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CLINICAL PSYCHOLOGY

Distress Screening in Russian Pediatric Oncology: Adaptation and Validation of the Distress Rating Scale

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Background. Children undergoing cancer treatment face a number of emotional, physical, and other problems leading to distress that need to be identified in a timely fashion. Regular assessment of patients' and their caregivers' psychosocial health care needs during the patients' hospital stays has become the standard of psychological care.

Objective. This study was conducted to determine the validity of the Distress Rating Scale (DRS) on a Russian pediatric sample. The DRS appeared to be a reliable pediatric measure of patients' distress level.

Design. One hundred fifty-nine (159) children of ages 7–17 with cancer and blood disorders, 153 caregivers, and 51 physicians were included in our study. Forty-five families were re-assessed as a test-retest group after a four-week interval. The DRS was validated through the use of the Children's Depression Inventory (CDI) by M. Kovacs and by the Pediatric Quality of Life Inventory (PedsQL 4.0).

Results. The convergent validity of the DRS's Russian version was shown by the reasonable agreement between the children's distress level and standardized measure scores. The criterion validity was demonstrated by significant correlations between the children's DRS self-reports, and those of their parents and physicians. The robustness and consistency of the results in the primary and repeated assessments between the DRS, the CDI, and the PedsQL, proved the reliability of the scale. Age-specific cut-off scores were determined.

Conclusion. The Russian version of the DRS is a valid tool for rapid and reliable assessment of children's emotional distress in order to identify their needs for psychological assistance in a timely manner.

Keywords:
oncology;
pediatric;
distress;
screening;
thermometer;
validation;
psychological
adjustment,
Distress Rating
Scale (DRS).

Introduction

Children undergoing treatment from oncological and hematological diseases face a number of psychophysical and psychosocial problems associated not only with a life-threatening disease itself, but also with serious, often traumatic, treatment. Treatment is usually accompanied by various side effects, uncomfortable procedures and pain, and a long-term hospitalization with isolation from family and home that leads to the emotional distress of both patients and caregivers (Kazak & Noll, 2015; Khain, 2004; Khain et al., 2014 a; Pai et al., 2007).

It turns out that more than 50% of cancer patients have high distress during their treatment (Dolgin, et al., 2007; Enskar & von Essen, 2007; Holland & Bultz, 2007; Stevens et al., 2006). The traumatic experience of having cancer places children at even more significant risk for distress and psychological maladjustment than adults. It has been noted that childhood cancers could be considered generally distressing for children and their families (Aralova et al., 2016; Kazak & Noll, 2015; Khain & Kholmogorova, 2017; Klipinina & Enikilopov, 2016). As for adolescents, it has been determined that the disruption caused by the cancer experience is probably in part responsible for the significant distress they experience during critical life-stages (Sansom-Daly & Wakefield, 2013). We know that the elevation of emotional distress in families is associated with a number of negative consequences: the decrease of the quality of life in different aspects, dissatisfaction with the treatment, and low adherence to prescriptions (Kennard et al., 2004).

For these obvious reasons, screening for emotional distress is becoming more common in pediatric cancer care. Moreover, regular assessment and monitoring of children's and their caregivers' psychosocial health care needs during cancer treatment has become the standard of psychological care. Such screening is important not only for timely detection of the distress itself, but also to identify those psychosocial problems that interfere with psychological adaptation to treatment (Kazak et al., 2015; Wiener, Viola, Koretski, Perper, & Patenaude, 2015).

Psycho-oncology as an interdisciplinary practice and study is quite a new field in Russia. Clinical psychologists have only recently begun to appear in Russian hospitals, and usually their number is not numerous (Khain et al., 2014 a). Still, there is a lack of psychosocial standards of care as a part of routine medical care, and the criteria for successful adjustment to life-threatening diseases have not yet been determined (Khain et al., 2014 b). Usually, the decision to offer psychological support is guided by a physician's understanding of a family's needs, but the degree of that understanding may vary from doctor to doctor. Requests from patients and caregivers for psychological counselling are not common in Russia, where often psychological care is associated with stigmatization. In general, the tradition of discussing psychosocial problems in children with severe diseases has just begun.

Regular assessment and monitoring of children's and caregivers' psychosocial health care needs during cancer treatment has become the standard of psychological care. It is helpful not only for timely detection of the distress itself, but also to identify those psychosocial problems that interrupt psychological adjustment to treatment (Holland & Bults, 2007; Varni, Burwinkle, Katz, Meeske, & Dickinson, 2002).

The term “distress” is also not common in Russian. The concept is borrowed from English, and is just now being integrated into professional usage to denote the negative emotional state of cancer patients, gradually replacing the more familiar, but not too specific, everyday concept of “stress.” As in English, the use of a non-stigmatizing word such as “distress” in Russian makes it easier for specialists to begin a dialogue with a family about psychosocial problems, without triggering embarrassment (Holland, Watson, & Dunn, 2011).

The lack of valid tools for assessing and monitoring the child’s and caregiver’s emotional state during treatment limits the further development of Russian psycho-oncology in targeting and providing care in a timely fashion. As a result, psychosocial problems often go unrecognized and without due attention, leading to greater long-term distress. Considering the fact that children with cancer can face a number of physical or psychosocial problems caused by their life-threatening disease and harsh treatment, the necessity or advisability of extra attention to emotional distress issues becomes evident. Therefore, there is a great deal of evidence in support of strongly recommending assessments of the psychosocial health care needs of children with cancer and their families (Kazak et al., 2015).

The National Comprehensive Cancer Network (NCCN) distress thermometer (DT) was developed as a screening tool to quickly identify and address emotional distress in cancer adult patients (Holland, 1997). It is widely used to monitor the emotional state of cancer patients (primary diagnosis and follow-up monitoring) (Blenkiron, Brooks, Dearden, & McVey, 2014; Zwahlen, Hagenbuch, Carley, Recklitis, & Buchi, 2008). There is also a pediatric DT, which is considered as a valid, feasible, and acceptable (to children, caregivers, and medical providers) screening tool for sufferers from cancer and other medical illnesses (Patel et al., 2011; Wiener et al., 2017). The validation of the Russian-language version of the children’s DT is a relevant task that may be considered one of the first necessary steps toward developing standardized and targeted psychosocial care in pediatric psycho-oncology.

Methods

Participants

Screening efficacy and the validity of the pediatric Distress Rating Scale were studied on a sample of pediatric patients under treatment at the Dmitry Rogachev National Research Center of Pediatric Hematology, Oncology, and Immunology.

The sample was comprised of patients 7 to 17 years old (n=159) with various cancer disorders (such as blastoma, teratoma, sarcoma, leukemia, and lymphoma), as well as with blood disorders requiring hematopoietic stem cell transplantation (acquired aplastic anemia); their caregivers (n=153); and their physicians (n=51).

Eligibility criteria for patients were hospitalization at the Rogachev Center for inpatient treatment, and native speaker competence in Russian language due to numerous different languages extant in Russia. The use of hematopoietic stem cell transplantation in the treatment of acquired aplastic anemia was identified as the most intense treatment protocol.

Excluded from the study were those children with a psychiatric diagnosis; problematic mental health problems (established earlier, or diagnosed during the

cancer treatment); and any concomitant diagnosis or condition which would make it difficult for them to understand the questions or make judgments.

Ethics committee approval was obtained (Approval Number: 2016–217, Local ethics committee and IRB, Federal Research Center for Pediatric Hematology, Oncology, and Immunology, Moscow, Russian Federation). Caregivers and adolescents over 15 years old (according to the law of Russian Federation) provided written informed consent prior to the study.

Procedure

Questionnaires

Distress Rating Scale (DRS)

The Distress Rating Scale (DRS) (Patel et al., 2011) is a developmentally relevant pediatric version of the DT, which was adapted for children with cancer by the Departments of Population Sciences, Pediatrics, and Support Care at the City of Hope. The DRS was adapted for 2–4 year old, 5–6 year old, and 7–17 year old children.

Only the DRS for children and adolescents ages 7 to 17 years appeared to be a valid screening measure to rate a child's distress. It has a visual analogue scale presented as a thermometer to rate distress level from 0 to 10, and a brief problem checklist (PL).

Patients' distress could be classified on three levels: mild (0–4), moderate (5–7), and severe (8–10). The caregivers received a parent-version of the DRS to rate their perception of their child's distress, whereas the physicians were asked to fill out a staff-version in order to register the medical team's evaluation. The PL of symptoms that a child may face during the treatment process identifies emotional, physical, practical, spiritual, and family causes for the distress. The child's, caregiver's, and physician's checklist versions consist of a total of 37 symptoms.

Pediatric Quality of Life Inventory 4.0

The PedsQL 4.0 (Varni et al., 2002) is a tool for measuring the health-related quality of life of children and adolescents of ages 2 to 18 years in their physical, emotional, social, and school functioning. Self-report Russian-language versions for children ages 7–17 years (varied for cohorts of 5–7 years, 8–12 years, and 13–18 years), and a Russian-language parent-report version for caregivers, were used in order to evaluate the children's quality of life issues.

Children's Depression Inventory (CDI)

The Children's Depression Inventory (Kovacs, 1992) rates the severity of symptoms related to depression or dysthymic disorder in children and adolescents (from 7 to 17 years old). The CDI yields a total score and five subscales: a) negative mood; b) interpersonal difficulties; c) ineffectiveness; d) anhedonia; and e) negative self-esteem.

The validation study on the Russian-language sample (Volikova, Holmogorova, & Kalina, 2013) showed that the CDI total score (T) could vary from 0 to 54. Fifty (50) was a critical score, after which the depth of symptoms increased. Therefore, we consider the value of T interval ≥ 50 as a critical threshold for diagnosing depression.

The Intensity of Treatment Rating Scale 3.0 (ITR)

The Intensity of Treatment Rating Scale 3.0 (Kazak et al., 2012) is used to assess treatment intensity (ITR-3.0). The ITR-3.0 classifies pediatric cancer treatment on four levels: level 1 = least intense; level 2 = moderately intense; level 3 = very intense; and level 4 = most intense.

Study Design

The psychometric characteristics of the DRS have not previously been studied on a Russian-language sample. A validation scheme, using the same elements as the original one, was approved with the consent of the authors.

First, a double-blind translation of the DRS was carried out: peer review was used to select the exact words that most accurately reflect the essence of each statement. Clinical psychologists, as well as oncologists and hematologists, participated as experts in creating a Russian version of the DRS.

Then, several pilot studies were conducted to examine the DRS's validity for children of three age groups (2–4, 5–6, and 7–17 years old) (Khain & Kholmogorova, 2017; Stefanenko et al., 2017). We encountered the same problems in obtaining valid test results in children under 7 years old as S. Patel and colleagues had (Patel et al., 2011). Children ages 2–4 years ($n = 18$) could not make a clear choice between three faces to rate their level of distress and point to the one that showed how they felt. Children ages 5 to 6 years ($n = 10$) also had difficulty in filling in both the DRS and the PedsQL due to misunderstanding the questions, and in rating their distress level according to the scale.

A pilot study in a group of patients ages 11–18 years ($n = 22$) before and after hematopoietic stem cell transplantation (HSCT) demonstrated differences in the distress level before and after the HSCT in adolescents and their parents. In addition, a tendency for the DRS to have convergent validity and test-retest reliability was shown (Khain & Kholmogorova, 2017).

For these reasons, we decided to go ahead with the validation of the DRS version for children and adolescents ages 7 to 17 years on the Russian sample of pediatric patients.

A total of 159 patients and 153 caregivers participated in this study. Forty-five families were re-assessed after a four-week interval and comprised a test-retest group (T1 = test, T2 = retest).

Statistical Analyses

The XLSTAT-Biomed software was used for all analyses; missing data for variables was left as missing; non-parametric statistical criteria were applied, since no normal distribution of the measured parameters was found. Psychometric characteristics of the DRS were examined.

The Spearman rank (r) correlation analysis was applied to assess the convergent validity, criterion validity, and test-retest reliability of the DRS. Evaluation of convergent validity was conducted by analyzing the correlation between the results of the DRS with the results of standardized child measures for depression (the CDI)

and quality of life (the PedsQL). Criterion validity was examined by assessing the connection between a child's DRS ratings, and the caregivers' and medical team's ratings of the patient's distress. Then test-retest reliability was determined by testing the correlation between the distress ratings and standardized child measures in the test (T1) and retest (T2) groups. Finally, the strength of the correlation between the distress ratings and the problem scores (PL) was studied. Spearman rank correlations were classified as small (< 0.30), moderate ($0.30-0.7$), and strong (> 0.7). The Mann-Whitney U-test for independent samples was used to study the differences in the distress level in terms of the demographic and clinical characteristics of the sample.

A receiver operating characteristic (ROC) analysis was used to establish a cut-off score for tracing the elevated levels of distress in Russian children with cancer and blood diseases. The area under the ROC curve (AUC) could be > 0.75 , $0.5-0.75$, or < 0.5 , and shows the discriminatory power of the DRS to be high, moderate, or low, respectively. Sensitivity, specificity, and positive or negative predictive values (PPV, NPV) were also examined for every score on the distress scale.

Results

The majority of the children fell within the 13–17 year-old age group (64.8%) ($M = 13.5$, $SD = 2.6$). The distribution by gender was almost equal (78 boys and 81 girls). The length of time spent in a medical care setting ranged from 0 to 23 months ($M = 13.5$, $SD = 3.6$). Hospitalization was scheduled in 41% of the cases, but 37% of all the pediatric patients were hospitalized for emergency reasons. Approximately 50% of the sample underwent treatment for blood cancer diseases and

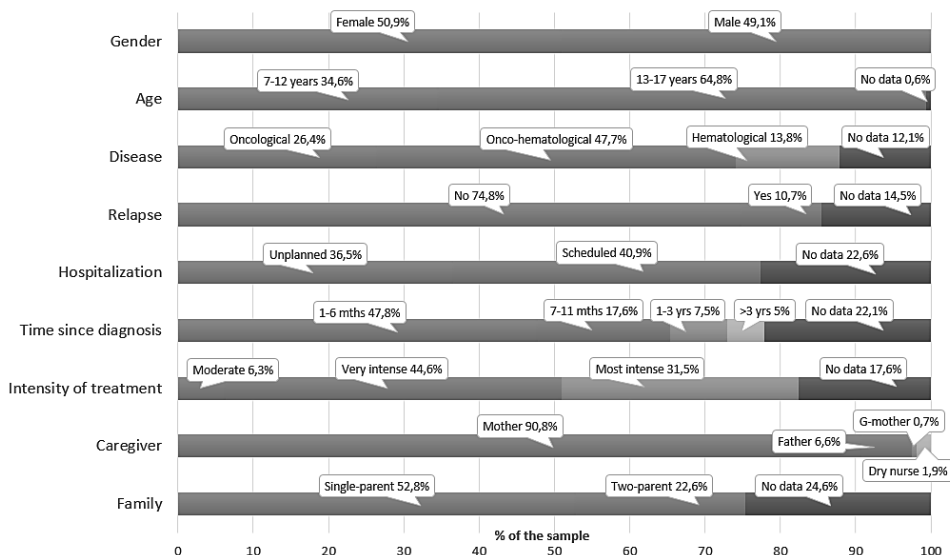


Figure 1. Demographic and clinical characteristics of patients

Note. The diagram illustrates the percentage of the sample by demographic and clinical characteristics.

had ITR scores at the very intense level; 11% had had a relapse. The age range of children's caregivers was broad, ranging from 28 to 61 years ($M = 40.3$, $SD = 5.5$); they were primarily mothers (84%). Of the 120 families who designated their status, 84 were single-parent (52% of the sample). Detailed characteristics of the sample are presented in *Figure 1*.

The *convergent validity* of the DRS was demonstrated by the reasonable agreement ($p < .01$, $p < .05$) between the child's DRS ratings and the standardized measures' scores for depression and quality of life (see *Table 1*). The children's distress ratings correlated moderately with their PedsQL total scores ($r = -0.538$, $p < .01$), as well as with the CDI total scores ($r = 0.332$, $p < .01$), and the CDI subscales. In particular, the thermometer score, and emotional and family/social problem domain scores, moderately correlated ($p < .01$) with both the negative mood ($r = 0.240$; $r = 0.179$; $r = 0.193$), and the anhedonia ($r = 0.438$; $r = 0.345$; $r = 0.255$) CDI subscales respectively. The physical problem domain scores correlated mildly ($p < .01$) with the anhedonia CDI ($r = 0.199$).

