers.

The problem with this work, is that authors have typically either overlooked the lack of psychometric examination of the measure, or predicated use on the established properties of the MTQ48. The assumption that the MTQ18 is psychometrically sound because the parent measure is validated is flawed. This is particularly true when the MTQ48 asserts that mental toughness is a multidimensional construct, yet the MTQ18 is a unidimensional. Although, previous research has generally failed to consider and/or report the measurement properties of the MTQ18, there is

emerging evidence that the scale is valid and reliable [see 19]. With reference to validity, the MTQ18 is strongly positively correlated with the MTQ48 ($r = 0.87$) signifying the scale adequately samples the content of its parent measure. Additionally, several studies report that the MTQ18 possesses internal reliability [see 20]. These range from satisfactory [e.g., 13; 21] through satisfactory to excellent [e.g.22; see 19]. Reporting of test-retest reliability is limited. Crust using a small sample of 21 academy football players observed that MTQ-18 was highly stable across a 3-month interval.

Noting that the MTQ18 was used widely within research examined the measures psychometric properties. Analysis indicated that the measure was an acceptable, index of global mental toughness. This outcome supported the use of the MTQ-18 as a brief unidimensional measure of mental toughness. In comparison to a shorter 10-item version, however, the MT18 produced poorer fit due. This issue arose from the fact that the 18-item scale possessed additional variance to that accounted for by a unidimensional solution. This was a consequence of Clough selecting high loading items from each of the MTQ-48 subscales; structural contamination from the 4Cs dimensions weakened the unidimensional structure. Hence, psychometrically the MTQ18 is an adequate global measure that derives from a less than optimal factorial solution. Noting that despite this minor limitation the MTQ18 is widely used and the MTQ10 is currently undergoing development, this paper provides Russian researchers with a Russian language version of the MTQ18. Another advantage of translating the 18-item version is that it will hopefully facilitate refinement of a briefer Russian version of the MTQ10. Moreover, the current paper presents norms from a large Russian speaking sample. This is an important innovation as performance on psychological measures can vary as a function of cultural factors. Hence, these data will enable relative comparisons in performance [19].

Method

Participants

A random sample of 1150 participants (432 male and 718 female) completed the study. Mean participant age was $M = 38.19$, $SD = 10.44$; age ranges from 18-69

years. Male mean age was $M = 40.24$, $SD = 11.14$, range 18-84 years. Female mean age was $M = 36.96$, $SD = 9.80$, range 18-77 years. The sample comprised of general adult population from all regions of Russia. Respondent were recruited via Anketolog company that specialises in participants recruitment. Of the sample, 15 (1.3%), 261 (22.7%), 833 (72.5%), and 41 (3.5%) completed high school, college/further education, higher education, and postgraduate education respectively. Participation was voluntary, and respondents could terminate participation at any time during the study. The only exclusion criteria were that participants must be at least 18 years of age.

Translation

Psychologists who conduct cross-cultural research are often in dire need of translating their questionnaires and instructions for participants from one language to another. One of the most well-known techniques for adequate and reliable translation of measures is the back-translation method. According to Brislin (1970), back-translation is a technique that refers to a bilingual individual or researcher translating measures or passage, which is followed by another independent bilingual individual translating the passage back to the original language [23]. Any differences in meaning can be resolved by modifying the target measures or instructions in the target language version. For the Russian participants, the questionnaire was translated and back translated by the one of the lead researchers. Back translation, or translation of a translated text back into its original language, has been used in cross-cultural survey research over the past 50 years, primarily as a translation quality assessment tool. It was, historically, the first linguistic quality control technique introduced to cross-cultural research and has been considered a standard translation procedure for a long time [24; 25]. This approach is used in other studies and is supported by several academic fields. Consensus reveals that this approach preserves the original meaning of the questionnaire items in another language. Douglas and Craig (2007) noted that among the 45 articles published in the Journal of International Marketing between 1997 and 2005 that reported surveys using multiple languages, 34 of them (75%) used back translation as a primary quality assessment method [26].

Measures

Mental Toughness

The Mental Toughness Questionnaire [see 1] or MTQ-18 uses a selection of items (18 to be exact) from the MTQ-48 (three Challenge, three Commitment, five Control, and seven Confidence). Items appear as statements (e.g., “I generally feel in control”) and respondents indicate their level of agreement via a five-point Likert-type scale anchored at 1 = strongly disagree and 5 = strongly agree. Since the MTQ-18 is a unidimensional, global index of mental toughness following reversal of items (2, 3, 6, 8, 9, 11, 12, 16, and 17) the scale is scored by summation of individual item responses. Summing of individual item responses produces an overall score. Higher scores indicate greater levels of MT. In the current study, internal reliability for the scale was adequate $\alpha = .76$.

Grit

The 12-item Grit Scale evolved from a pool of 27 items indexing the construct of grit. These captured the attitudes and behaviors of high-achieving individuals identified by previous exploratory interviews with professionals (e.g., lawyers, businesspeople, and academics). Item design ensured that statements had face valid for adolescents and adults and were context free. Thematically, items reflected the ability to sustain effort within two broad domains. Firstly, in the face of adversity (e.g., “I have overcome setbacks to conquer an important challenge «), and secondly because of the expectations of others and/or a lack of aware of alternative options. Reflecting this several items enquire about the consistency of interests over time (e.g., “I have difficulty maintaining my focus on projects that take more than a few months to complete”). Consideration of item-total correlations, internal reliability coefficients, redundancy, and exploratory factor analysis reduced the item pool to the 12 items that comprise the Grit Scale. These subdivided into two six-item factors consistency of interests and perseverance of effort. In the current study, internal reliability for the scale for Russian sample was adequate $\alpha = .71$ [27; 29].

Hardiness

The Dispositional Resiliency Scale-15 v.3.2 or DRS-15 measures hardiness via 15 statements, which comprise three subcomponents: Commitment

(e.g., “I really look forward to my daily activities”), Control (e.g., “It is up to me to decide how the rest of my life will be”), and Challenge (e.g., “I enjoy the challenge when I have to do more than one thing at a time) [29].

Respondents specify agreement on a 4-point scale (0 for not at all true to 3 for completely true). Higher scores indicate greater hardiness. Researchers use both factor and overall scores Psychometric evaluation of the DRS-15 has established that the measure is valid (criterion-related and predictive validity) and reliable (internal and test-retest) (Bartone, 1991/2007). In the current study, internal reliability for the scale for Russian sample was $\alpha = .71$ [30].

Procedure

Potential respondents clicked on a web link, which accessed the study materials, hosted by the Anketolog web-based survey tool. Included with the survey was a separate section on debrief, where participants had to agree to proceed further. This outlined the nature of the study and explained ethical procedures. If respondents agreed to participate, they registered informed consent and progressed to the measures. Procedural instructions then asked respondents to consider questions carefully; work through the items systematically, at their own pace; respond to all questions; and answer in an honest and open manner. Questionnaire section order rotated to prevent order effects. Alongside item endorsement respondents forwarded basic demographic information (preferred gender, age, etc.).

The present study used a cross-sectional design, where data collection occurred at one time point. This approach is susceptible to common method variance (CMV), which occurs when measurement instruments influence responses and produce bias. Noting this, countermeasures were employed [31]. Specifically, consistent with Podsakoff (2003), study instructions created psychological distance between constructs by stating that each item set was independent. Additionally, to limit social desirability and evaluation apprehension, the instructions stressed the need for honesty and that there were no correct answers.

Ethics

Ethical approval was granted by Manchester Metropolitan University for a series of studies examining personality traits and its relationship to the behavioral outcomes in the form of prejudice and aggression.

Data analysis

Analyses, using Mplus Version 8.0, evaluated measurement models and determined which provided best data fit. Confirmatory factor analysis (CFA) is useful when assessing personality-based measures (such as the MTQ18) because it comprises unique features including the ability to model hierarchical structures and examine latent structures (consistent with the view of personality encompassing a hierarchical order, and traits resembling latent dispositions) argue exploratory structural equation modelling (ESEM) is effective for testing personality measures because, like CFA, it permits robust analyses of structure, but without the limitations of constraining non-target loadings to zero and limiting the possibility of cross-loadings. Essentially, ESEM provides a flexible framework for the scrutiny of personality measures [32; 33; 34].

Model evaluation included traditional CFA followed by ESEM. Tested models were a one-factor model comprising a single mental toughness dimension (a null test of the measure's structure), a four-factor correlated model encompassing Confidence, Control, Commitment and Challenge, and a four-factor correlated ESEM model. The authors employed oblique target rotation because it most effectively combines confirmatory and exploratory techniques. Analyses utilized MLR estimation.

Indices of chi-square, Comparative Fit

Index (CFI), Standardized Root-Mean-Square Residual (SRMR) and Root-Mean-Square Error of Approximation (RMSEA) evaluated model fit. Good fit thresholds are $CFI \geq .90$, $SRMR \leq .08$ and $RMSEA \leq .08$ [35]. Analysis considered also Akaike's Information Criterion (AIC) and Bayesian Information Criterion (BIC). Inter-factor correlations $>.10$, $>.30$, and $>.50$ indicated small, medium, and large effect sizes. Lastly, convergent validity assessment compared the MTQ18 factor means with similar constructs (Grit and Hardiness) [36].