Table 1

Correlation between the child's DRS ratings and the standardized measures' scores

	Thermometer score	Emotional problems	Physical problems	Practical problems	Spiritual problems	Family/Social problems	Total score PL (5 domains)
CDI							
Negative mood	0.240**	0.179**	0.024	0.119	0.081	0.193**	0.152*
Interpersonal Difficulties	0.185*	0.194**	-0.052	0.004	0.021	0.083	0.079
Ineffectiveness	0.006	0.117	0.117	0.053	0.001	0.096	0.056
Anhedonia	0.438**	0.345**	0.199**	0.111	0.125	0.255**	0.342**
Negative Self-Esteem	0.062	0.083	-0.053	0.009	0.027	0.058	0.022
Total score CDI	0.332**	0.236**	0.047	0.079	0.056	0.177*	0.181*
PedsQL							
Physical functioning	-0.404**	-0.299**	-0.370**	-0.103	-0.101	-0.170	-0.395**
Emotional functioning	-0.299**	-0.431**	-0.264**	-0.229*	-0.128	-0.303**	-0.432**
Social functioning	-0.430**	-0.353**	-0.153	-0.129	-0.204*	-0.175	-0.307*
School functioning	-0.291**	-0.104	-0.193*	-0.437**	-0.321**	-0.265**	-0.300**
Psychosocial Health	-0.468**	-0.329**	-0.212*	-0.381**	-0.310**	-0.270**	-0.394**
Total score PedsQL	-0.538**	-0.424**	-0.380**	-0.281**	-0.221*	-0.292**	-0.509**

Note. * $p < .05$. ** $p < .01$.

The DRS's *criterion validity* was established by the presence of moderate correlations ($p < .01$) between the child's distress score by self-report and the reports of the parents ($r = 0.572$) and medical team ($r = 0.414$). Also, there was a statistical

connection between all coincident PedsQL scales scores ($0.359 \leq r \leq 0.584$) in the child's and parent's reports (see *Table 2*).

Table 2

Correlations of child's distress and QL self-report with caregiver' and physician' ratings

Patient	Caregiver	Physician
DRS		
Thermometer score	0.572**	0.414**
Emotional problems	0.320**	0.340**
Physical problems	0.389**	0.342**
Practical problems	0.257**	0.208
Spiritual problems	0.497**	–
Family/Social problems	0.284**	0.014
Total score PL (5 domains)	0.350**	0.401**
PedsQL		
Physical functioning	0.584**	–
Emotional functioning	0.447**	–
Social functioning	0.359**	–
School functioning	0.561**	–
Psychosocial Health	0.512**	–
Total score PedsQL	0.465**	–

Note. ** $p < .01$

The medical team's ratings of the patients' distress and accompanying complaints turned out to be moderately correlated ($p < .01$) with the children's self-ratings: *i.e.*, the thermometer scores ($r = 0.414$); emotional scores ($r = 0.340$); and physical problem domain scores ($r = 0.342$). The identification of the children's spiritual, social, and practical problem domains by the doctors was not sufficiently reliable, which was to be expected due to a physician's concentration on his or her professional tasks.

The **robustness** and **consistency** of the results in the primary and repeated assessment in the 45 families proved **the test-retest reliability** of the DRS. The correlations between the DRS (both thermometer scores and PL domains scores) with the CDI and PedsQL total scores in T1 (test-group) and T2 (retest-group) are summarized in *Table 3*. In both the test and retest samples, the thermometer scores correlated moderately to strongly with the CDI total scores (T1: $r = 0.831$, $p < .01$; T2: $r = 0.623$, $p < .05$), as well as with the PedsQL total scores (T1: $r = -0.527$, $p < .05$; T2: $r = -0.564$, $p < .05$). The total PL scores in all five domains correlated moderately with the CDI total scores (T1: $r = 0.607$, $p < .05$; T2: $r = 0.662$, $p < .01$) and the PedsQL total scores (T1: $r = -0.596$, $p < .05$; T2: $r = -0.538$, $p < .05$).

Table 3

Correlation between the patient's DRS scores and the standardized measures' scores at times T1 and T2

	DRS			
	Thermometer score		Total score PL (5 domains)	
	T1	T2	T1	T2
CDI				
Negative Mood	0.456	0.727**	0.477	0.071
Interpersonal Difficulties	0.697**	0.213	0.573*	0.264
Ineffectiveness	0.481	0.393	0.099	0.330
Anhedonia	0.698**	0.480	0.552*	0.830**
Negative Self-Esteem	0.251	0.317	0.022	0.533*
Total score CDI	0.831**	0.623*	0.607*	0.662**
PedsQL	T1	T2	T1	T2
Physical functioning	-0.452	-0.345	-0.549*	-0.540*
Emotional functioning	-0.555*	-0.598*	-0.508	-0.247
Social functioning	-0.295	-0.193	-0.321	-0.310
School functioning	-0.436	-0.576*	-0.194	-0.571*
Psychosocial Health	-0.539*	-0.624*	-0.442	-0.436
Total score PedsQL	-0.527*	-0.564*	-0.596*	-0.538*

Note. * $p < .05$. ** $p < .01$.

Correlation analysis showed a significant relationship between the thermometer score and the problem score in all five domains (see Table 4). However, a stronger correlation (moderate) was detected between the thermometer scores and the domains of the emotional and physical problems' scores ($0.412 \leq r \leq 0.611$, $p < .01$).

Table 4

Correlation between thermometer score and PL domains scores

	Thermometer score
Problem score (PL)	
Emotional problems	0.611**
Physical problems	0.412**
Practical problems	0.164*
Spiritual problems	0.225**
Family/Social problems	0.328**
Total score PL (5 domains)	0.588**

Note. * $p < .05$. ** $p < .01$.

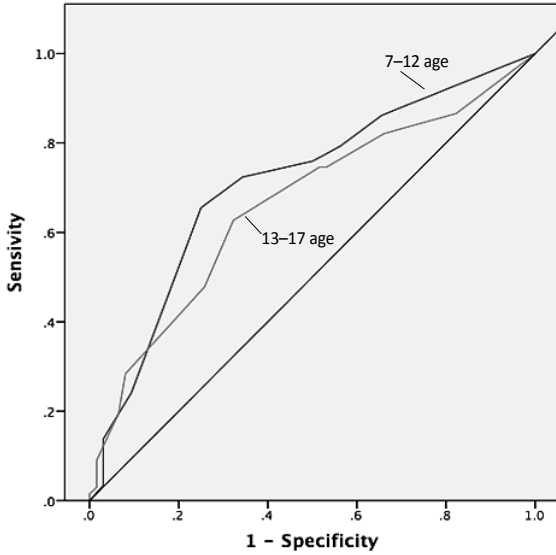


Figure 2. ROC curves of two age groups: 7–12 and 13–17 years (CDI T ≥ 50)

Note. The diagram illustrates the ROC curves for two ages that shows the relationship between sensitivity and specificity for every possible cut-off.

Establishing the cut-off scores. ROC curve analysis indicated that for the 7–12 year-old age group, a DRS cut-off score of 4 provided the optimal combination of sensitivity (72%) and specificity (66%), for the CDI total depression score higher than the 50 T-score (which is recommended for the Russian version of the CDI) (see Table 5). The results for the area under the curve — AUC = 0.709 (SE = 0.068; 95% CI, 0.58-0.84; $p = .005$) — indicated that we had a good prediction model (see Figure 2).

Table 5

Sensitivity, specificity, PPV, and NPV of DRS ratings in relation to CDI T ≥ 50 in the 7–12 age group

Distress rating	Sensitivity	Specificity	PPV	NPV
0	1.000	0.000	0.48	0.00
1	0.862	0.344	0.54	0.73
2	0.793	0.437	0.56	0.70
3	0.759	0.500	0.58	0.70
4	0.724	0.656	0.66	0.72
5	0.655	0.750	0.70	0.71
6	0.241	0.906	0.70	0.57
7	0.138	0.969	0.80	0.55
8	0.069	0.969	0.67	0.53
9	0.034	0.969	0.50	0.53
10	0.000	1.000	0.00	0.52
10	0.000	1.000	1.00	0.48

Note. PPV = Positive predictive value. NPV = Negative predictive value.

In the 13–17 year-old age group, a cut-off score of 3 on the DRS scale optimally identified 74% of those with depression (sensitivity) and 48% non-depressed (specificity) (see Table 6). The area under the curve — AUC = 0.662 (SE = 0.048; 95% CI, 0.57–0.76; $P = .002$) — represents a fair prediction model (see Figure 2).

Table 6

Sensitivity, specificity, PPV, and NPV of DRS ratings in relation to CDI $T \geq 50$ in the 13–17 age group

Distress rating	Sensitivity	Specificity	PPV	NPV
0	1.000	0.000	0.52	0.00
1	0.866	0.177	0.53	0.55
2	0.821	0.339	0.57	0.64
3	0.746	0.484	0.61	0.63
4	0.627	0.677	0.68	0.64
5	0.478	0.742	0.67	0.63
6	0.284	0.919	0.79	0.57
7	0.194	0.935	0.76	0.54
8	0.090	0.984	0.86	0.52
9	0.030	0.984	0.67	0.50
10	0.000	1.000	1.00	0.48

Note. PPV = Positive predictive value. NPV = Negative predictive value.

Figure 3 presents the differences in the children’s emotional issues depending on the duration of their disease. Patients diagnosed more than three years ago have significantly lower thermometer scores in comparison with patients diagnosed

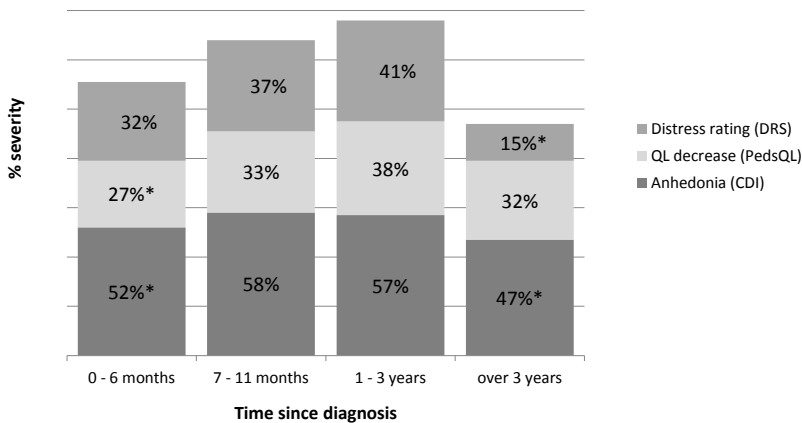


Figure 3. Patients’ emotional issues and time since diagnosis

Note. The histogram illustrates the percentage of severe emotional issues in 4 periods of treatment. * $p < .05$.

within 0-6 months ($U = 259, p = .045$), up to 1 year ago ($U = 80, p = .007$), and 1-3 years ago ($U = 26, p = .003$). The patients with disease duration of less than three years did not differ in the level of their distress.

Patients who were in treatment for more than six months had a significantly lower PedsQL total score in comparison with those who were in treatment from 0 to 6 months ($U = 499, p = .016$) (see *Figure 3*).

At the same time, *Figure 3* shows that children who have been treated anywhere from 6 months to 3 years, showed a significant increase in anhedonia over patients who had lived through three years of the disease ($U = 39.5, p = .022$), and those who started treatment within the last six months ($U = 1034, p = .01$).

A statistically significant difference in the increase of Anhedonia was also shown when the child's hospitalization was unplanned ($U = 1960, p = .009$).

Concerning the child's disease types, there was a significant difference in the PedsQL total score ($U = 378.5, p = .006$) between those with cancer tumors and those with blood cancer. In particular, children with solid tumors had a significantly lower score on the PedsQL physical activity scale ($U = 350.5, p = .002$).

As for the types of treatment, patients undergoing chemotherapy showed a significant decrease in their PedsQL total score ($U = 90, p = .03$). Surgery was accompanied by anhedonia ($U = 1424, p = .019$). Children with HSCT had a much greater number of emotional ($U = 2385, p = .036$) and physical problems ($U = 2361, p = .03$), as shown by their PL score, as well as depression symptoms: negative mood ($U = 2174, p = .014$), negative self-esteem ($U = 1990, p = .002$), and ineffectiveness ($U = 1940, p = .001$).

Discussion

The purpose of this study was to validate the Russian version of the DRS for children ages 7 to 17 years. The DRS was translated into the Russian language and evaluated on its psychometric properties using data from 159 patients with hematological, onco-hematological, and oncological diseases. The results provided support for convergent and criterion validity, and also demonstrated good test-retest reliability.

The DRS (comprised of the distress thermometer rating and PL) was moderately associated with both the CDI and the PedsQL scores, and indicated good convergent validity; in a test-retest sample of 45 families, the presence of moderate-to-strong correlations between the DRS and the standardized measures proved its robustness and consistency. Criterion validity was confirmed by the moderate correlations between the child's DRS self-ratings and the ratings of their parents and medical team.

The strongest correlations were found between the children's overall distress and their emotional and physical problem domains (rather than their spiritual or social problems), which is in accord with findings in other studies. A reliable relationship between the level of distress, and prevalence of emotional and physical problems from the PL, was shown in most instances, but the results on spiritual and religious issues did not look convincing (Iskandarsyah et al., 2013; Jacobsen et al., 2005; Shim, Shin, Jeon, & Hahm, 2008). It seems that during the treatment process, children pay more attention to their physical and emotional state, and present fewer complaints about family, social, or spiritual problems.

The practical problem domain had a small correlation with overall distress. This could be related to the specific conditions at the Rogachev Center during cancer treatment. Children at the hospital have no household duties, and their school problems are mostly solved by having the opportunity to continue their schooling and to get an individualized approach to learning appropriate to their state of well-being during treatment. The thermometer score thus appears sufficient to assess the overall distress level in children. At the same time, the information from the PL can supplement the DT by defining the sources of distress and providing for a more targeted intervention in clinical practice.

We sought age-specified cut-off scores of clinical distress in children ages 7–12 and adolescents ages 13–17. We found that the cut-off score of 4 had optimal sensitivity and specificity relative to the CDI for the children. The cut-off score for adolescents was lower than that for children and was equal to 3. At this level, the sensitivity is high enough not to miss adolescents with problems, although it could result in false-positive cases because of quite low specificity. As a result, every adolescent in need could be offered psychological help. We can assume that the lower cut-off score in adolescents is due to the characteristic tendency for this age group to uphold their personal independence and autonomy and, consequently, hide their emotions. This would be especially true under conditions of invasive treatment, which is often perceived as intrusive and violating not only physical, but also mental boundaries.

As was expected, in different countries the distress thermometers also have different cut-off scores (ranging from 3 to 5) for indicating clinically significant problems in emotional well-being, and thus reflect differences among clinical settings, languages, and even cultures (Donovan, Grassi, McGinty, & Jacobsen, 2014). Therefore, the cut-off score of 3 may be due not only to age specificity, but also to a country or cultural characteristic: the strategy of hiding one's true emotional state and the value of emotional self-control are part of the Russian cultural code. However, this hypothesis requires further study, at least on a Russian adult sample. In fact, the prospect of verifying the cross-cultural validity of the instrument is quite challenging (Bullinger, Anderson, Cella, & Aaronson, 1993).

There was also a significant difference between children's distress depending upon their different durations of hospitalization. The most difficult period is from six months to three years from the moment of the diagnosis. A possible explanation could be that, on one hand, children who are being forced to undergo treatment far away from home at the Rogachev Center, and lose direct contact with relatives and friends, are more likely to suffer from loneliness; they have a reduced ability to experience pleasant emotions, and a reduced sense of pleasure. On the other hand, by the time fatigue from prolonged and severe treatment accumulates, the children have already managed to get through most phases of their treatment, even though they have not yet completed the entire course of therapy. Also, during this period, followup therapy begins in cases of the ineffectiveness of the first course of treatment, failure to achieve remission, or the detection of an early relapse of the disease.

The results also showed a significant difference in children's emotional state between treatment types. The children who received HSCT — the most intense treatment (level 4 of treatment intensity) — significantly differed from the others in the number of emotional and physical complaints, as well as depression. This may be due to the fact that for most diseases, the use of such an intense treatment as the

HSCT, is supposed to be the “last chance” to achieve remission in the fight against cancer. Thus, these children may have negative self-esteem, and feel depressed and ineffective. Treatment conditions for HSCT are characterized by a higher level of isolation, with less personal space and increasing requirements for compliance with sterility rules in the HSCT Department, so that transplantation becomes one of the most stressful types of treatment (Khain & Kholmogorova, 2017).

Conclusion

The validation of the Russian-language version of the DRS is a relevant task that may be considered one of the first necessary steps towards the development of standardized and targeted psychosocial care in pediatric psycho-oncology in Russia.

The DRS is a reliable pediatric measure of patients’ distress levels in a Russian sample, regardless of their demographic (sex, age) and clinical characteristics (diagnosis, treatment stage, and duration of the disease). As expected, findings from this study revealed no differences in the level of distress by sex (boys and girls), by age (two age groups), by family/caregiver characteristics, or by the disease and the presence of relapse. DT studies have also found no links between the level of distress and the socio-demographic and clinical characteristics of adult patients (Iskandarsyah et al., 2013; Shim et al., 2008).

Limitations

The current study had several limitations that must be noted. It would be useful to conduct future studies with larger sample sizes, especially of physicians. Determining the validity of the DRS criteria seems to be quite challenging. First, despite the fact that our study showed significant correlations between the children’s self-report and parental reports on a child’s distress, the question of using a parental report as a valid proxy for a child report remains controversial and requires further study. Parental reports are likely to be influenced by their own emotional state (Abate et al., 2018). Second, relying on medical team reports on a child’s distress, rather than on a psychosocial specialists’ expert opinion, somewhat limits the ability of our study to achieve a reliable evaluation of the validity of the DRS criteria.

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Elaborating Screening Scales for Early Diagnosis of Developmental Delay in Five- to Six-Year-Old Children in Russia

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Background. It is known that the earlier a child is diagnosed with developmental delay (DD), the more promising his/her cognitive development can be. Various screenings are used worldwide for early detection of developmental problems. However, timely diagnosis of DD is not sufficiently carried out in Russia at present.

Objective. Elaboration of screening scales to quickly monitor the mental development of five- to six-year-old Russian children was the objective of this study. The scales we developed involved the use of modern information technologies to obtain reliable results.

Design. This study was carried out with a sample of 1,860 children. The formal procedure for multilateral monitoring of child development was used for data collection, involving a much more extensive set of tasks than in traditional tests of abilities; this allowed for a wider variation of the factor structure. For the five-year-olds, 349 tasks were used, and 292 for the six-year-olds. To construct scales for each age group (six–seven items in each), which would most accurately predict the diagnosis (Norm or DD), factor and discriminant analysis were carried out. To verify the prediction model, structural equation modeling (SEM) was used.

Results. As a result of the study, we developed scales which had similar types of variables for each age group (simpler for the five-year-olds and more complex for the six-year-olds). The common variables were logical reasoning, motor skills, and general awareness; two other scales were added for the six-year-olds: sustained attention and counting. According to the SEM, these scales are indicators of the general ability factor, and the latter one (general awareness) is the main predictor of the diagnosis.

Conclusions. Short scales for rapid identification of DD in Russian preschoolers were constructed, which allow the use of computer technology to uncover the risk group among five- and six-year-olds in a timely fashion, and have high sensitivity and specificity of the forecast (not lower than 94%).

Keywords: screening; developmental delay (DD); construction of scales; structural equation modeling (SEM); five- to six-year-olds

Introduction

The age of six represents a significant shift from earlier age ranges, in that it is a threshold between a relaxed childhood and the beginning of systematic school education for Russian children. The current education system mandates special requirements for typically developing six-year-olds, so that by the beginning of school, children must have already mastered the primary skills of reading, writing, and counting. Thus, at the age of five to six years, it is especially important to assess the level of a child's cognitive development, because there is still time to correct problems. At the same time, it is necessary at that time to specify the optimal educational route, taking into account the individual characteristics of the child's development, should he or she have certain cognitive deficits. This is of paramount importance for the prevention of maladjustment at school, and for adjusting the vector of the child's development.

The concept of developmental delay (DD) includes the slow-down in mastering speech and language, in motor skills, and in social-emotional and cognitive abilities (Bellman, Byrne, & Sege, 2013). A study comparing age-related changes in cognitive functions in typically developing preschool children, with those of children with DD, is of considerable scientific and practical interest, since it not only brings us closer to understanding the mechanisms of mental development, but also provides us with the opportunity to recognize a potential trajectory of development in the norm and in DD. It also can help us to identify common patterns and markers of DD, including such forms of the latter identified under F80-F89 in the International Statistical Classification of Diseases and Related Health Problems 10th version, 2018.

It is known that the diagnosis of DD is not set in stone, since there is a high potential for rehabilitation when it is identified early enough: the earlier the diagnosis is made, the higher the chances of changing the child's developmental potential and achieving a successful outcome. It is also known that children with DD who do not receive a timely diagnosis and subsequent psycho-correction, are much more likely to develop behavioral problems than their peers with typical development (Crnic, Hoffman, Gaze, & Edelbrock, 2004). For this reason, the possibility of rapid screening to identify children at risk for DD is very important. Therefore, we aimed to create a system for screening diagnostics of the mental development in five- to six-year-olds, specific to the Russian sample, which would utilize computer technologies to obtain reliable results on the basis of a relatively small set of data, with high sensitivity and specificity of the forecast.

The Problem of Early Diagnosis of DD in Russia and Abroad

The problem of DD has a special place in Russia. This is not only because the number of children with DD is constantly increasing, but especially due to advances in medicine which have helped premature and somatically weakened children survive. The primary variable is associated with the factor of the intervention time, on which the prospects of the child's development hugely depend.

It is known that children diagnosed with DD have a high potential for rehabilitation when corrective measures are timely and properly organized. However, a delay significantly increases the likelihood of more serious neurodevelopmental disorders (Levy, 2018). It is also known that the younger the child, the more neu-

roplasticity his/her brain possesses, and the more compensatory possibilities are available (Kolb & Gibb, 2011). Therefore, the study and prognosis of the development of cognitive functions are most important at an early age. However, given the goal of identifying predictive markers of cognitive development, we must take into account that the preschool age is characterized by intensive heterochronous development of mental functions (Glozman, 2013) and, accordingly, by the high variability of the structure of its indicators.

Various screening techniques have been successfully used in European countries for a long time (Frankenburg & Dodds, 1967; Griffiths, 1970). But there are no attempts for elaborate screening of child mental development in Russia today that meet modern requirements for psychometrics, except our previous work (Nasledov, Miroshnikov, & Tkacheva, 2018). The age slice being studied in scientific Russian publications begins with older preschoolers, and often DD is revealed only when they enter school, and this, unlike in most Western countries, is at the age of seven years, not five.

It would be possible to adapt one of the Western screening techniques to the Russian sample; however, the process is associated with significant financial costs. In addition, the translation and adaptation of the existing screening system would not permit reflection of the peculiarities of the Russian language, the Russian mentality, and the specificity of the current trends in the development and education of children in Russia. According to the results of cross-cultural research, children of the West and East differ in the dynamics of their cognitive development (Hughes, et al., 2014). Therefore, we set out to create a system of screening diagnosis of mental development of five- to six-year-olds specific to a Russian sample.

When assessing children's psychological readiness for school, Russian scientific publications commonly utilize such concepts as the level of development of basic cognitive processes such as: memory, attention, conceptual thinking, motor skills, and volitional aspects of cognitive performance (Kuindzhi, 2009). In Western literature, however, the criterion of school readiness is the formation of executive functions (Anderson & Reidy, 2012). The key elements of the executive function are: the ability to extrapolate; arbitrary attention; behavioral control and self-regulation; working memory; the ability to plan and organize cognitive activities; and the use of effective strategies to solve problems (Willoughby, Wirth, & Blair, 2011).

In addition, it is customary to distinguish some factors that affect mental development in early childhood. Among them are motor development (Frick & Mohring, 2013); speech development (Goswami, 2015); random access memory (Cowan & Alloway, 2009); attention (Stipek & Valentino, 2015); spatial thinking (Hodgkiss et al., 2018); logical reasoning (Hollister, Sandberg, & McCullough, 2010); and cognitive control mechanisms (Zanolie & Crone, 2018). In accordance with our aim to develop a screening procedure, it was necessary to assess the contribution of these factors as predictors of mental development, in order to assess whether five- to six-year-olds are typically developing, or at risk for DD.

Traditional works devoted to the diagnosis of cognitive development are based on classical ideas about the factor structure of intelligence, which is set a priori in the tests themselves. But there is a problem with such tests, because the subtests and factors are based on several predetermined types of tasks; this fact significantly limits the ability to study the real factor structure of the child's abilities (Macmann

& Barnett, 1994). Thus, a selection of the most effective methods of a child's training and education at a particular age, should be conducted on the basis of empirically confirmed data on the features of sensitive periods and heterochrony in the development of the child's cognitive functions. Accordingly, we chose a wider set of initial features, which were selected for our study by experts; this allowed for more flexible grouping into factors. Therefore, the factor analysis was carried out on a set of various separate tasks, which allowed for a more detailed analysis and more precise grouping of tasks into factors not limited a priori by the structure of the subtest.

The aim of our study was to identify the markers that have the most predictability value in estimating the probability of five- to six-year-old Russian children exhibiting DD, as well as to develop a short scale that allows accurate assessment of the risk for DD. Usually, screenings that evaluate mental development are divided into two categories: 1) those that require psychodiagnostics of the child and a survey of his or her parents, and 2) those that are entirely based on the parents' report (Humilton, 2006). In our case, the use of screening does not necessarily involve a survey of the parents (which minimizes the subjective component of the assessment), and is focused on rapid computerized diagnosis.

In one of the most well-known and widely used Western screenings, the Denver Developmental Screening Test (Dawson & Camp, 2014), child development is evaluated by assessing the following domains, which are assumed to be vectors of development and related to the factor structure of intelligence: 1) large and fine motor skills; 2) speech development; and 3) communication and social adaptation. We assumed that the screening scales obtained in our research would correspond to Denver, and thus included the following domains: motor skills, speech development, and comprehension as a basis for adaptation and communication.

Method

Materials

Data collection was carried out using the same software "Longitude" (Ivanova & Miroshnikov, 2001) as in our previous study (Nasledov, Miroshnikov, & Tkacheva, 2018). This software included a huge bank of tasks, presented in accordance with the child's calendar age, and aimed at estimating a wide range of abilities in primary domains such as motor skills, social adaptation, and cognitive abilities. A psychologist worked with the child, conducted the evaluations, and filled out the test's electronic forms.

The content of the questions and tasks was typical for screenings and development tests, but at the same time very versatile, since the bank of tasks was created as the result of a survey of a large number of expert practitioner psychologists. In this study, the "Longitude" software was used only as a tool to collect raw data for subsequent analysis, without taking into account the grouping of tasks in the structure of the original method; thus we worked with completely "clean" data, not distorted by the a priori subtest or factor structure of the method used.

The baseline data included 847 dichotomous items (where 2 = Yes, the child can perform a control action, and 1 = No, the child cannot). Then we selected those

items for which the answers to one of the two alternatives were no more than 95% for this sample (the results of performance of individual tasks and specialists' observations). Thus, 349 points were used for the five-year-olds and 292 points for the six-year-olds (see *Table 1* for examples of the tasks).

Procedure

Diagnosis of the children (including assignment to the Norm or DD group) was carried out by experienced specialists from psychological and pedagogical counseling centers and pre-school institutions. It was done in the framework of planned work on individual support of children's development, with written parental consent, in the period from 2015 to 2019, in Saint-Petersburg, Murmansk, Belgorod, and other cities of Russian Federation. The diagnosis of DD was confirmed outside the scope of this study by experts, representatives of advisory centers, and commissions with the participation of neurologists, pathologists, and psychiatrists (1 = Norm, 2 = DD).

The Sample

The Norm sample was comprised of children without diagnosis who were attending ordinary preschool institutions. The DD sample consisted of children from specialized preschool institutions, already diagnosed with DD. In total, 604 five-year-old (527 Norm, 77 DD) and 628 six-year-old children (532 Norm, 96 DD) were surveyed, evenly represented in the age range of 1828 to 2554 days. Differences in the ages (measured in days) between the children of the Norm and DD groups were statistically insignificant.

Statistical Data Analysis

Statistical data analysis (as we did in our study of four- and five-year-olds (Nasledov et al., 2018)) was carried out for the following purposes: a) identification of a compact set of scales that predict the diagnosis most accurately (belonging to the group Norm or DD), and have sufficient reliability in relation to the different age ranges of five- to six-year-old children; b) interpretation of the relationships between predictors and the relative contribution of various scales in predicting the diagnosis; and c) development of statistical norms and an algorithm for rapid assessment of the probability of DD by applying the elaborated methodology. The analysis was carried out separately for the samples of five- and six-year-olds, in the same sequence, and using the same methods as in our previous study (Nasledov et al., 2018). All statistical analysis was performed using IBM SPSS software and AMOS version 25.

Results

Selection of Variables

To reduce the set of variables for each age, we used Discriminant Analysis (DA) (Klecka, 1980) of 349 variables for five-year-olds and 249 variables for six-year-olds with a stepwise method and grouping of the variable diagnosis (Norm or DD). As a result, the sets of variables that best distinguished the groups were obtained (Norm or DD): 52 variables for the five-year-olds, and 69 for the six-year-olds.

The Formation of Scales

A stepwise procedure for selecting the variables was applied according to the following criteria, separately for each age group: 1) each of the remaining variables for factor analysis (FA) is included in only one factor, with a load of at least 0.4; 2) each factor includes at least five such variables; 3) the calculated factors together provide maximum accuracy in predicting the diagnosis; and 4) the items included in each factor form a fairly reliable scale for internal consistency (Cronbach's alpha). For this purpose, in relation to each age group, FA with calculation of factor values was repeatedly applied to the selected variables, followed by DA, with the inclusion of calculated factors and the age of the child in days as predictors. As a result of the cyclic application of FA and DA for each age, a combination of predictors (factors) was revealed, the removal of each of which statistically significantly worsened the distinction between the classes (p for F: inclusion = .05, exclusion = .10).

Table 1

Tasks examples

Age	Tasks (Items)
Scale "General awareness"	
5-year-old	Aware of the sequence of days of the week. Can give a correct answer to the question: "How old will you be in one year?"
6-year-old	Can answer the question: "What is the name of the town where you live?" Can determine what time of year it is before or after it's named.
Scale "Motor skills"	
5-year-old	Manage scissors to cut simple contours out of paper Can fulfill tasks on a sheet of checkered paper, following instructions.
6-year-old	Can jump on two feet forward and backward over a rope elevated above the ground. Can tie a simple knot according to a pattern.
Scale "Logical reasoning"	
5-year-old	Capable of explaining why a car needs brakes. Can answer the question: "What is the similarity between a hammer and an axe?"
6-year-old	Can give the correct answer to the question: "Why can I smell smoke?" Can correctly explain the use of the school bell, desks, and portfolio (correctly described the purpose of each of these items).
Scale "Sustained attention"	
6-year-old	Can focusing on a line and trace it from the beginning to the end (6 lines). Can continue a drawing pattern from memory (3 patterns).
Scale "Counting"	
6-year-old	Can call out numbers in direct order (from 11 to 19). Can give the names of banknotes.

For each age (five and six years), a set of factors satisfying all the requirements was obtained: three factors, including 19 items (tasks) for five-year-olds; and five factors (35 items) for six-year-olds. Each factor consisted of six-seven items. It is important to note that for both ages, three factors were obtained that coincided as to the type of tasks (for five-year-olds, simpler; for six-year-olds, more complex): 1) “General Awareness” (completeness of the child’s knowledge about the world); 2) “Motor Skills” (development of large and small differentiated motor skills); and 3) “Logical Reasoning” (the ability to draw logical conclusions based on comparison and taking into account the conditions of the task).

Two additional factors were identified for six-year-olds: 1) “Sustained attention” (the ability to direct attention selectively, to perceive specific stimuli, to stay focused for a certain time, and to prevent shifts of attention to irrelevant stimuli) (Anderson & Reidy, 2012); and 2) “Counting” (the ability to encode numerical information in the form of words, the implementation of arithmetic operations). Examples of the tasks are presented in *Table 1*.

The whole sample was divided into two age groups (younger and older) according to the median age (in days) of the DD groups, in order to verify the stability of the forecast with a given set of predictors. The reliability of the scales (Cronbach’s alpha) was separately defined for the five- and six-year-olds, and for parallel subgroups of the younger and older groups for each age. A sufficiently high reliability of each scale was found according to Cronbach’s alpha (.779 to .922). Then the values of the scales were calculated as sums of their constituent items.

Due to the fact that the DD sample (task performance is worse) is much smaller than the Norm sample, the distributions of all scales for each age has a right (negative) asymmetry (asymmetry values for summary scales: -1.073 for five-year-olds; -1.563 for six-year-olds). *Table 2* shows the results of comparing the Norm and DD samples for each age on the summarized scales. The size of the effect is huge (Cohen’s $d \gg .8$); this indicates the high validity of the scales according to the criteria for separating the sample into Norm and DD groups.

Table 2

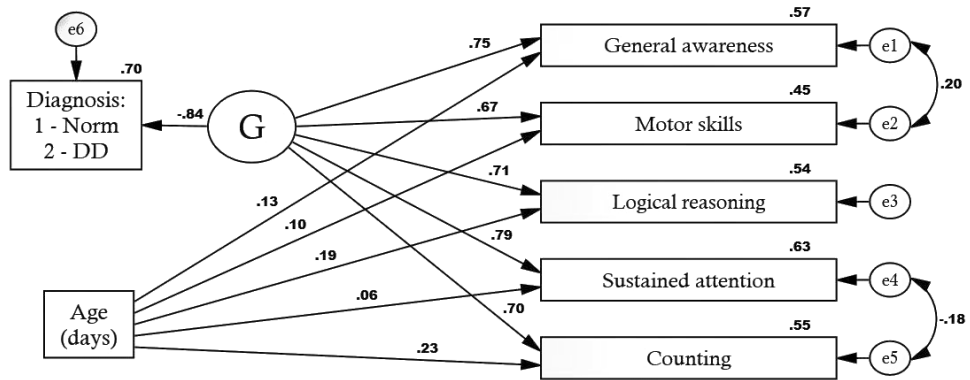
*Comparison of means for summarized scales**

Age	Diagnosis	N	Mean	Std. dev.	Cohen’s d	η^2
5-year-olds	Norm	527	33.9450	3.12825	2.914	.487
	DD	77	24.4805	3.97893		
6-year-olds	Norm	532	64.9586	4.23711	3.398	.600
	DD	96	48.3333	7.57512		

*Statistical significance of differences in the t -student criterion for all scales $p < 0.001$ (adjusted for multiple checks)

Structural equation modeling (SEM) was used to check the following suppositions: 1) the obtained scales are indicators of the general factor (G-factor), which is the main predictor of the diagnosis; and 2) age has an indirect impact on the diagnosis through the G-factor. The verification was carried out on samples from each age group.