Results

Data screening

Assessment of univariate skewness and kurtosis indicated no concerns with the MTQ18 items; skewness values fell between -2.0 and $+2.0$, and kurtosis between -4.0 and $+4.0$ [37]. However, estimates of multivariate kurtosis (Mardia's $b2p = 57.54$, $p < .001$) and skewness (Srivastava's $b1p = 171.68$, $p < .001$) suggested departure from multivariate normal distribution. Therefore, use of MLR estimation was necessary; this produces parameter estimates and standard errors that are robust to instances of non-normality [38].

Factor analyses

For the one-factor correlated model, CFA indicated poor data-model fit (Table 1). In addition, consistent with Dagnall within-item error correlations were recommended to improve model fit (i.e., for more than 50% of scale items). The four-factor correlated model also demonstrated poor fit. These findings indicated that the instrument requires modification to achieve a good fit, or at least correlation of error terms and correction for model misspecification [19].

Table 1.

Fit indices for MTQ18 factor models

Model	χ^2	df	CFI	SRMR	RMSEA (90% CI)	AIC	BIC
One-factor CFA	1786.57**	135	.57	.12	.10 (.09-.10)	58974.76	59075.76
Four-factor CFA	1413.81**	129	.67	.12	.09 (.08-.09)	58475.79	58588.01
Four-factor ESEM	213.15**	87	.96	.02	.03 (.03-.04)	57104.62	57295.39

Note. ** χ^2 significant at $p < .001$.

CFA results therefore highlight the necessity of ESEM as an alternative approach. The ESEM results yielded better fit for the four-factor correlated model, with fit indices increasing, thus providing a better fit between the conceptual and observed data. AIC and BIC values corroborated these findings, confirming that the ESEM model was superior. CFA results therefore highlight the necessity of ESEM as an alternative approach. The ESEM results yielded better fit for the four-factor correlated model, with fit indices increasing, thus providing a better fit between the conceptual and observed data. AIC and BIC values corroborated these findings, confirming that the ESEM model was superior.

Scrutiny of parameter estimates involved observing the four factors of the MTQ18, as explained by the variance of each item within the model (Table 2). Reporting includes cross-loadings because ESEM analysis permits latent variables to correlate with one another. Results indicated that all items loaded significantly on targeted factors of Confidence and Commitment ($\lambda = .29 - .72$). However, two of five items (2 and 16) did not load significantly on the target factor of Control, and only one of three items (item 11) loaded significantly on the target factor of Challenge.

Table 2.

Parameter estimates of the MTQ18 based on ESEM

Item	λ			
	Confidence	Commitment	Control	Challenge
<u>Confidence</u>				
Q5	.54**	-.06	.15*	.19
Q7	.72**	.14*	-.03	-.18**
Q8	.29**	.29**	-.34**	.09
Q9	-.35**	.31**	-.03	.51**
Q14	.51**	-.18**	.11	.37**
Q15	.58**	-.24**	.05	.36**
Q18	.68**	.14*	-.05	-.19**
<u>Commitment</u>				
Q3	-.14*	.54**	-.03	.04
Q6	-.03	.40**	-.25**	.17*
Q17	.04	.29*	-.31*	.17*
<u>Control</u>				
Q1	.05	.23*	.65**	.11
Q2	.25**	.36**	-.12	.09

Item	λ			
	Confidence	Commitment	Control	Challenge
Q10	.11*	.27**	.28**	.24**
Q12	.26**	.26**	-.35**	.16**
Q16	-.08	.49**	-.16	.02
<u>Challenge</u>				
Q4	.47**	-.05	.26**	.21
Q11	-.04	.43**	.02	.19*
Q13	.46**	.03	.24**	.12

Note. λ = factor loading; targeted loadings in bold. * $p < .05$; ** $p < .001$.

Many items displayed significant cross-loadings. However, some items displayed loadings $> .40$. Specifically, item 9 on Challenge ($\lambda = .51$), items 11 and 16 on Commitment (λ of .43 and .49 respectively), and items 4 and 13 on Confidence (λ of .47 and .46 respectively). Examining these separately suggested the items most representative of each factor. For Confidence, item 7 loaded the highest ($\lambda = .72$); item 3 loaded highly on Commitment ($\lambda = .54$); item 1 loaded highly on Control ($\lambda = .65$); and item 11 reflected the highest loading on Challenge ($\lambda = .19$). Of the four factors, Challenge demonstrated the least clear structure in terms of target loadings, with all items loading more significantly on other factors (specifically Commitment and Confidence).