Since the condition of multidimensional normality was not met (Multidimensional kurtosis ranged from 15.8 to 27.5; its C.R. from 22.7 to 30.8) in all cases, the Asymptotically Distribution Free method was used, as in our previous paper (Nasledov et al., 2018). All models confirmed the initial assumptions on the fit indices and the statistical significance of the parameters. All estimated parameters (regression coefficients, variance of exogenous variables, and covariance) were statistically significant ($p < .05$). An example of one model is shown in Figure 1 (for six-year-olds). The model for five-year-olds differs only in the absence of the scales “Sustained attention” and “Counting.”



CMIN=9.476; df=8; p=.304; GFI=.995; CFI=.994; RMSEA=.017; Pclose=.939

Figure 1. Structural diagnosis prediction model

Note. Numbers at arrows = standardized regression coefficients; numbers at contours of variables = squares of multiple correlation.

For each age all the scales are indicators of a general factor G, which is a predictor of the diagnosis and explains a significant percentage of the latter’s variance. Thus, the diagnosis is directly affected by the general factor G, indicators of which are all the selected scales for each age. While age is a significant predictor of the diagnosis, it affects it indirectly, while factor G has a direct impact on all indicators.

Verification of the Relative Contribution of the Scales and Prognosis Accuracy

DA was applied on the samples of each age, with predictors “Age” (in days) and scales S1 – S3 on a sample of five-year-olds, and S1 – S5 on a sample of six-year-olds. The standardized coefficients of discriminant functions, the absolute value of which is proportional to the contribution of each scale to the distinction between the Norm and the DD groups, are represented in Table 3.

The following factors, represented in descending order of contribution, were the most important in predicting the diagnosis (Norm or DD) for the sample of five-year-olds: “Logical reasoning,” “Motor skills,” and “General awareness.” For the

Table 3

*The standardized coefficients of the discriminant functions**

Variables	Coefficients	
	5-year-old	6-year-old
S1 General awareness	.319	.188
S2 Motor skills	.563	.225
S3 Logical reasoning	.673	.231
S4 Sustained attention	No	.559
S5 Counting	No	.396
Age	-.397	-.268

Note. * Norm — on the positive, DD — on the negative pole of the discriminant function. The maximum coefficients of the absolute value are in bold.

sample of six-year-olds the ordering was: “Sustained attention,” “Counting,” “Logical reasoning,” “Motor skills,” and “General awareness.” In other words, the higher the value on these scales, the more likely the child belongs to the norm group. Age in all cases contributes negatively to the differentiation of the groups. Given that the Norm and DD samples do not differ by age (in days), the negative contribution means that the difference between the groups on the selected scales increases with age.

The accuracy of the prediction of group allocation (Norm or DD) for the different ages, obtained as the result of applying DA to the two samples, is represented in Table 4.

Table 4

The prediction accuracy of the diagnosis (Norm/DD)

Original group membership	Diagnosis	Predicted group membership		In total	
		Norm	DD		
5-year-olds (96.7% of predicted is true)	Count	Norm	514	13	527
		DD	7	70	77
	%	Norm	97.5	2.5	100.0
		DD	9.1	90.9	100.0
6-year-olds (94.4% of predicted is true)	Count	Norm	515	17	532
		DD	18	78	96
	%	Norm	96.8	3.2	100.0
		DD	18.8	81.3	100.0

Sensitivity measures the accuracy of predicting the diagnosis of DD, and specificity measures the accuracy of predicting the child belonging to the Norm group. For five-year-olds the prediction accuracy was 96.7% (sensitivity 90.9%, specificity 97.5%), and for six-year-olds it was 94.4% (sensitivity 81.3%, specificity 96.8%).

Development of test scales was subordinated to the idea of achieving maximum accuracy in grouping the sample into groups Norm and DD. The main difficulty was to take into account the age, as during each period (in days), the measured indicators increase significantly. As in our previous study (Nasledov et al. 2018), this problem was solved with the use of DA: for each age, a discriminative function was constructed, *i.e.*, an axis passing through the centroids of the shared classes (Norm, DD). The linear equation of this function relates the discriminant scores for each child (DF) to the values of the previously selected scales (S1, ..., S5) and to age (in days).

The calculated discriminant scores for the entire sample for each age group were the raw scores to be scaled. From various options for nonlinear scaling, we chose 50-point percentile scales. Then the percentile limit which provided the most accurate allocation of the groups (Norm or DD) was determined. For five-year-olds, the upper limit of the 16th percentile (P16) was 94.8% sensitivity and 95.4% specificity. And for six-year-olds, the upper limit of P18 corresponded to 89.8% sensitivity and 94.5% specificity. Sensitivity and specificity of 70% to 80% are generally considered to be sufficient for good quality screening (Glascoe, 2005). Thus, the scales developed in our study have a fairly high accuracy.

Discussion

In classic tests of cognitive abilities, the content of the scales is determined by individual characteristics (“vectors of development”) of typically developing children. The uniqueness of the scales we constructed in our project is that during the process of their elaboration, a vector was formed that polarized the children into two groups: Norm and DD.

We found that the Norm and DD groups among five-year-olds differed according to the following factors (represented in descending order of contribution): “Logical reasoning,” “Motor skills,” and “General awareness”; in six-year-olds they were “Sustained attention,” “Counting,” “Logical reasoning,” “Motor skills,” and “General awareness.” It is important to point out that the most powerful predictor of DD for five-year-old children was the factor “Logical reasoning,” and for six-year-olds “Sustained attention.” It should also be emphasized that the prognostic ability of revealed predictors is valid only in their totality.

Our results are consistent with our previous work on the development of screening scales for four- to five-year-old Russian children (Nasledov et al., 2018). We found that the scales for four- to five-year-olds coincided in terms of the factors included, but differed in terms of the complexity of the tasks; while the scale for six-year-olds included new factors related to executive functions, primarily sustained attention.

Sustained attention is included as one of the four main domains in the structure of executive functions, as discussed in Western literature; it emphasizes the role of the prefrontal cortex in the implementation of this function (Best, Miller, & Jones, 2009). The concept of sustained attention implies the ability to control attention, selectively perceive specific stimuli, stay focused for a certain period of time, and prevent shifts in attention to irrelevant stimuli (Anderson, & Reidy, 2012).

Apparently, it is the factor of sustainability of attention that is the decisive predictor of DD at the senior preschool age, since it is directly related to the morpho-functional maturation of the cerebral cortex. It is known that the level of sustainability of attention is the basis for academic success (Clark, Pritchard, & Woodward, 2010). It is also believed that sustained attention is an essential part of executive functions, along with verbal abilities and behavioral control (Decker, Ezrine, & Ferraracci, 2016). Interestingly, in our previous studies, which aimed to identify predictive markers for four- and five-year-olds (Nasledov et al., 2018), this factor was not found. This can be explained by the heterochronicity and staging of mental development, and, therefore, the age of six years can be considered a sensitive period of formation of sustained attention in normal ontogenesis.

The factor “Counting” appeared to be in the second place, according to its predictive power in the senior preschool age. It is interesting that this factor, as well as “Sustained attention,” is detected for the first time at this age, and was not evident in the prognostic markers of DD for four- and five-year-olds. It is obvious that the formation of counting skills for Russian children is especially important in the senior preschool period, while at an earlier age the child is faced with the more relevant tasks of widening general awareness, improving the ability to reason, and developing motor skills. Counting assumes sufficient maturity of the frontal cortex and the established system of neural connections between the frontal and parietal cortex of both hemispheres, as well as satisfactory storage capacity and functionality of short-term and long-term memory (Qin, Cho, Chen, Rosenberg-Lee, Geary, & Menon, 2014).

At the same time, it is known that such factors as the socio-economic status of the family, the parents’ competence, and the culture of home education play a major role in facilitating children’s counting skills (Berch et al., 2016). It was found that children with whom parents played a variety of mathematical games which required operations of recalculation and comparison, demonstrated higher rates of development of arithmetic skills than children from families where parents focused on training their spatial thinking (Hart, Ganley, & Purpura, 2016). Similar data were obtained in another study, where the mastery of basic counting and comparison skills in early preschool age are powerful predictors of the formation of arithmetic skills later on (Long, Malone, Tolan, Burgoyne, Heron-Delaney, Witteveen, & Hulmea, 2016).

At the same time, it is believed that the strategies of counting on the fingers are culturally conditioned, and that visual and verbal abilities play a key role in the development of such cognitive strategies (Bender, & Beller, 2012). It has also been shown that counting on the fingers at a preschool age selectively predicts future mathematical abilities (Reeve, & Humberstone, 2011). A longitudinal study on measuring the approximate sense of number and knowledge of the Arabic number system, showed that knowledge of Arabic numbers at the age of six years is a powerful longitudinal predictor of the growth of arithmetic skills later in life (Göbel, Watson, Lervåg, & Hulme, 2014). This is because the coding of numerical information in words is important to obtaining and maintaining simple facts on addition and subtraction (De Smedt, Janssen, Bouwens, Verschaffel, Boets, & Ghesquière, 2009).

In third place, according to its predictive power for six-year-old children, was the factor “Logical reasoning;” recall that this came in first place for five-year-olds. It is noteworthy that logical reasoning is included in the second domain of executive functions: *i.e.*, goal setting, along with the ability to plan, extrapolate, and strategically organize one’s own cognitive activity (Handley, et al. 2004). This factor is the main predictor of DD in four- to five-year-olds (Nasledov et al., 2018). However, it shows its predictive significance in six-year-olds as well, as it illustrates the establishment of understanding as the ability to reason and determines the significance of information.

It is believed that the ability to generate ideas is also associated with the development of logical reasoning (de Chantal, & Markovits, 2017). According to the results of a neuroimaging study of comprehension tasks requiring verbalization, there was high variability in the results for typically developing six-year-olds, while eight-year-old children were much more successful in task processing, and the variability of the results was lower (Rajagopal, Byars, Schapiro, Lee, & Holland, 2014). This reflects the individual trajectories of maturation of the cerebral cortex at the senior preschool age.

Fourth place in the contribution to the prediction of group allocation (Norm or DD) was taken by the factor “Motor skills”, which was also a significant predictor of DD for younger children. The results obtained on the prognostic importance of motor skills for cognitive development of the child were quite expected because the importance of motor development in preschoolers has been demonstrated in many studies. Thus, the relationship between motor development and speech manifestation (Van der Fels, te Wierike, Hartman, Elferink-Gemser, Smith, & Visscher, 2013), as well as the formation of a sustained attention span and behavioral control (Diamond, & Lee, 2011), was demonstrated. Data were obtained on the impact of the development of fine motor skills in six-year-olds on their academic success in arithmetic, but not in reading (Pitchford, Papini, Outhwaite, & Gulliford, 2016).

A leading role for the family in the development of fine motor skills of preschool children was also found, and again, the data obtained are directly associated with the socio-economic status of the family (Gottschling-Lang, Franze, & Hoffmann, 2013). It is believed that improving motor skills, such as learning and maintaining rhythms and finely differentiated movements in the preschool age, can accelerate the formation of cognitive skills (van der Fels et al., 2015). According to the results of a comparative neuroimaging study of typically developing seven- to eight-year-old children and children of the same age with DD, the most significant differences were found in the areas of the brain connected with motor skills, perception, and behavior control (Baglio et al., 2014).

In fifth place was the “General awareness” factor, which is also included in the structure of predictors of DD for the younger age group. The importance of this factor was quite expected, since the cognitive development of the child is accompanied by an expansion of general knowledge about the world, and the increasing understanding of substantive relationships between phenomena and occurrences of the world. The beginning of school education dictates certain requirements as to the level and depth of the child’s knowledge about the world. It is not surprising that an assessment of the breadth and depth of the child’s knowledge of the world is an indispensable component of the school readiness tests (Janus, & Offord, 2007).

Despite the fact that “Logical reasoning” and “Counting” stood out as separate factors, the empirical data showed a causal relationship between the development of logical abilities and mastering arithmetic in six-year-olds. Thus, it was shown that a well-developed ability for logical reasoning predicted success in mathematical achievements over 16 months of primary school education (Nunes, Bryant, Evans, Bell, Gardner, Gardner, & Carraher, 2007). It was also reported that the development of counting skills is associated with more general cognitive abilities, such as working memory, sustained attention span, and other components of executive functions, among which are the essential ones of planning and control; it is emphasized that children with DD suffer from a deficit of these functions (Belanger, & Caron, 2018).

To summarize: In our study, we focused on exploring the factor model of cognitive and psycho-motor developmental vectors in typically developing preschoolers and children with DD. We obtained our data using SEM, whose screening scales were built for quick identification of groups at risk for DD, with high prognostic ability, because they reflect the current trends in cognitive development of Russian children. The unique characteristic of our elaborated scales comes from the use of computer technology in the data collection; similar studies, like the adaptive intelligence test AID, use tables. (Kubinger, Reif, & Yanagida, 2011). Thus, we could take into account the individual specificities of the tasks relative to their level and complexity, and the choice of tasks in relation to the child’s calendar age, which greatly improves the monitoring procedure.

Conclusion

Our study resulted in the development of a computer-based screening program to measure the cognitive development of preschoolers, which is easy and quick to use, and allows us to identify the “risk group” among five- to six-year-old children with high accuracy (the sensitivity of the forecast was not less than 94%). Thus, we hope that the use of such screening will help to improve the system of early detection of DD risks, in order to allow timely intervention, and thus decrease the number of children in need of special attention from specialists.

Limitations & Future Research

The use of our elaborated screening scales is intended for the timely diagnosis of the risk of DD in children when signs of DD have not yet become obvious, and thus nosological classification is quite difficult. It is important to note that the results of the screening are not the basis for precise diagnosis, but can serve as a first step to clarify the educational route and plan further assessments. In order to make an accurate diagnosis of DD, it is always necessary for the child to be examined by a specialist, regardless of symptoms revealed during the first computerized assessment.

In the future, we plan to expand the study sample to other age groups and create independent software that will optimize the process of data collection in the screening mode. However, in the case of detection of children at high risk for DD, more precise individual psychodiagnosis will be required to clarify the etiology and nosological type of DD, and to prescribe the necessary corrective measures.

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Beck's Personality Beliefs Questionnaire: Evidence of Validity and Reliability of the Russian Version

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Background. The cognitive model of personality disorders has differentiated 10 patterns of dysfunctional beliefs that lead to specific deficient and highly developed coping strategies. The Personality Belief Questionnaire (PBQ) is a self-report instrument based on this model, which differentiates patients with avoidant, dependent, obsessive-compulsive, narcissistic, paranoid, histrionic, passive-aggressive, antisocial, and borderline disorders from each other and from patients with other mental illnesses.

Objective. To validate the Russian version of the PBQ in clinical and control samples.

Design. The PBQ was translated and back-translated. 591 adults without mental illnesses and 200 in patients with different mental illnesses (predominantly affective disorders, personality disorders, schizotypal disorder, and schizophrenia) filled out the Russian version of the PBQ. 178 participants from the control sample and all 200 patients also filled out the Symptom Checklist-90 Revised. 78 participants from the control sample and 58 patients filled out the Millon Clinical Multiaxial Inventory – III. 54 participants from the control sample filled out the PBQ again after three weeks to check for test-retest reliability.

Results. The Russian version of the PBQ demonstrated good consistency (Cronbach's alphas .74 – .88) in both samples and test-retest stability ($r = .54 - .76$) in the control sample. In line with previous findings, there were high correlations between the scales. Higher scores for avoidant, dependent, passive-aggressive, paranoid, and borderline beliefs and probably histrionic beliefs are typical for patients with different mental illnesses compared to the control sample and especially for patients with schizotypal disorder. The convergent and discriminant validity of the PBQ are supported by specific correlations with clinical personality patterns both in the controls and the clinical sample. Any dysfunctional beliefs are related to more general psychopathological complaints.

Conclusion. The data support the validity and reliability of the Russian version of the PBQ. Both in the control and clinical samples, dysfunctional beliefs have a mixed structure and are related to general psychopathology.

Keywords:
reliability;
mental illnesses;
cognitive model of personality disorders;
validation;
Personality Beliefs Questionnaire

Introduction

There is a long tradition of psychological interest in personality disorders, including diagnostically significant indicators differentiating borderline personality from other personality structures (Kernberg, 1984; Sokolova, 2015). A number of structured measures aimed to achieve correspondence between psychological constructs and clinical classifications (predominantly DSM). Among the most famous is the Minnesota Multiphasic Personality Inventory (MMPI, Butcher et al., 2001), which was based on an “empirical keying” strategy but then included psychometrical proof and theoretical interpretation for many scales (Tellegen et al., 2008), and the Millon Clinical Multiaxial Inventory (MCMI, Millon, 2009), which was developed in accordance with T. Millon's personality theory.

According to the cognitive approach (Beck, Davis, & Freeman, 2015), there are dysfunctional core beliefs that make people feel the need to defend themselves. Intermediate beliefs defending the personality are specific to different personality disorders and lead to the development of some coping strategies and a deficiency of others. For instance, a person with the core belief “I'm vulnerable. Everybody can hurt me” could say to herself: “To defend myself I should never trust others” (typical of paranoid personality disorder). As a consequence, her abilities and strategies to be alert and defensive would be highly developed, while abilities to form close relationships and trust would be deficient. The same core belief could be transformed to another intermediate belief: “If I attack first, I could defend myself”, leading to symptoms of antisocial personality disorder.

Based on this theory, in 1991 A.T. Beck and J.S. Beck developed the Personality Belief Questionnaire — a self-report instrument including 126 items describing beliefs typical of people with different personality disorders (according to DSM-IV): avoidant, dependent, obsessive-compulsive, narcissistic, paranoid, histrionic, passive-aggressive, antisocial, schizoid (Beck et al., 2001). The validation study comprised 756 outpatients, including 128 patients with Axis I but no Axis II disorders (controls) and patients with different Axis II disorders. The study supported good scale consistency (Cronbach's alphas .81 – .93), test-retest reliability ($r = .57 - .93$), and criteria validity (patients with avoidant, dependent, obsessive-compulsive, paranoid, and narcissistic disorders scored higher on the corresponding beliefs than other patients). The study, using the short version of the PBQ, also demonstrated the highest scores on corresponding scales for patients with avoidant, dependent, obsessive-compulsive, paranoid, and narcissistic disorders (Fournier et al., 2012).

However, we could not find any studies supporting factor validity of the first (full) version of the questionnaire, which is reasonable taking into account the high comorbidity of different personality disorders as well as the close relationships between different dysfunctional beliefs (Beck et al., 2015). A study of the short version of the PBQ using confirmatory and exploratory analysis showed (Fournier et al., 2012) that exploratory factor analysis reveals a 7-factor structure instead of a 9- or 10-factor structure, with mixed Avoidant and Dependent scales, Antisocial and Narcissistic scales, and interference of some items having higher loading on other factors. Confirmatory factor analysis in this study support the same 7-factor structure with an “acceptable” fit. This mixed structure is in line with A. Beck's idea (Beck et al., 2015) that different conditional beliefs in personality disorders have

the same source in basic beliefs. Moreover, some contrary beliefs (e.g., avoidant and dependent ones) could be highly positively correlated, indicating general problems (or sensitivity to such problems) in interpersonal relationships.

The Borderline Personality Disorder scale of the PBQ was developed later (Butler, Brown, Beck, & Grisham, 2002) by indicating 14 items from the PBQ that differentiate 84 patients with borderline personality disorder and 204 patients with other personality disorders. The items described dependency, helplessness, distrust, fear of rejection or loss of emotional control, and attention-seeking behavior and were initially developed for the Dependent, Paranoid, Avoidant, and Histrionic scales.

The PBQ did not become as popular in clinical practice as MCMI or MMPI, but is a widespread practical tool that has been translated into many languages including Spanish, Norwegian, Polish, Brazilian Portuguese, Argentine Spanish, and Turkish (e.g., Aktas, Guriz, Alpaslan, Cavdar, & Orsel, 2015; Moretti, Trógolo, Dominguez-Lara, Conn, & Medrano, 2018; Hernández, Darío, Vasquez, & Semenova, 2015; Zawadski, Popiel, Praglowska, & Newman, 2017) and is used not only in clinical samples but also in healthy controls (Ryan, Kumar, & Wagner, 2015; Thimm, Jordan, & Bach, 2016), patients with functional and somatic illnesses (Taymur et al., 2015) and people with drug addictions (Albein-Urios, Martínez-González, & Lozano, 2014). Some reviews consider the PBQ as a relevant instrument for DSM-V as well (e.g., Bhar, Beck, & Butler, 2012). There is also a brief version of the PBQ that was developed by statistical choice of the “best” items for each scale (Butler, Beck, & Cohen, 2007) and a modified version (Zawadski et al., 2017), changed for better between-group differentiation.

The aim of the present study was to validate the Russian version of the PBQ in clinical and control samples. This study started in 2009, with the permission of Dr. A. Beck. Since that time, another Russian version of the PBQ was independently developed by A.B. Kholmogorova and her colleagues (Kargin, Kholmogorova, & Vojtseh, 2009). However, when looking for published psychometric characteristics for this variant, we could find them only for the 14-item Borderline Personality Disorder scale (PBQ-BPD), which was first translated and used for the study of male prostitution (Maximov & Kholmogorova, 2011) and was validated in samples of 543 Internet users, 35 patients with schizoaffective disorders, and 50 males involved in male prostitution (Konina & Kholmogorova, 2016). Unfortunately, we could not find any published detailed psychometric characteristics of this version of the PBQ, but we compared the published characteristics for the Borderline scale. Below we compare the psychometric characteristics for these two Russian versions of the Borderline scale. Studies using the full version of the PBQ with Russian samples concentrate on specific clinical phenomena — suicidal behavior (Kargin et al., 2009), social anxiety in patients with affective disorders (Nikitina, Kholmogorova, & Krasnova, 2012). The first paper bases its description of the test on English references only, while the second mentions that the validation is incomplete.

To our knowledge, this is the first study to demonstrate the consistency, test-retest reliability, factor validity (structure), convergent and discriminant validity (correlation with corresponding personality patterns and psychopathological symptoms and no relationship to non-corresponding patterns and symptoms), and criteria validity (differences between clinical sample and controls) of the Russian version of the full PBQ.

Unfortunately for research purposes, the situation in the clinic is a typical one, in that there is not a wide range of personality disorders represented. The sample of 756 outpatients includes only 17 patients with paranoid personality disorder and 20 with narcissistic disorder (like in Beck et al., 2001). In line with the cognitive model of personality disorders (Beck et al., 2015) these people typically have a rather high level of social functioning and seek medical help only under special circumstances like anxiety or depression. They indeed are more vulnerable to stressful situations compared to people with a stable, positive self-conception, but they are rarely inpatients in clinics. This is especially true for people with narcissistic and passive-aggressive beliefs that are contrary to the idea of looking for and receiving help and accepting one's illness. So instead of looking for group with different personality disorders, we concentrated on patients with a wide range of mental illnesses. We hypothesized that:

1. The scores for dysfunctional personal beliefs would be higher in patients with mental illnesses (because of the vulnerability of people with personality disorders to mental symptoms) and at least for some beliefs, they would be most intense in a general group of patients with personality disorders and patients with schizotypal disorder, due to the greatest personality changes in these groups.
2. Both in controls and patients with mental disorders, scores for dysfunctional personality beliefs would be related to a higher level of psychopathological complaints and to corresponding personality patterns according to the Millon Clinical Multiaxial Inventory–III (MCMI-III, Millon, 2009), which is another psychological measure relevant for DSM-IV classification of mental disorders.

Methods

Data collection was in 2010–2013 and in 2016.

Participants

The control samples included 591 adults who reported that they have no diagnosis of mental illnesses nor referrals to psychiatrists or psychotherapists due to mental conditions (Table 1). While combining a number of homogeneous samples from different studies may compromise results, we analyzed them both together and separately. In Sample 1, we asked students and working adults from medical and psychological universities to participate in the study; data were collected during personal interviews in 2010. In Samples 2 and 3, in 2016, we asked students from different faculties, as an optional part of their psychological studies, to invite 1–2 people to participate in the study (online through the Google Form platform in Sample 2 and through a personal interview in Sample 3). Taking into account that in Samples 1 and 2, females and younger people dominated, Sample 3 concentrated on males and older people.

Three different clinical groups (200 inpatients with mental illnesses) from different departments of the Mental Health Research Center (Director, Prof. Tatiana P. Klyushnik, M.D.) participated in the study:

Table 1

Description of samples

Samples	Total N	Males (%)	Age: min – max (mean ± SD)
Control samples:	591	251 (42.6%)	17–70 years old (25.40 ± 9.58)
• Sample 1: Validation sample (students and working adults, psychological and medical professions)	260	80 (30.9%)	17–60 years old (21.80 ± 6.35)
• Sample 2: Online sample of adults aged 18–45	145	43 (29.7%)	18–45 years old (22.21 ± 4.37)
• Sample 3: Sample of adults of different ages	186	128 (69.2%)	18–70 years old (32.75 ± 11.79)
Clinical samples:	200	151 (75.5%)	17–63 years old (24.30 ± 9.42)
• Clinical Group 1: Patients of the clinic’s departments of “Borderline” Mental Pathology and Affective Disorders	58	9 (15.9%)	17–63 years old (32.36 ± 12.36)
• Clinical Group 2: Young male patients with mood disorders, personality disorders or schizotypal disorder	111	111 (100%)	17–30 years old (20.24 ± 3.12)
• Clinical Group 3: Young male patients recovering after their first psychotic episode	31	31 (100%)	17–24 years old (21.00 ± 2.53)

1. Clinical Group 1 included a wide range of inpatients (predominantly female) from the clinic’s departments of “Borderline” Mental Pathology and Affective Disorders. There were 21 (36.2%) patients with anxiety disorders, hypochondriasis, panic or obsessive-compulsive disorders¹ (F40, F41, F42, F45.2, according to ICD-10), 22 (37.9%) patients with depression, including bipolar affective disorders with current episode depression (F32, F33, F34.1, F31.3, F31.4), and 15 (25.9%) patients with schizophrenia or schizotypal disorder (F20, F21).
2. Clinical Group 2 included 111 male youths with nonpsychotic mental illnesses including 44 (39.6%) patients with mood disorders (F31.3, F31.4, F32, except for F32.2), 34 (30.6%) patients with personality disorders (F60), and 33 (29.7%) patients with schizotypal disorder (F21).
3. Clinical Group 3 included 31 male youths recovering after their first psychotic episode (F20.2, F20.3). The length of their recovery period varied from 10 days to one month; they were hospitalized throughout this period.

General exclusion criteria were organic mental disorders, alcoholism or drug dependence, mental retardation or any difficulties of understanding study items due to motivational cognitive or any other deficiency.

Patients in Clinical Group 1 participated in 2016. Patients in Clinical Groups 2 and 3 participated in 2010–2013.

¹ All these disorders are described in CBT as having a common basis in anxiety-related problems (Beck et al., 2005)

Procedure

Questionnaires

The *Personality Beliefs Questionnaire* (PBQ) consists of 126 items rated on a 0–3 Likert scale. Each group of 14 items reflects beliefs typical for one personality disorder: avoidant, dependent, passive-aggressive, obsessive-compulsive, antisocial, narcissistic, histrionic, schizoid, and paranoid disorders. The scale for borderline beliefs includes items from different scales. With the permission of Prof. A. Beck (e-mail, 2009) the PBQ was translated into Russian and back-translated. Then the content of the items was discussed by the group of two clinical psychologists and two psychiatrists familiar with the cognitive model of personality disorders. Then they were pilot tested on 15 inpatients who were interviewed about any misunderstandings they may have had during testing. All participants in this study filled out the PBQ.

From the control Sample 2, a total of 110 participants filled out the *Symptom Checklist-90 Revised* (SCL-90R, Derogatis, 1994) and 78 participants filled out the *Millon Clinical Multiaxial Inventory - III* (MCMI-III, Millon, 2009). SCL-90R is a symptom checklist including nine scales: Somatization, Obsessive-Compulsive, Interpersonal Sensitivity, Depression, Anxiety, Hostility, Phobic Anxiety, Paranoid Ideation, and Psychoticism, as well as 3 general indices: the Global Severity Index (GSI, measures overall psychological distress), the Positive Symptom Distress Index (PSDI, measures intensity of symptoms), and the Positive Symptom Total (PST, measures a number of symptoms). The MCMI-III includes 14 severe personality patterns corresponding to Axis II in DSM-IV: Schizoid, Avoidant, Depressive, Dependent, Histrionic, Narcissistic, Antisocial, Sadistic, Compulsive, Negativistic (Passive-Aggressive), Masochistic (Self-Defeating), Schizotypal, Borderline, Paranoid. There are also scales for clinical syndromes corresponding to Axis I disorders: Anxiety, Somatoform, Bipolar Manic, Dysthymia, Alcohol Dependence, Drug Dependence, Post-Traumatic Stress Disorder, Thought Disorder, Major Depression, Delusional Disorder.

68 participants from control Sample 3 also filled out the SCL-90R.

54 participants from control Sample 1 filled out the PBQ twice in 3 weeks to assess *test-retest* reliability.

All 58 patients from clinical group 1 filled out the SCL-90R and MCMI-III. All 111 patients from Clinical Group 2 and 31 patients from Clinical Group 3 filled out the SCL-90R.

Cronbach's alphas for the MCMI-III in our study varied from .63 to .85 for severe personality patterns and .64 – .86 for clinical syndromes. Cronbach's alphas for SCL-90R scales varied .75 – .90.

All participants from the clinical groups signed informed consent for participation in research projects at the Mental Health Research Center, including this study. All participants from the control groups gave their informed consent before participation. The study was conducted in accordance with the Declaration of Helsinki, and the protocol was approved by the Ethics Committee of the Lomonosov Moscow State University Faculty of Psychology; it met the requirements of the Code of Ethics of the Russian Psychological Society.

Data were processed in SPSS Statistics 23.0.

Results

Descriptive Statistics, Scales Reliability, and Correlations Between Scales

Personal beliefs typical of disorders obviously have a mixed structure (Fournier et al., 2012), especially in control samples. Our approach was consistent with that of previous studies (Beck et al., 2001; Fournier et al., 2012), concentrating on discussion of the content validity of the scales and the content differences between them, and then testing correlations between the scales. As shown in Table 2, almost any beliefs were related to each other and this result replicates data of the original PBQ (Beck et al., 2001). For the controls, all the correlations are significant, $p < .01$. For the clinical samples, all correlations but those of dependent beliefs with antisocial, narcissistic, and schizoid beliefs are significant ($p < .05$). Comparison of relationships in the control and clinical samples and in the original validation sample reveals high correlations between avoidant and dependent beliefs, and between narcissistic and histrionic beliefs. This result is similar to the original version and could be explained by the content closeness of these beliefs. Avoidant and dependent beliefs both include the feeling that the person cannot stay alone and cannot create stable, safe relationships. So, people with such beliefs need to avoid close relationships and/or to make others stay with them. People with both narcissistic and histrionic beliefs feel that they need attention and admiration from others. In our samples, narcissistic beliefs are also highly related to antisocial beliefs, which is not typical for American clinical samples, and might be a culture-specific result, which we address below.

Table 2

Pearson's correlations between personality beliefs in the control samples (above the major diagonal) and clinical samples (below diagonal)

	Avoidant	Dependent	Passive-Aggressive	Obsessive-Compulsive	Antisocial	Narcissistic	Histrionic	Schizoid	Paranoid	Borderline
Avoidant	1	.68**	.29**	.14**	.30**	.36**	.42**	.25**	.45**	.79**
Dependent	.59**	1	.25**	.12**	.19**	.28**	.47**	-.03	.28**	.67**
Passive-Aggressive	.39**	.17*	1	.35**	.46**	.46**	.46**	.43**	.39**	.39**
Obsessive-Compulsive	.36**	.24**	.44**	1	.31**	.24**	.18**	.32**	.33**	.21**
Antisocial	.27**	-.01	.52**	.45**	1	.73**	.50**	.55**	.58**	.49**
Narcissistic	.29**	.04	.39**	.35**	.68**	1	.70**	.47**	.51**	.47**
Histrionic	.42**	.33**	.48**	.38**	.48**	.66**	1	.25**	.39**	.50**
Schizoid	.33**	-.06	.52**	.34**	.53**	.42**	.24**	1	.58**	.40**
Paranoid	.49**	.23**	.47**	.37**	.57**	.46**	.40**	.54**	1	.71**
Borderline	.80**	.60**	.47**	.37**	.44**	.38**	.48**	.46**	.74**	1

Note. * $p < .05$, ** $p < .01$.

All the scales demonstrate good consistency across the control and clinical samples (Table 3) although it is a bit lower than for the clinical sample of A. Beck et al. (2001).