Next, analysis compared latent factor correlations. Confidence evidenced a significant correlation with Control and Challenge only (r s of .43 and .30; medium effect sizes). In addition, Commitment demonstrated significant correlations with Control and Challenge only (r s of .34 and .26; medium and small effect sizes respectively).

Composite reliability and convergent validity

Internal consistency tests including Cronbach's α often under- or overestimate scale reliability within a latent modelling context, and composite reliability offers a more rigorous assessment of internal consistency [39]. The current study assessed composite reliability of the MTQ18 four factors, with values greater than .60 considered acceptable [40]. Results indicated that the Confidence factor demonstrated satisfactory composite reliability ($\rho_c = .716$), and the Control and Commitment factors

possessed marginal internal consistency ($\rho_c = .593$ and $\rho_c = .580$ respectively). The Challenge factor demonstrated unsatisfactory composite reliability, however ($\rho_c = .515$).

Correlations between MTQ18 factors and Grit (global and subscales; Consistency of Interest and Perseverance of Effort) and Hardiness appear in Table 3. The results indicated that the MTQ18 factors correlated mostly in expected ways with Grit and Hardiness, thus suggesting reasonable convergent validity of the MTQ18.

Table 3.

Correlations of MTQ18 with Grit and Hardiness

MTQ18	Grit	Consistency of Interest	Perseverance of Effort	Hardiness
Confidence	.35**	.32**	.34**	.45**
Commitment	.25**	.21**	.26**	.26**
Challenge	.27**	.25**	.25**	.34**
Control	.37**	.33**	.37**	.45**
MTQ18 total	.44**	.39**	.43**	.54**

Note. ** $p < .001$.

Discussion

Examination of models (i.e., one-factor and four-factor correlated) using confirmatory factor analysis (CFA) found poor data-model fit. These findings concurred with Dagnall [19], who observed that CFA models for the English language version of the MTQ18 reported significant misspecification. Explicitly, the scale possessed additional variance to that accounted for by a unidimensional solution, resulting in the need to correlate more than 50% of scale item error terms. In the present study, to produce adequate model fit it was also necessary to correlate error terms. Although this approach is inconsistent with CFA, it is compatible with the assumptions of ESEM. ESEM is a method for analysis of latent variables when non-ignorable cross-factor loadings occur. Accordingly, ESEM was employed to test the Russian MTQ18 adaptation. This found adequate fit for the four-factor correlated model. This outcome was congruent with Perry [12], who following examination of the MTQ48, concluded that due to item cross loading subsequent analysis of the scale and abridged versions should employ ESEM.

Consistent with the UK version, at the item level the Russian adaptation demonstrated pronounced cross-factor loadings. Thus, although items originating from the Confidence and Commitment subscales of the parent MTQ48 measure loaded most strongly on the designated factors, they also correlated with other factors. In the case of Control, factor loading was unsatisfactory for two items, and these demonstrated associations with other factors. Notably these items were reverse-keyed, and this may have affected interpretation. Specifically, although translated accurately, understanding of these items may have been different than originally intended. The Challenge items produced the least coherent structure; all items loaded higher on other subscales.

These results were consistent with evaluation of the UK version of the MTQ18, which found that the measure was adequate but structurally challenged. Explicitly, additional variance arose from the item selection procedure [1] to sample construct breadth, selected highest loading items from each of the MTQ-48 subscales (Challenge, Commitment, Control, and Confidence). This process unintentionally resulted in structural contamination arising from dimensional resonance. Thus, item associations with the 4C factors undermined the intended unidimensional structure. Consequently, the MTQ18 is an adequate global measure of mental toughness derived from a suboptimal factorial solution. In this context, translation further influenced preexisting factor relationships.

Additional analysis indicated that the MTQ18 Russian adaptation at the global and factorial levels possessed adequate convergent validity. This was evident because positive correlations were observed with associated non-cognitive skills (i.e., Hardiness and Grit, global and subscales; Consistency of Interest and Perseverance of Effort). These relationships were in the medium range using Cohen's [41] commonly cited guidelines for interpreting correlation effect size. These, however, have been criticized for being too stringent. Hence, application of more liberal criteria based on a large sample of previously published meta-analytically derived correlations that classified relationships as relatively large $> .30$ [42].

The observed relationships between the MTQ18 and the convergent measures (Hardiness and Grit) concurred with those reported previously. Although these associations need cautious interpretation since researchers have used a variety of measures to assess mental toughness, hardiness, and grit. Despite this, the overall pattern of relationships corresponded with preceding work. For instance, observed a correlation of .38 between mental toughness and Hardiness, and Fawver noted a correlation of .40 between mental toughness and Grit [see 43; 44; 45].