Test-retest reliability was high for all the scales (Table 1) and was in general close to the original data ($r = .57-.93$, Beck et al., 2001). A paired Student t-test demonstrated that for none of the scales was there a shift in scores in the three weeks between test and retest ($p > .10$). However, it should be noted that some effect sizes for the paired Student t-test reached a small effect size (Henson, 2006). Notably, retest scores for dependent, obsessive-compulsive, schizoid, and paranoid beliefs were insignificantly higher in retest, with a small effect size.

Table 3

Descriptive statistics and reliability of PBQ scales in the control and clinical samples (for Cronbach's alphas, variations in the samples are given in parentheses)

Scales of Personality Beliefs Questionnaire	Controls (N = 591)				Clinical sample (N = 200)			Student t-test	Effect size r
	Mean	SD	Cronbach's alpha	Test-retest reliability r (N = 54)	Mean	SD	Cronbach's alpha		
Avoidant	1.40	.68	.82 (.72-.87)	.66**	1.91	.73	.83 (.73-.87)	1.35	.18
Dependent	1.50	.73	.86 (.84-.88)	.65**	2.05	.78	.87 (.84-.88)	-1.61	.22
Passive-Aggressive	2.06	.60	.78 (.69-.83)	.58**	2.23	.58	.75 (.73-.77)	-.16	.02
Obsessive-Compulsive	2.28	.64	.84 (.83-.85)	.58**	2.41	.61	.80 (.76-.83)	-1.60	.21
Antisocial	1.73	.73	.85 (.82-.86)	.72**	1.79	.72	.85 (.80-.85)	-1.34	.18
Narcissistic	1.53	.79	.88 (.86-.90)	.76**	1.43	.66	.83 (.75-.86)	-1.37	.18
Histrionic	1.65	.64	.82 (.79-.82)	.54**	1.70	.64	.79 (.75-.81)	-1.02	.14
Schizoid	1.98	.61	.79 (.77-.81)	.58**	1.98	.59	.75 (.65-.78)	-1.45	.20
Paranoid	1.73	.77	.86 (.81-.89)	.58**	1.85	.82	.90 (.78-.91)	-1.47	.20
Borderline	1.50	.64	.74 (.67-.81)	.64**	1.90	.69	.78 (.74-.81)	-.36	.05

Note. * $p < .05$, ** $p < .01$.

Both in the control and clinical samples, people tended to report obsessive-compulsive and passive-aggressive beliefs (Figure 1). The least reported are avoidant, dependent, narcissistic, and histrionic (as well as borderline) beliefs.

The clinical samples demonstrate higher scores for avoidant, dependent, passive-aggressive, paranoid, and borderline beliefs.

Females held more avoidant, dependent and borderline as well as narcissistic and histrionic beliefs ($t = -5.58 - -2.38$, $p < .05$, $r = .10 - .23$) than males. Most of these differences, except for dependent beliefs ($t = -5.58$, $p < .01$, $r = .23$), disappear in the clinical sample. Moreover, in the clinical sample, females demonstrate

less narcissistic, histrionic, and antisocial beliefs than males ($t = 2.14 - 4.82$, $p < .05$, $r = .15 - .32$). Although these differences in the clinical samples could be explained by differences in diagnoses, the data support the assertion that gender differences could be less prominent in the clinical compared to the control samples.

In the control groups, age was weakly related to lower scores for antisocial ($r = -.21$, $p < .01$), narcissistic ($r = -.17$, $p < .01$), and histrionic ($r = -.19$, $p < .01$) beliefs. All other correlations were lower than $|.15|$. In the clinical groups, older patients demonstrated more dependent beliefs ($r = .22$, $p < .01$) and less antisocial ($r = -.20$, $p < .01$) and narcissistic beliefs ($r = -.18$, $p < .05$).

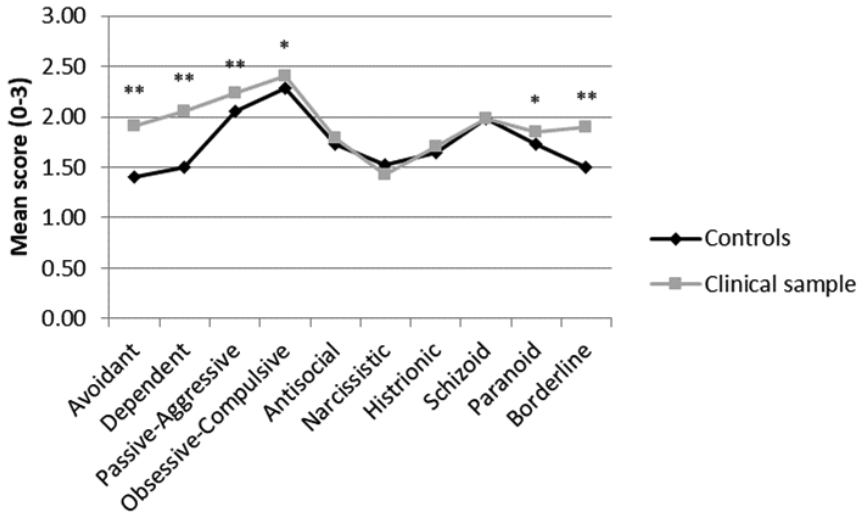


Figure 1. Control and clinical profiles of personality beliefs.

* $p < .05$, ** $p < .01$.

Personal Beliefs in Mental Illnesses

The patients in Clinical Group 1 compared to the controls have higher scores for avoidant, dependent, and borderline beliefs ($F = 5.66 - 23.32$, $p < .01$, $\eta^2 = .03 - .10$), but lower scores for antisocial and narcissistic beliefs ($F = 5.96$, $p < .01$, $\eta^2 = .03$ and $F = 8.33$, $p < .01$, $\eta^2 = .04$, respectively). However, according to post hoc Scheffé comparisons, the differences in avoidant and dependent beliefs are explained by differences between patients and controls, while patients with anxiety, depression, schizophrenia, and schizotypal disorder do not differ from each other. There are no post hoc differences in borderline beliefs among the three clinical subgroups and controls. Between-group differences in antisocial and narcissistic beliefs are explained by their lower scores in depressive patients compared to the controls ($p < .05$). Comparisons of patients with depression, anxiety, and schizophrenia/schizotypal disorder reveal no differences in beliefs.

To study personal beliefs in Clinical Groups 2 and 3, we have chosen from the control groups 185 males 30 years old or younger. The patients with mental disorders, especially schizotypal disorder, hold more avoidant, dependent, passive-aggressive, histrionic, and borderline beliefs than the controls. Post hoc Scheffé

comparisons demonstrate that the controls have less avoidant and borderline beliefs than patients with mood, personality, and schizotypal disorders and patients experiencing remission after a psychotic episode ($p < .05$). Schizotypal patients also have higher scores for borderline beliefs than patients who have experienced psychosis ($p < .05$). For dependent beliefs, the controls significantly differ from the patients in mood disorder, schizotypal disorder, and psychosis, but not personality disorders. However, there are no post hoc between-group differences for passive-aggressive and histrionic beliefs. Moreover, there is no evidence of differences between the different kinds of illnesses.

Comparisons of clinical subgroups only showed significant differences in dependent and borderline beliefs ($F = 2.81 - 3.58$, $p < .05$, $\eta^2 = .07 - .09$) and marginally significant differences in narcissistic and obsessive-compulsive beliefs ($F = 2.18 - 2.39$, $p < .10$, $\eta^2 = .06$). Scores for dependent and narcissistic beliefs are higher in schizotypal disorder, while scores for borderline beliefs are higher in schizotypal and mood disorders. Scores for obsessive-compulsive beliefs are higher in schizotypal disorder and those in remission after psychosis. The only post hoc difference that reaches significance is a higher score for borderline beliefs in patients with schizotypal disorder compared to patients in remission after psychosis.

Table 4

Comparisons of young male patients with mental illnesses and controls

Personal beliefs	Controls		Mood disorders		Personality disorders		Schizotypal disorder		Remission after psychotic episode		Fisher's F	Effect size η^2
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD		
Avoidant	1.23	.66	1.99	.78	1.76	.74	2.19	.72	1.79	.74	19.15**	.21
Dependent	1.35	.65	1.91	.73	1.70	.80	2.29	.83	1.92	.70	14.93**	.17
Passive-Aggressive	2.01	.64	2.12	.47	2.31	.62	2.35	.61	2.19	.55	3.63**	.05
Obsessive-Compulsive	2.32	.66	2.47	.63	2.21	.64	2.53	.71	2.53	.57	2.32 ^T	.03
Antisocial	1.79	.73	1.92	.63	2.04	.59	1.97	.69	2.09	.67	1.84	.02
Narcissistic	1.51	.77	1.51	.52	1.51	.52	1.85	.64	1.59	.59	1.56	.02
Histrionic	1.57	.64	1.72	.52	1.77	.57	1.93	.65	1.85	.64	3.62**	.05
Schizoid	1.97	.64	2.03	.52	2.11	.71	2.13	.47	1.91	.53	.75	.01
Paranoid	1.76	.83	1.95	.69	1.83	.89	2.26	.73	1.94	.62	2.08 ^T	.03
Borderline	1.44	.62	2.01	.64	1.85	.57	2.24	.75	1.70	.68	14.00**	.16

Note. ^T $p < .10$, * $p < .05$, ** $p < .01$.

Personal Beliefs and Personality Patterns

In general, higher scores for dysfunctional personality beliefs are related to stronger general psychopathological complaints (Table 5). In particular, avoidant, dependent, paranoid, and borderline beliefs are strongly correlated with psychopathological complaints both in the control and clinical samples. We could not find any stable pattern of correlations for narcissistic, schizoid, obsessive-compulsive, or antisocial beliefs, so we did not include them in the table.

Table 5

Personal beliefs and psychopathological symptoms

Scales ($N_{\text{norm}}=178$ / $N_{\text{clinc}}=200$)	Avoidant	Dependent	Passive- Aggressive	Histrionic	Paranoid	Borderline
SCL-90R — Soma- tization	.42**/.14	.34**/.24**	.21**/.10	.32**/.12	.33**/.20**	.47**/.26**
SCL-90R — Obsessiveness- Compulsiveness	.60**/.37**	.55**/.35**	.25**/.18*	.29**/.13	.36**/.33**	.64**/.46**
SCL-90R — Interper- sonal sensitivity	.66**/.43**	.54**/.38**	.20**/.21**	.30**/.22**	.47**/.36**	.69**/.53**
SCL-90R — Depres- sion	.57**/.29**	.52**/.29**	.31**/.10	.28**/.12	.36**/.31**	.63**/.40**
SCL-90R — Anxiety	.51**/.31**	.44**/.29**	.26**/.17*	.31**/.15	.35**/.28**	.56**/.36**
SCL-90R — Hostility	.42**/.20**	.24**/.21**	.26**/.27**	.37**/.16*	.35**/.27**	.45**/.34**
SCL-90R — Phobia	.50**/.28**	.37**/.35**	.12/.19*	.13/.21**	.34**/.29**	.51**/.37**
SCL-90R — Paranoia	.44**/.34**	.30**/.25**	.31**/.34**	.41**/.24**	.52**/.47**	.57**/.51**
SCL-90R — Psycho- ticism	.53**/.31**	.51**/.30**	.21**/.18*	.34**/.17*	.45**/.30**	.63**/.41**
SCL-90R — Positive Symptom Distress Index	.63**/.34**	.53**/.34**	.29**/.21**	.37**/.18*	.45**/.36**	.70**/.46**
SCL-90R — Positive Symptom Total	.59**/.37**	.50**/.32**	.27**/.22**	.35**/.22**	.44**/.37**	.64**/.48**
SCL-90R — Global Severity Index	.51**/.24**	.41**/.27**	.29**/.14	.34**/.05	.33**/.20**	.54**/.32**

Note. * $p < .05$, ** $p < .01$. Correlations that are discussed in the text are boldfaced

Correlations between paranoid beliefs and paranoia and psychoticism are high but not the highest ones. However, obsessive-compulsive beliefs have low correlation with obsessiveness-compulsiveness ($r=.12$ in both clinical and control

Table 6
Correlations between personal beliefs and MCMI-III scales

Scales (N _{norm} =78 / N _{clinic} =58)	Avoidant	Dependent	Passive- Aggressive	Obsessive- Compulsive	Antisocial	Narcissistic	Histrionic	Schizoid	Paranoid	Borderline
MCMI-III — 2A Avoidant	.75**/.50**	.52**/.37**	.36**/.09	.40**/.21	.30**/.05	.31**/-.16	.19/.06	.25*/.10	.60**/.52**	.73**/.60**
MCMI-III — 3 Dependent	.75**/.50**	.72**/.68**	.26*/.10	.24*/.01	.13/-.07	.21/-.24	.39**/.10	-.09/-.08	.34**/.19	.65**/.54**
MCMI-III — 8A Negati- vistic	.66**/.52**	.36**/.45**	.47**/.30*	.15/.29*	.38**/.19	.40**/-.05	.43**/.16	.17/.10	.56**/.40**	.65**/.57**
MCMI-III — 7 Compul- sive	-.14/.12	.00/.07	-.35**/.40**	.39**/.41**	-.15/.19	-.23*/.03	-.34**/.13	.00/.35**	.00/.20	-.10/.14
MCMI-III — 6A Anti- social	.37**/.24	.08/.04	.53**/.25	.13/.14	.41**/.33*	.45**/.29*	.49**/.39**	.21/.29*	.39**/.28*	.38**/.27*
MCMI-III — 5 Narcis- sistic	-.29**/00	-.43**/-.20	.12/.31*	-.02/.32*	.32**/.39**	.38**/.56**	.24*/.46**	.24*/.30*	.05/.03	-.21/-.06
MCMI-III — 4 Histrionic	-.54**/.42**	-.41**/.33*	-.20/.53**	-.24*/.34**	-.15/.24	-.13/-.29*	.07/.53**	-.29*/.43**	-.41**/.34**	-.50**/.40**
MCMI-III — 1 Schizoid	.60**/.37**	.30**/.18	.35**/.18	.39**/.30*	.40**/.16	.34**/00	.11/.11	.52**/.37**	.56**/.53**	.57**/.53**
MCMI-III — P Paranoid	.60**/.47**	.22/.27*	.48**/.41**	.39**/.51**	.50**/.47**	.57**/.28*	.38**/.32*	.41**/.36**	.77**/.73**	.63**/.64**
MCMI-III — C Borderline	.72**/.46**	.52**/.31*	.51**/.24	.15/.21	.34**/.18	.38**/00	.51**/.29*	.13/.11	.45**/.44**	.67**/.51**

Note. *p < .05, **p < .01. Correlations between similar patterns measured by PBQ and MCMI-III are boldfaced.

groups); schizoid beliefs are unrelated to psychoticism ($r = .19$ and $r = .12$, respectively). Relationships between hostility and passive-aggressive beliefs are not the highest, while relationships between hostility and antisocial beliefs are low for the control sample and non-significant for the clinical sample ($r = .23$ and $r = .11$, respectively).

As can be seen in *Table 6*, comparison between the PBQ and the MCMI-III gives better results in terms of scale specificity. For schizoid, avoidant, dependent, narcissistic, antisocial, compulsive, paranoid, and borderline beliefs, correlations with similar MCMI-III patterns are among the highest both in the control and clinical groups. For histrionic beliefs, there was a correlation with the histrionic clinical pattern, but in the clinical sample only. The only correlations that are not so high compared to other beliefs are related to passive-aggressive beliefs, although these are positive and significant. The passive-aggressive pattern is more closely related to avoidant, paranoid, and borderline beliefs.

Discussion

The Russian version of the PBQ demonstrates good reliability and test-retest validity, although they both are a bit lower than the original PBQ data (Beck et al., 2001) and Russian Borderline Scale data. In particular, in our clinical and control samples, Cronbach's alpha for the Borderline Scale were $.74 - .78$ versus $.89$ (Konina & Kholmogorova, 2016; Butler et al., 2002) and test-retest correlation was $.64$ versus $.78$. Nevertheless, all these results indicate good reliability and consistency and are close to the results of other PBQ-based studies (Bhar et al., 2012), pointing to consistency as $.77 - .94$ and test-retest reliability as $.57 - .93$.

In general, both in the control and clinical samples, people tend to report obsessive-compulsive and passive-aggressive beliefs and deny narcissistic and histrionic (as well as borderline) beliefs. This is reasonable because obsessive-compulsive beliefs in Russian culture include people's attempts to do their best and to eliminate mistakes, while passive-aggressive beliefs describe a tendency not to demonstrate aggression even though it is there. Narcissistic and histrionic beliefs, however, refer to the subjective importance of attention and admiration, so it could be socially desirable to deny them. In the control sample, the least reported are also avoidant and dependent beliefs. There are gender differences in personality beliefs in the control sample that disappear in the clinical sample (except for dependent beliefs); in general, females are more avoidant, dependent, borderline, narcissistic, and histrionic compared to males. Age is only weakly related to beliefs.

Beliefs systems seem not to be highly differentiated in people, both in the original version (Beck et al., 2001) and in our study. This is especially true for avoidant and dependent beliefs ($r = .59 - .73$) as well as for narcissistic and histrionic beliefs ($r = .64 - .70$). Theoretically this result is reasonable, given common closeness-related problems for the first two beliefs and common attention- and acknowledgment-related problems for the latter two. In the Russian samples, there are high correlations between antisocial and narcissistic beliefs ($r = .68 - .73$) which might be a culture-specific result. Compared to American culture, where self-presentation, defending one's own interests, and achievement are perceived as positive traits, in Russian culture these traits are perceived as individualistic, selfish, and aggressive,

so admission of such beliefs could be perceived as admission of readiness for aggression and competition at any price.

Although we did not compare subsamples with different personality disorders (Beck et al., 2001), we could replicate the general finding that patients with mental illness demonstrate higher scores for avoidant, dependent, passive-aggressive, paranoid, and borderline beliefs, and probably (in one subsample) histrionic beliefs. Understanding personality patterns in different mental disorders is especially important given their relationship to illness representation and adherence to treatment (Rasskazova, 2018). However, we did not find any stable differences between patients with different disorders that could indicate low specificity of the PBQ's scales for different mental disorders in general clinical practice. Moreover, the results from Clinical Sample 1 suggest an even lower level of antisocial and narcissistic beliefs in patients with depression compared to controls. However, as a support of PBQ specificity, previous empirical findings (Beck et al., 2001; Butler et al., 2002; Fournier et al., 2012) strongly support differences in personal beliefs in patients with avoidant, dependent, obsessive-compulsive, narcissistic, paranoid, histrionic, passive-aggressive, avoidant, antisocial, and borderline disorders, while our results suggest that high scores for a wide range of beliefs (avoidant, dependent, passive-aggressive, obsessive-compulsive, paranoid, and borderline) could be typical of patients with schizotypal disorder. It should be noted that differentiation of schizotypal disorder from other disorders is a relevant clinical task and psychological diagnostics could be practically helpful in this sphere, especially in studies of those at high risk for psychosis and of its prevention (Rasskazova & Friedberg, 2012).

Possible clarification of the uses of the PBQ in differentiation of groups of patients comes from the study of its convergent and discriminant validity. Comparisons with MCMI-III clinical personality patterns reveal strong evidence of the validity and specificity of the PBQ scales, while comparisons with the SCL-90R reveal strong positive correlations of almost all beliefs with almost all psychopathological symptoms (and has been replicated for the Russian Borderline Scale [Konina & Kholmogorova, 2016], although correlations in our clinical and control samples were a bit higher). In particular, such specific relationships were found for the Avoidant, Dependent, Schizoid, Obsessive-Compulsive, Narcissistic, Paranoid, and Borderline scales and — in the Clinical Group only — for the Histrionic scale. Passive-aggressive and antisocial beliefs were related to Negativistic and Antisocial patterns from the MCMI but were more closely related to the Paranoid pattern. In line with the cognitive theory of personality disorders (Beck et al., 2015), it is reasonable to suggest that there are specific personality patterns that are consistently measured by different instruments (e.g., the MCMI and PBQ), patterns which are especially high in patients with such personality disorders. However in general, the control or clinical samples of most of such personality beliefs show that the beliefs lead to mental vulnerability and a general increase in psychopathological symptoms that has been called “demoralization” in some studies (e.g., Tellegen et al., 2008).

Conclusion

Thus Russian version of the PBQ is a reliable, stable, and valid instrument both in the control and clinical samples. Higher scores for avoidant, dependent, passive-

aggressive, paranoid, and borderline beliefs, and probably histrionic beliefs, are typical for patients with different mental illnesses compared to the control sample, while especially high scores for avoidant, dependent, passive-aggressive, obsessive-compulsive, paranoid, and borderline beliefs are prominent in patients with schizotypal disorder. Further studies could test whether these results could be helpful for differential diagnosis of schizotypal disorders in clinical practice.

Although appropriate testing of the specificity of the PBQ scales requires samples with different personality disorders, we found (in line with previous findings) that both in the control and clinical samples, dysfunctional beliefs have a mixed structure, with high interference between avoidant and dependent, passive-aggressive and schizoid, narcissistic and histrionic beliefs. Moreover, dysfunctional beliefs seem to be related not to specific psychopathological complaints, but to a general level of psychological “demoralization”. Nevertheless, specific relationships of the PBQ scales with corresponding clinical personality patterns confirm their convergent and discriminant validity.

Limitations

The major limitation of the study is the absence of large specific groups of patients with different personality disorders. This limitation is explained by the low rate of such patients in mental health clinics (Beck et al., 2001). Although this limitation could compromise our conclusion about the partial specificity of the PBQ scales, the conclusion has support from previous data on high inter-scale correlations and mixed structure (Fournier et al., 2015) and high scores on a number of beliefs in patients with mood disorders (e.g., Yucens et al., 2014). Moreover, the problem of the PBQ scales’ convergent validity and specificity is still discussed in the literature and some authors have suggested a modified version of the PBQ (Zavadski et al., 2017). Another limitation is the heterogeneity of samples (especially clinical samples), which was addressed in the paper by comparisons of psychometric characteristics for a general sample and subsamples separately. The cross-sectional design of the study limits our conclusion about the direction of relationships between mental illnesses and cognitive beliefs that are proposed in A.T. Beck’s model. Further research could concentrate on the specificity of dysfunctional beliefs both in a control sample and in patients with different mental disorders. Also, there is a limitation in terms of sampling: this paper reported data on several samples from different years, using slightly different design. Some of these samples are smaller than 100 participants (e.g., 78 control subjects and 58 patients filled out the MCMI-III). Although following A. Beck (Beck et al., 2015), we see no reason to expect differences in personal beliefs from 2010 to 2016, and comparisons between the samples revealed no such differences, it could be taken into account in further studies.

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ORGANIZATIONAL PSYCHOLOGY

A Pilot Study to Assess the Psychometric Properties of the Job Apathy Scale with Russian Employees

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Background. The Job Apathy Scale (JAS), developed by G.B. Schmidt (2017), has been widely used in industrial and organizational psychology. This scale examines two dimensions of job apathy, namely apathetic thought (weak interest in the job processes and unwillingness to develop strategies for the promotion of job efficacy) and apathetic action (investing little emotional energy in job tasks, coworkers, or the organization).

Objectives. 1) To examine the psychometric properties of the JAS with Russian employees; 2) to assess the influence of sociodemographic characteristics on job apathy.

Design. The sample was recruited using the convenience sampling method. Two hundred and seventy-five Russian employees were included in this cross-sectional study. In addition to the JAS, all participants completed measures assessing professional burnout, work engagement, and job satisfaction. Cronbach's alpha values were used to assess the internal consistency of the JAS. Exploratory and confirmatory factor analyses were employed to examine the factor structure of the JAS. The nonparametric Spearman rank order correlation coefficient was used to examine the convergent and divergent validity of the JAS. The Student's t-test and one-way analysis of variance (ANOVA) were used to assess the sociodemographic differences in job apathy.

Results. Exploratory and confirmatory factor analyses supported a two-dimensional structure of the JAS. The Cronbach's alpha values were .86 and .73 for the apathetic thought scale and the apathetic action scale, respectively. Job apathy was positively correlated with professional burnout and was negatively correlated with work engagement and job satisfaction. There is evidence of convergent and divergent validity of the JAS. The analysis using a one-way ANOVA revealed a significant effect of age and marital status on job apathy: Younger and married employees are more prone to apathetic action than their older and single colleagues.

Conclusion. The JAS with the Russian employees is psychometrically reliable and valid, which argues for its scientific and practice-oriented applications.

Keywords:

JAS; job apathy; psychometric properties; factor structure; reliability; validity; sociodemographic characteristics

Introduction

It is reasonable that modern employees may feel psychological distress in the workplace. A growing number of job tasks, work-family conflict, family-work conflict, and a general trend of increasing complexity are the reality for many employees around the world (Findlay, Kalleberg, & Warhurst, 2013; Kelly et al., 2014; Moczydłowska, 2016). Cadieux and Marchand (2014) investigated the role of working in the mental health of professionals and found that skill utilization, psychological demands, and job insecurity were positively correlated with psychological distress, whereas social support in the workplace was negatively related to psychological distress. It is known that psychological distress is characterized by three symptoms: depression, anxiety, and apathy (Simard, Hudon, & van Reekum, 2009). Haslam, Atkinson, Brown, and Haslam (2005) examined the effects of psychological distress and the treatment for these comorbid conditions on performance and safety in the workplace and found that depression and anxiety symptoms and psychotropic medications to treat them significantly impaired work performance. Unfortunately, they have not studied apathy, the third component of psychological distress in employees.

To date, there have been several studies evaluating job apathy. Csikszentmihalyi and LeFevre (1989) wondered what affects the quality of experience more: whether a person is at work or leisure, or whether a person is “in the flow”, defined as a combination of high challenges and skills. Analyzing data from 78 adult employees, they found that workers functioning in the flow reported more positive experiences in the workplace than those who were subject to apathy. Spector (1975) investigated the influence of organizational frustration and locus of control on emotional and behavioral reactions of employees to frustrating conditions. Analyzing the factor structure of the employee responses, he discovered a specific factor that he labeled “apathy about the job”. The items of this factor were represented by apathetic employee behavior and job frustration (e.g., “purposely did job incorrectly”, “taking any kind of drug at work to get high”). Later, Ladebo (2005) assessed the effects of work-related attitudes on the intention to leave the profession among primary school teachers in Nigeria. She used a job satisfaction scale and found a factor that she labeled “job apathy”. This factor comprised five items (e.g., “I feel isolated from my colleagues”, “I do not feel that I can choose my own tasks in relation to my teaching”). The job apathy subscale, encoded such that a higher score meant a lower level of job apathy, was positively correlated with a career commitment scale, a global job satisfaction index, and a quit intentions scale, where a higher score meant a lower intention to leave the profession. Thus, in the studies of Spector (1975) and Ladebo (2005), job apathy was found as a result of data factorization.

Finally, Schmidt, Park, Keeney, and Ghumman (2017) defined job apathy as “a state of diminished motivation and affect toward one’s job” (p. 486). They suggested that job apathy comprises three dimensions: apathetic emotion (emotional detachment from the job and organization), apathetic thought (little thought or mental attention being paid to the job or the workplace), and apathetic action (a lack of action in the workplace beyond what is absolutely required). Thus, “the apathetic worker should display signs of decreased affect toward the workplace, decreased

mental investment in their job, and a lower level of effortful action toward workplace tasks” (Schmidt et al., 2017, p. 488).

Schmidt et al. (2017) developed the Job Apathy Scale (JAS), with data from a sample of employed college students supporting two dimensions: apathetic thought and apathetic action (according to the results of exploratory and confirmatory factor analyses, the apathetic emotion subscale and the apathetic thought subscale were combined). The authors suggested that, firstly, job apathy was distinct from clinical apathy, negative affectivity, cynicism, and employee engagement; and secondly, that job apathy can predict personal initiative, withdrawal, and organizational deviance. To date, there is only one study in which the JAS has been used. Ugwu et al. (2019) investigated job apathy in a Nigerian mass transit company. They found that apathetic employees reported being less engaged in work; they had less organizational tenure and spiritual intelligence than those with a high perception of leader integrity. The data confirmed the convergent validity of the JAS.

In consideration of the potential utility of the JAS, as well as its current unavailability in Russia, the main aim of this study was to examine the psychometric properties of the JAS with Russian employees. The current study aimed to assess the factor structure of the JAS by performing exploratory and confirmatory factor analyses, and also to examine the reliability and validity of the Russian version of the JAS.

Several studies have assessed the proposed relationships among apathy, addiction, engagement, burnout, and satisfaction with life. Kirschner, Rabinowitz, Singer, and Dagher (2020) investigated the common mechanism of apathy and *addiction* in subjects with Parkinson’s disease. Holmes and his colleagues (2006) suggested that live interactive music has immediate and positive *engagement* effects in apathetic individuals with dementia, regardless of the severity of their disease. Maslach and Jackson (1981) proposed that *burnout* leads to irritability, frustration, excessive fatigue, and an apathetic attitude towards work. Montoya-Murillo, Ibarretxe-Bilbao, Peña, and Ojeda (2020) found that integrative cognitive rehabilitation program groups showed significant improvements compared to the control group in apathy and *satisfaction with life*. It was hypothesized that job apathy may be correlated with work addiction, work engagement, professional burnout, and job satisfaction.

Finally, the current study aims to assess the influence of sociodemographic characteristics on job apathy, in particular depending on gender, age, marital status, educational level, and work experience.

Method

Participants. This study is cross-sectional. The sample was recruited using the convenience sampling method. The participants were 369 Russian employees of an express delivery company working in the office in Moscow. They were invited to participate in a voluntary, anonymous survey. The sample was selected due to its availability for research. All employees were informed in advance about the aim of the study and they provided their informed consent to participate. They com-

pleted a paper-and-pencil questionnaire. Data were collected between April and May 2019.

Instruments. The participants filled out a sociodemographic form and measures assessing job apathy, apathy, work addiction, work engagement, professional burn-out, and job satisfaction.

Sociodemographic Form

The sociodemographic form covers gender, age, marital status, educational level, and work experience.

Job Apathy

The Job Apathy Scale (JAS) was developed by Schmidt et al. (2017) to examine job apathy as a type of selective apathy characterized by diminished motivation and affect toward one's job. The JAS is a 10-item measure comprised of two subscales: apathetic thought (weak interest in the processes of the job and unwillingness to develop strategies for promoting job efficacy) and apathetic action (investing little emotional energy in job tasks, coworkers, or the organization). The study by Schmidt et al. (2017), conducted on a sample of 248 undergraduates and 442 working students, examined the factor structure, convergent, divergent, and criterion-related validity of the JAS and found that the original measure is psychometrically sound.

The translation of the JAS into Russian was carried out following the standard procedure recommended by Krach, McCreery, and Guerard (2017). In the first step, the author of this study translated the JAS from English to Russian. In the second step, a bilingual expert back-translated the Russian version of the JAS into English. In the third step, the back-translation was matched against the original English version, and the Russian version was then revised after resolving discrepancies. The back-translation was approved by Gordon Schmidt, the author of the original version of the JAS.

Apathy

The Apathy Scale (AS) was developed by Zolotareva (2020b) to measure apathy as a lack of interest in life activities or interactions with others. The scale consists of 12 items (e.g., "I am familiar with situations on the brink of despair"). Each item needs to be assessed using a 4-point scale from 1 ("disagree") to 4 ("agree"). Zolotareva's (2020a) study, conducted on both non-clinical and clinical samples (985 community subjects and 52 depressed patients), suggested that the AS had good psychometric properties.

Work Addiction

The Dutch Work Addiction Scale (DUWAS) was developed by Schaufeli, Taris, and Bakker (2006). Work addiction can be defined as "the compulsion or the uncontrollable need to work incessantly" (Oates, 1971, p. 11). The DUWAS consists of

two subscales: working excessively (“It is hard for me to relax when I’m not working”) and working compulsively (“I often feel that there’s something inside me that drives me to work hard”). Patients were asked to rate their agreement with the statements on 4-point Likert scales from 1 (“almost never”) to 4 (“almost always”). Lovakov (2016) examined the psychometric properties of the Russian version of the DUWAS by using a sample of 1,783 Russian employees and reported that the adapted measure is reliable and valid.

Work Engagement

The Utrecht Work Engagement Scale (UWES-9) was developed by Schaufeli and Bakker (2003) to measure “a positive, fulfilling, work-related state of mind that is characterized by vigor, dedication, and absorption” (p. 4). The UWES-9 comprises 9 items integrated into three subscales: vigor (“At my job, I am very resilient, mentally”), dedication (“My job inspires me”), and absorption (“I feel happy when I am working intensely”) (Schaufeli & Bakker, 2003). Each item should be assessed on a 7-point scale from 0 (“never”) to 6 (“always, every day”). Schaufeli, Bakker, and Salanova (2006) found that the UWES-9 had good psychometric properties. Lovakov, Agadullina, and Schaufeli (2017) analyzed the psychometric properties of the Russian version of the UWES-9 by using a sample of 1,783 employees of a large Russian organization and found that the adapted measure is reliable and valid.

Professional Burnout

The Maslach Burnout Inventory (MBI) was developed by Maslach, Jackson, and Leiter (1997) to assess burnout as “a psychological syndrome of emotional exhaustion, depersonalization, and reduced personal accomplishment that can occur among individuals who work with other people in some capacity” (p. 192). The MBI includes 22 items comprising three subscales: emotional exhaustion (feelings of being emotionally overextended and exhausted by one’s work), depersonalization (an unfeeling and impersonal response toward recipients of one’s service, care, or instruction), and personal accomplishment (feelings of competence and successful achievement in one’s work). Participants were asked to rate their agreement with the statements on 7-point Likert scales from 1 (“never”) to 7 (“daily”). Vodopjanova and Starchenkova (2008) assessed the psychometric properties of the Russian version of the MBI by using a sample of 947 Russian respondents and found that the adapted measure is reliable and valid.