At a general level, this study has demonstrated that it is important to assess the psychometric properties of translated measures to ensure that they are valid and reliable for the intended population. Previously in Russia, researchers have too often used adaptations of personality questionnaires, which have been translated, but not subsequently psychometrically assessed. This in practice is problematic since it assumes common, shared understanding. However, meaning may vary as a function of language and culture. Thus, to be effective it is important to ensure that translations recognize social differences and nuances (i.e., connotation, relevance, and expression) [46].

Indeed, even when a language adapted version of a scale is administered in the native language of a country, variations in sense can arise that undermine scale validity. This supposition is supported by previous work on cross-cultural translation, which has reported that linguistic and cultural disparities affect comprehension of self-report instruments. Clearly, issues such as these can undermine scale reliability and validity and reduce psychometric performance within target populations [47]. Acknowledging these issues, the current version of the Russian MTQ18 was adapted using established, recommended methods. Explicitly, the standard procedures of translation, back-translation, assessment of structural and convergent validity, and examination of internal consistency [48].

Despite this, a concern with the MTQ18 is temporal stability. Currently, there exists only limited evidence to support the test-retest reliability of the measure [see 49; 19]. Establishing that the MTQ18

generally, and the Russian adaptation specifically, provides consistent measurements is important to the psychometric integrity of the scale. This process will also inform the conceptual development of mental toughness.

Finally, the Russian translation of the MTQ18 produced an adequate measure of global mental toughness. This would benefit from further development and refinement with Russian samples. For example, future research should generate appropriate norm groups for Russian samples. This is particularly important in the case of MTQ48 based measures as previous literature indicates that they are susceptible to structure variations as a function of contextual variations. Noting these issues, the authors advocate caution when generalizing data produced with the Russian version to other national samples [see 15; 16].

Приложение

Translation of the measures in Russian:

1. Даже при значительном давлении я сохраняю спокойствие.
2. Я склонен беспокоиться о вещах задолго до того, как они действительно произойдут.
3. Мне обычно трудно испытывать энтузиазм по поводу задач, которые я должен выполнить.
4. Я вообще хорошо справляюсь с любыми возникающими проблемами.
5. Я вообще чувствую, что я достойный человек.
6. Я просто не знаю, с чего начать» - это чувство, которое я обычно испытываю, когда мне предлагают несколько задач, которые можно сделать одновременно.
7. Я обычно высказываю свои мысли, когда мне есть что сказать.
8. Когда я делаю ошибки, я обычно позволяю себе беспокоиться в течение нескольких дней после их совершения.
9. В обсуждении я склонен отступить, даже когда я убежден в своей правоте.
10. Я вообще держу себя под контролем.
11. Мне часто хочется, чтобы моя жизнь была более предсказуемой.

12. Когда я чувствую усталость, мне трудно начинать что-то новое.
13. Я обычно могу быстро реагировать, когда происходит что-то неожиданное.
14. Какими бы плохими ни были события, я обычно чувствую, что в итоге все получится.
15. Я вообще смотрю на жизнь с оптимизмом и думаю в позитивном ключе.
16. Мне вообще сложно расслабляться.
17. Я обычно испытываю трудности в том, чтобы заставить себя сосредоточиться, когда устаю.
18. Если я чувствую, что кто-то не прав, я не боюсь с ним спорить.

References

1. Clough, P., Earle, K., & Sewell, D. (2002). Mental toughness: The concept and its measurement. In I. Cockerill (Ed.), *Solutions in sport psychology* (pp. 32–45). London: Thomson.
2. Kobasa, S.C. (1979). Stressful life events, personality, and health: an inquiry into hardiness. *Journal of Personality and Social Psychology*, 37(1), 1-11. <https://doi.org/10.1037/0022-3514.37.1.1>
3. Gentry, W.D., & Kobasa, S.C. (1984). Social and psychological resources mediating stress-illness relationships in humans. In W.D.Gentry(Ed.), *Handbook of behavioral medicine* (p.87-16). NewYork: GuilfordPres.
4. Quick, J.C., Wright, T.A., Adkins, J.A., Nelson, D.L., & Quick, J.D. (2013). *Preventive Stress Management in Organizations* (2nd ed.). Washington, DC: American Psychological Association. <https://doi.org/10.1037/13942-000>
5. Weinberg, R.S., & Gould, D. (2011). *Foundations of sport and exercise psychology*. Champaign, Human Kinetics.
6. Gucciardi, D.F., & Hanton, S. (2016). *Critical reflections and future considerations. Routledge international handbook of sport psychology*. New York, NY: Routledge, 439-457.
7. Crust, L, Swann, C, Allen-Collinson, J (2016). The thin line: A phenomenological study of mental toughness and decision-making in elite, high-altitude mountaineers, *Journal of Sport & Exercise Psychology* 38 (6): 598-611.
8. Clough, P., & Strycharczyk, D. (2012). *Developing Mental Toughness: Improving Performance, Wellbeing and Positive Behavior in Others*. London: Kogan Page.
9. Drinkwater KG, Dagnall N, Denovan A, Neave N (2020) Psychometric assessment of the Generic Conspiracist Beliefs Scale. *PLoS ONE* 15(3): e0230365. <https://doi.org/10.1371/journal.pone.0230365>.
10. St. Clair-Thompson, H., Giles, R., McGeown, S. P., Clough, P., Putwain, D., Perry, J. (2016). Mental toughness and transitions to high school and to undergraduate study. *Educational Psychology: An International Journal of Experimental Educational Psychology*. Advance online publication. doi:10.1080/01443410.2016.1184746.
11. Gerber, M., Kalak, N., Lemola, S., Clough, P. J., Pühse, U., Elliot, C., & Holsboer-Trachsler E, & Brand S. (2012). Adolescents' exercise and physical activity are associated with mental toughness. *Mental Health and Physical Activity*, 5(1), 35–42. <https://doi.org/10.1016/j.mhpa.2012.02.004>.
12. Perry, J. L., Clough, P. J., Crust, L., Earle, K., & Nicholls, A. R. (2013). Factorial validity of the Mental Toughness Questionnaire-48. *Personality and Individual Differences*, 54(5), 587–592. <http://dx.doi.org/10.1016/j.paid.2012.11.020>.
13. Crust, L., & Azadi, K. (2009). Leadership preferences of mentally tough athletes. *Personality and Individual Differences*, 47, 326-330.
14. Crust, L., & Clough, P. J. (2005). Relationship between mental toughness and physical endurance. *Perceptual and Motor Skills*, 100, 192-194.
15. Vaughan, R., Hanna, D., & Breslin, G. (2018). Psychometric properties of the Mental Toughness Questionnaire 48 (MTQ48) in elite, amateur and nonathletes. *Sport, Exercise, and Performance Psychology*, 7(2), 128–140. <https://doi.org/10.1037/spy0000114>
16. Birch, P.D., Crampton, S., Greenlees, I.A., Lowry, R.G., & Coffee, P. (2017). The Mental Toughness Questionnaire-48: A re-examination of factorial validity. *International Journal of Sport Psychology*, 48(3), 331–355.
17. Sheard, M., Golby, J., & Van Wersch, A. (2009).

- Progress toward construct validation of the Sports Mental Toughness Questionnaire (SMTQ). *European Journal of Psychological Assessment*, 25(3), 186–193. <https://doi.org/10.1027/1015-5759.25.3.186>.
18. Crust, L., & Swann, C. (2011). Comparing two measures of mental toughness. *Personality and Individual Differences*, 50, 217–221.
 19. Dagnall, N., Denovan, A., Papageorgiou, K.A., Clough, P.J., Parker, A., & Drinkwater, K.G. (2019). Psychometric assessment of shortened Mental Toughness Questionnaires (MTQ): Factor structure of the MTQ-18 and the MTQ-10. *Frontiers in Psychology*, 10, 1933. <https://doi.org/10.3389/fpsyg.2019.01933>.
 20. Taber, K.S. (2018). The use of Cronbach's alpha when developing and reporting research instruments in science education. *Research in Science Education*, 48(6), 1273–1296. <https://doi.org/10.1007/s11165-016-9602-2>.
 21. Lang, C., Brand, S., Colledge, F., Ludyga, S., Pühse, U., and Gerber, M. (2019). Adolescents personal beliefs about sufficient physical activity are more closely related to sleep and psychological functioning than self-reported physical activity: a prospective study. *Journal of Sport and Health Science*, 8(3), 280–288. <https://doi.org/10.1016/j.jshs.2018.03.002>.
 22. Sadeghi Bahmani, D., Hatzinger, M., Gerber, M., Lemola, S., Clough, P. J., Perren, S., von Klitzing K, von Wyl A, Holsboer-Trachsler E, & Brand S. (2016b). The origins of mental toughness–prosocial behavior and low internalizing and externalizing problems at age 5 predict higher mental toughness scores at age 14. *Frontiers in Psychology*, 7, 1221. <https://doi.org/10.3389/fpsyg.2016.01221>.
 23. Brislin, R.W. (1970). Back-translation for cross-cultural research. *Journal of Cross-cultural Psychology*, 1(3), 187–16.
 24. Dept, S., Ferrari, A., & Halleux, B. (2017). Translation and cultural appropriateness of survey material in large-scale assessments. In P. Lietz, J.C. Cresswell, K.F. Rust, & R. J. Adams (Eds.), *Implementation of Large-Scale Education Assessments* (pp. 168–192). Sussex, UK: Wiley.
 25. Harkness, J.A., Villar, A., & Edwards, B. (2010b). Translation, adaptation, and design. In J. A. Harkness, M. Braun, B. Edwards, T. P. Johnson, L. Lyberg, P. Ph. Mohler, B.-E. Pennel, & T. Smith (Eds.), *Survey methods in multinational, multiregional, and multicultural contexts* (pp. 117–140). Sussex, UK: Wiley.
 26. Douglas S.P. & Craig C.S. Collaborative and Iterative Translation: An Alternative Approach to Back Translation. *Journal of International Marketing*. April 2006: pp. 30–43.
 27. Duckworth, A.L., & Quinn, P.D. (2009). Development and validation of the Short Grit Scale (GRIT-S). *Journal of Personality Assessment*, 91(2), 166–174. <https://doi.org/10.1080/00223890802634290>.
 28. Duckworth, A.L., Peterson, C., Matthews, M.D., & Kelly, D.R. (2007). Grit: Perseverance and passion for long-term goals. *Journal of Personality and Social Psychology*, 92(6), 1087–1101. <https://doi.org/10.1037/0022-3514.92.6.1087>.
 29. Bartone, P.T. (2007). Test-retest reliability of the Dispositional Resilience Scale-15, a brief hardiness scale. *Psychological Reports*, 101(3), 943–944. <https://doi.org/10.2466/pr0.101.3.943-944>.
 30. Bartone, P.T., Ursano, R.J., Wright, K.M., & Ingraham, L.H. (1989). The impact of a military air disaster on the health of assistance workers: A prospective study. *The Journal of Nervous and Mental Disease*, 177(6), 317–328. <https://doi.org/10.1097/00005053-198906000-00001>.
 31. Krishnaveni, R., Deepa R. Controlling Common Method Variance while Measuring the Impact of Emotional Intelligence on Well-being. *Psychology*. 1 January 2013.
 32. Muthén, B., & Muthén, L. (2017). *Mplus user's guide* (8th edn.). Los Angeles, CA: Muthén & Muthén.
 33. Booth, T., & Hughes, D.J. (2014). Exploratory structural equation modeling of personality data. *Assessment*, 21, 260–271. <https://doi.org/10.1177/1073191114528029>.
 34. Marsh, H.W., Lüdtke, O., Muthén, B., Asparouhov, T., Morin, A.J., Trautwein, U., & Nagengast, B. (2010). A new look at the big five factor structure through exploratory structural equation modeling. *Psychological Assessment*, 22, 471–491. <https://doi.org/10.1037/a0019227>.
 35. Browne, M.W., & Cudeck, R. (1993).

Alternative ways of assessing model fit. In K. A. Bollen & J. S. Long (eds.), *Testing Structural Equation Models*, pp 136–162. Newbury Park, CA: Sage.

36. Cohen, J. (1992). A power primer. *Psychological Bulletin*, 112, 155–159. <https://doi.org/10.1037/0033-2909.112.1.155>.

37. Field, A., & Miles, J. (2010). *Discovering statistics using SAS*. London, UK: Sage.

38. Marsh, H.W., Vallerand, R.J., Lafrenière, M.A.K., Parker, P., Morin, A. J., Carbonneau, N., Jowett, S., Bureau, J.S., Fernet, C., Guay, F. and Salah Abduljabbar, A., & Paquet, Y. (2013). Passion: does one scale fit all? Construct validity of two-factor passion scale and psychometric invariance over different activities and languages. *Psychological Assessment*, 25(3), 796–809. <https://doi.org/10.1037/a0032573>.

39. Raykov, T. (1998). Coefficient alpha and composite reliability with interrelated nonhomogeneous items. *Applied Psychological Measurement*, 22(4), 375–385. <https://doi.org/10.1177/014662169802200407>.

40. Diamantopoulos, A., & Siguaw, J. A. (2000). *Introducing LISREL*. London, UK: Sage. <https://doi.org/10.4135/9781849209359>.

41. Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Erlbaum.

42. Gignac, G.E., & Szodorai, E.T. (2016). Effect size guidelines for individual differences researchers. *Personality and Individual Differences*, 102, 74–78.

43. Fawver, B., Cowan, R L., DeCouto, B S., Lohse, K R., Podlog, L., & Williams, A M. (2020). Psychological characteristics, sport engagement, and performance

in alpine skiers. *Psychology of Sport and Exercise*, 47, 101616. <https://doi.org/10.1016/j.paid.2016.06.069>.

44. Golby, J., & Sheard, M. (2004). Mental toughness and hardiness at different levels of rugby league. *Personality and Individual Differences*, 37(5), 933–942. <https://doi.org/10.1016/j.paid.2003.10.015>.

45. Joseph, A. I. (2009). *The role of grit in predicting performance in collegiate athletes*. (Unpublished doctoral dissertation). Capella University, Minneapolis, Minnesota.

46. Slanbekova, G.K., Kabakova, M P., Duisenbekov, D.D., Mun, M V., & Kudaibergenova, S K. (2015). Testing of the "Fisher Divorce Adjustment Scale" Questionnaire for Russian Sample in Kazakhstan. *Asian Social Science*, 11(6), 83–91. <https://doi.org/10.5539/ass.v11n6p83>.

47. Ivanova, E., Khan, A., Liharska, L., Reznik, A., Kuzmin, S., Kushnir, O., Agarkov, A., Bokhan, N., Pogorelova, T., Khomenko, O., & Chernysheva, K. (2018). Validation of the russian version of the positive and negative syndrome scale (PANSS-Ru) and normative data. *Innovations in Clinical Neuroscience*, 15(9-10), 32-48.

48. Nartova-Bochaver, S., Reznichenko, S., & Maltby, J. (2020). The Authenticity Scale: Validation in Russian Culture. *Frontiers in Psychology*, 11, 609617–609617. <https://doi.org/10.3389/fpsyg.2020.609617>.

49. Crust, L. (2009). The relationship between mental toughness and affect intensity. *Personality and Individual Differences*, 47(8), 959–963. <https://doi.org/10.1016/j.paid.2009.07.023>.

Статья поступила в редакцию 16 июня 2021 г.

Принята к публикации 24 августа 2021 г.

Ссылка для цитирования: Денован Э., Дэгнолл Н., Хилл-Артамонова Е. Мусиенко Т.В. Ментальная устойчивость: русская версия шкалы измерений (MTQ18) // Национальная безопасность и стратегическое планирование. 2021. № 3(35). С. 47-59. DOI: <https://doi.org/10.37468/2307-1400-2021-3-47-59>

Сведения об авторах:

ДЕНОВАН ЭНДРИО – Старший психометрист Adelpi Values Bollington, Великобритания
E-mail: A.Denovan@mmu.ac.uk

ДЭГНОЛЛ НИЛ – преподаватель прикладной когнитивной психологии, Манчестерский столичный университет, г. Манчестер, Великобритания
E-mail: N.Dagnall@mmu.ac.uk

ХИЛЛ-АРТАМОНОВА ЕЛЕНА – аспирант, кафедра психологии, здравоохранения и социальной помощи, Манчестерский столичный университет, г. Манчестер, Великобритания
E-mail: Elena_artamonova@hotmail.com

МУСИЕНКО ТАМАРА ВИКТОРОВНА – доктор политических наук, кандидат исторических наук, доцент, действительный член Академии геополитических проблем, действительный член Петровской академии наук и искусств, ассоциированный научный сотрудник Социологического института РАН, профессор кафедры управления и экономики Санкт-Петербургского университета ГПС МЧС России, г. Санкт-Петербург
E-mail: tvn7777@mail.ru

For citation: Denovan A., Dagnall N., Hill-Artamonova E., Musienko T. V. Mental toughness questionnaire (MTQ18): A Russian version // National security and strategic planning. 2021. № 3(35). P. 47-59. DOI: <https://doi.org/10.37468/2307-1400-2021-3-47-59>

Authors' information

Dr. Denovan Andrew – Senior Psychometrician, Adelphi Values Bollington SK10 5JB
E-mail: andrew.denovan@adelphivalues.com

Dr. Dagnall Neil – Reader in applied cognitive psychology, Manchester Metropolitan University, Manchester, M15 6GX
E-mail: N.Dagnall@mmu.ac.uk

Hill-Artamonova Elena – PhD Candidate Department of Psychology, Health and Social Care, Manchester Metropolitan University, Manchester, M15 6BH
E-mail: Elena_artamonova@hotmail.com

Dr. Musienko T.V. – Doctor in Politics, PhD in History, Associate Professor, Professor of the Management and Economics Department in St. Petersburg University of the State Fire Service of EMERCOM of Russia, Saint-Petersburg
E-mail: tvn7777@mail.ru