Job Satisfaction

The Job Satisfaction Components Questionnaire (JSCQ) was developed by Ivanova, Rasskazova, and Osin (2012) to measure five job satisfaction dimensions: salary satisfaction, satisfaction with the organization of work, satisfaction with the leadership, satisfaction with the team, and satisfaction with the process and content of work. The JSCQ consisted of 19 items. Each item should be assessed on a 5-point

scale from 1 (“disagree”) to 5 (“agree”). The study was conducted on a sample of 4,708 Russian employees, and the results suggested that the JSCQ had good psychometric properties.

Data Analysis

The data was analyzed using IBM SPSS Statistics 20.0 and AMOS. First, descriptive analysis and internal consistencies were computed. Cronbach's alpha values above 0.6 indicate a satisfying internal consistency (Cronbach & Meehl, 1955). Second, exploratory factor analyses (EFA) and confirmatory factor analyses (CFA) were employed to examine the factor structure of the Russian version of the JAS. The EFA results were assessed by using the Kaiser-Meyer-Olkin measure of sampling adequacy. The CFA results were examined by using several indicators: Satorra-Bentler χ^2 , the comparative fit index (CFI), the root mean square error of approximation (RMSEA), and the standardized root mean square residual (SRMR). The model is considered acceptable for the values of $> .93$ for the CFI, $\leq .80$ for the RMSEA, and $\leq .60$ for the SRMS (Hu & Bentler, 1999). Third, the nonparametric Spearman rank order correlation coefficient (r) was used to examine the convergent and divergent validity of the Russian version of the JAS. Correlations between .40 and .60 are considered as acceptable values (Nunnally, 1994). Fourth, the Student's t-test and the one-way analysis of variance (ANOVA) were used to assess the sociodemographic differences in job apathy. A p-value of $\leq .05$ was regarded as significant.

Results

Participant Characteristics

Two hundred and seventy-five employees (74.5%) responded to the invitation to participate in this study. The mean age of participants was 33.33 years ($SD = 7.85$) and the mean work experience was 4.56 years ($SD = 4.47$). Of these employees, 50.2% were female, 36.1% were single, 52.5% were married, and 11.4% were divorced. The educational level was: 5.5% secondary general education, 15.8% secondary vocational education, 16.9% unfinished higher education, 53.7% higher education, and 8.1% two or more higher educational degrees.

Descriptive Statistics

Descriptive statistics for the measures are presented in *Table 1* and descriptive statistics for the Russian version of the JAS items are presented in *Table 2*.

The Cronbach's alpha values for the apathetic thought scale and the apathetic action scale scores were .86 and .73, respectively. The Cronbach's alpha values are not excellent but are considered as the minimum acceptable criterion of an instrument's internal consistency (Streiner, 2003). Intraclass correlation coefficients (ICC) were .86 (95% CI = .83–.88, $p < .001$) and .73 (95% CI = .68–.78, $p < .001$), respectively, suggesting moderate reliability (Koo & Li, 2016).

Table 1
Descriptive statistics for the measures

Measures	Mean (SD)	Cronbach's α
Job Apathy Scale (JAS)		
Apathetic thought	1.66 (.97)	.86
Apathetic action	1.99 (.99)	.73
Apathy Scale (AS)	1.92 (.55)	.81
Dutch Work Addiction Scale (DUWAS)		
Work excessively	2.71 (.65)	.69
Work compulsively	2.46 (.65)	.71
Utrecht Work Engagement Scale (UWES-9)		
Vigor	3.82 (1.35)	.79
Dedication	4.08 (1.39)	.87
Absorption	4.28 (1.23)	.73
Maslach Burnout Inventory (MBI)		
Emotional exhaustion	2.61 (.93)	.75
Depersonalization	2.31 (.92)	.81
Personal accomplishment	4.26 (.74)	.89
Job Satisfaction Components Questionnaire (JSCQ)		
Salary satisfaction	3.37 (1.04)	.84
Satisfaction with the organization of work	3.54 (.91)	.72
Satisfaction with leadership	3.77 (.84)	.79
Satisfaction with team	4.29 (.64)	.91
Satisfaction with the process and content of work	3.94 (.75)	.87

Table 2
Descriptive statistics for the Russian version of the JAS items

JAS items and subscales	Mean (SD)	Cronbach's α
(01) It is difficult to become motivated in my job.	1.89 (1.08)	.85
(02) I am indifferent toward my job.	1.49 (.87)	.82
(03) I feel mentally checked out from work.	1.78 (1.04)	.83
(04) I am emotionally detached from my job.	1.67 (1.01)	.83
(05) My mood at work could be described as passive.	1.45 (.84)	.82
(06) If I don't find something needed for a work task I give up looking quite easily.	1.37 (.69)	.72
(07) As long as I finish things assigned to me, I usually do not work harder than necessary.	1.72 (1.00)	.67
(08) Producing work of average quality is good enough.	1.70 (.97)	.67
(09) Whenever new tasks present themselves, I let others take them on.	2.79 (1.19)	.68
(10) I refrain from volunteering to take on assignments.	2.40 (1.11)	.69

Factor Structure

The results of the EFA suggested that two factors explained over 58% of the variance. The Kaiser-Meyer-Olkin (KMO) test for measure of sampling adequacy showed 0.887, and Chi square for Bartlett's test of sphericity was significant ($\chi^2 = 1019.369$, $df = 45$, $p < 0.001$). The first factor corresponded to the apathetic thought subscale, and the second factor paralleled the apathetic action subscale.

The results of the CFA yielded a good fit to the data (Satorra-Bentler $\chi^2(39) = 54.029$, $p = .055$; CFI = .985; RMSEA = .038 (95% CI .000 to .060), SRMR = .059), providing construct validity (Perry, Nicholls, Clough, & Crust, 2015). The significant correlation between the two scales of the JAS ($r = .77$, $p < .001$) supported nomological validity (Hagger, Gucciardi, & Chatzisarantis, 2017). The factor loadings for each item are displayed in *Table 3*.

Table 3

Factor loadings for the Russian version of the JAS items

	Subscale item	EFA	CFA
<i>Apathetic thought</i>			
(01)	It is difficult to become motivated in my job.	.70	.65
(02)	I am indifferent toward my job.	.84	.83
(03)	I feel mentally checked out from work.	.76	.71
(04)	I am emotionally detached from my job.	.79	.73
(05)	My mood at work could be described as passive.	.88	.83
<i>Apathetic action</i>			
(06)	If I don't find something needed for a work task I give up looking quite easily.	.55	.69
(07)	As long as I finish things assigned to me, I usually do not work harder than necessary.	.65	.53
(08)	Producing work of average quality is good enough.	.73	.53
(09)	Whenever new tasks present themselves, I let others take them on.	.80	.42
(10)	I refrain from volunteering to take on assignments.	.64	.47

Note. Factor loadings with correspondent factors.

Evidence of Convergent and Divergent Validity

The correlations between the Russian version of the JAS subscales and other measures are presented in *Table 4*. Both apathetic thought and apathetic action were positively correlated with apathy and professional burnout and were negatively correlated with work engagement and job satisfaction, providing convergent and di-

vergent validity evidence of the JAS subscale scores' interpretations (Raykov, 2011). There was no significant correlation between job apathy and work addiction.

Table 4
Correlations between the Russian version of the JAS and other measures

Measures	Apathetic thought	Apathetic action
Apathy	.55 ^a	.45 ^a
Work addiction		
Working excessively	.01	-.08
Working compulsively	.05	-.05
Work engagement		
Vigor	-.53 ^a	-.42 ^a
Dedication	-.63 ^a	-.50 ^a
Absorption	-.46 ^a	-.36 ^a
Professional burnout		
Emotional exhaustion	.53 ^a	.36 ^a
Depersonalization	.57 ^a	.33 ^a
Personal achievement	-.54 ^a	-.42 ^a
Job satisfaction		
Salary satisfaction	-.37 ^a	-.17 ^b
Satisfaction with the organization of work	-.38 ^a	-.16 ^b
Satisfaction with leadership	-.42 ^a	-.22 ^a
Satisfaction with team	-.50 ^a	-.35 ^a
Satisfaction with the process and content of work	-.63 ^a	-.47 ^a

Note. ^a $p < .001$, ^b $p < .01$.

The Influence of Sociodemographic Characteristics on Job Apathy

There were no significant gender differences in job apathy. The analysis using a one-way ANOVA with post-hoc tests revealed a significant effect of age and marital status on job apathy. Younger employees (age 30 and under) are more prone to apathetic action than their older colleagues (age 31 and under) and single employees are less prone to apathetic action than married and divorced employees. Educational level and work experience do not affect job apathy. The findings are presented in Table 5.

Table 5
The influence of sociodemographic characteristics on job apathy

Characteristic	Apathetic thoughts		Apathetic actions	
	Mean (SD)	Difference	Mean (SD)	Difference
<i>Gender</i>				
Male	8.26 (3.67)	t = .09, p>.05	10.16 (3.76)	t = .89, p>.05
Female	8.31 (4.11)		9.79 (3.22)	
<i>Age</i>				
30 and less	8.91 (3.88)	F(2)=1.802, p>.05	10.88 (3.46)	F(2)=5.642, p<.01
31 to 40	7.92 (4.11)		9.31 (3.53)	
41 and more	8.08 (3.18)		9.59 (3.63)	
<i>Marital status</i>				
Single	7.99 (3.73)	F(2)=.742, p>.05	9.44 (3.26)	F(2)=3.386, p<.05
Married	8.63 (4.68)		10.54 (3.33)	
Divorced	8.56 (3.86)		10.59 (4.69)	
<i>Educational level</i>				
Secondary general education	9.67 (3.74)	F(4)=1.003, p>.05	10.81 (3.21)	F(4)=.552, p>.05
Secondary vocational education	8.42 (3.89)		10.28 (3.78)	
Unfinished higher education	8.02 (3.97)		10.24 (3.56)	
Higher education	8.25 (3.79)		9.73 (3.41)	
Two or more higher educational degrees	7.18 (3.65)		9.73 (3.81)	
<i>Work experience</i>				
Less than a year	8.03 (3.82)	F(3)=.846, p>.05	10.08 (3.71)	F(3)=1.467, p>.05
1 to 3 years	8.79 (4.19)		9.58 (3.44)	
3 to 10 years	7.97 (3.83)		10.41 (3.51)	
More than 10 years	7.78 (3.33)		9.09 (3.14)	

Discussion

The aim of this study was to examine the psychometric properties of the JAS with Russian employees. The results of the EFA and CFA showed that the Russian version of the JAS includes the two dimensions of apathetic thought and apathetic action. The first refers to emotional detachment from the job and organization and the little thought or attention being paid to the job or the workplace. The second implies a lack of action in the workplace beyond the absolute minimum. Regarding reliability, Cronbach's alpha values were satisfactory. Regarding validity, this research indicated a significant positive correlation between job apathy and professional burnout, as well as significant negative correlations between job apathy, work engagement, and job satisfaction.

Among prior studies, Blau and Boal (1987) described apathetic employees with low organizational commitment and low job involvement. Empirical studies have confirmed that job apathy is correlated with work engagement (Ugwu, 2019), professional burnout (Schmidt et al., 2017), and job satisfaction (Ladebo, 2005).

Finally, there was no significant correlation in the present study between job apathy and work addiction. In research that may bear on this issue, de Azevedo and da Silva Telles Mathias (2017) found that low quality of life may have negative outcomes, "such as increased absenteeism, lack of interest in activities, increased work-related accidents, apathy, muscle tension, tachycardia, headache, depression, sleep changes, as well as other physical, psychic and social problems" (p. 131). Perhaps quality of life can be a mediator between job apathy and work addiction, because the outcomes mentioned earlier may affect professional motivation (Andrade, Andrade, & Leite, 2015).

This study found that age and marital status are important factors in explaining job apathy. It was found that younger and married employees are more prone to apathetic action than their older and single colleagues. The relationship between marital status and job apathy can be explained by the constructs of family-work conflict and work-family conflict. For instance, Reddy, Vranda, Ahmed, Nirmala, and Siddaramu (2010) found that family-work conflict and work-family conflict lead to lower life satisfaction and greater internal conflict within the family. Furthermore, Warokka and Febrilia (2015) found that work-family conflict reduces job satisfaction, while family-work conflict encourages married employees to leave their jobs. There are no empirical studies on the relationship between job apathy, age, and educational level. However, Haley, Mostert, and Els (2013) suggested that young employees experience higher levels of burnout when compared to older employees, while older employees seemed to be more dedicated than their younger colleagues. Some researchers have written that "low educational level increases apathy and high educational level decreases apathy", and that "apathy increases with younger age and decreases with older age" (Awosan, 2009, p. 115). Guliyev (2018) found that the decline in educational quality has contributed a great deal to public apathy in Azerbaijan. Thus, it can be assumed that the sociodemographic patterns of job apathy are a considerable issue requiring specific research.

The current study has several limitations. First, the research is cross-sectional, and it does not necessarily support the hypothesis that job apathy causes a high level of professional burnout and low levels of work engagement and job satisfac-

tion. The future direction proposed for research is the experimental assessment of outcomes of job apathy among Russian employees. In particular, it appears necessary to examine the role of job apathy in career success, employee efficiency, work-family balance, psychological well-being of employees, and business and personal relationships between employees and management staff. Second, the fairly small sample from a single organization imposes meaningful constraints on the research. The sample for this study does not allow standardization of the JAS. Therefore, future studies should assess job apathy in a representative sample of employees from organizations covering a range of different employment sectors and professional activities. Third, the sample was recruited using the convenience sampling method, whereas both systematic sampling and stratified sampling methods have proven to be more reliable. Standardization of the JAS will enable devising diagnostic standards for apathetic thought and apathetic action scores that can be applied to the Russian population. Finally, a question that was not addressed in the current study is the possibility of social desirability bias in the Russian version of the JAS, although it is known that many measures assessing negative psychological states and features are subject to social desirability bias (van de Mortel, 2008).

Overall, this pilot study has shown that the JAS was reliable and valid in a small sample of Russian employees, arguing for its scientific and practice-oriented potential. The scientific potential of the JAS is that it can be used in organizational psychology research, specifically to validate other questionnaires and mass research on the organizational and psychological characteristics of employees in Russia. The practice-oriented potential of the JAS is that it can be an effective instrument for screening and monitoring job apathy when choosing candidates for a job, making personnel decisions, and performing routine psychological assessment with staff.

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Who Benefits from Environmental Identity? Studying Environmental Identity and Mental Wellbeing in Russia

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Background. Environmental Identity (EID) is a construct that demonstrates the extent to which people perceive themselves as a part of nature, incorporated in it, and defined by it. This concept, despite being relatively new, has proven to be associated with various beneficial traits such as emotional calmness, vigor, reduced stress, increased attentiveness, and positive mental effect (Kals, Schumacher, & Montada; Pretty et al.; Hartig et al., Raanaas et al.). It is also connected with nature conservation behavior and empathy towards people and nature (Scott & Willits; Paul, Hartmann, & Apaolaza-Ibáñez; Tam; Modi & Patel).

While there have been analyses correlating personality traits with other nature-related concepts — e.g., environmental engagement, environmental concern, and ecological behavior (Milfont & Sibley; Wuertz; Markowitz et al.), there is little evidence of which personality traits are connected with Environmental Identity.

Objective. Current research has three objectives: 1) to test the connection between Environmental Identity and Mental Wellbeing on a Russian sample; 2) to discover which personality traits are connected with Environmental Identity; and 3) to find out whether or not these personality traits moderate the Environmental Identity — Mental Wellbeing connection. Three hundred and twelve (312) students, of which 79.2% were females, participated in the study. The majority of participants (90.4%) were undergraduate students at Russian universities under 20 years old.

Methods. To perform our study, we used the Environmental Identity scale, the Short Big Five, and the Warwick-Edinburgh Mental Wellbeing Scale.

Results. We confirmed the connection between Environmental Identity and Mental Wellbeing on a Russian sample. Openness to Experience was the only significant personality trait predictor of Environmental Identity. Moderation analysis did not reveal any personality traits to be significant moderators between Environmental Identity and Mental Wellbeing.

Conclusion. We concluded that the impact of Environmental Identity on Mental Wellbeing does not depend on specific personality traits, suggesting that it has a universal resource function, and is important for Russian people in general in terms of their mental wellness.

Keywords: Environmental Identity (EID); mental wellbeing; nature; personality

Introduction

This study is devoted to the construct of Environmental Identity, which represents a feeling of connectedness to nature as a part of a universal life force. It is based on several theories: 1) A. Schweitzer's theory of reverence for life as a fundamental principle of morality; 2) the Deep Ecology theory of A. Næss (perceiving the world as a fragile balance of ecosystems); 3) the Biophilia Hypothesis of E. Wilson (the urge to affiliate with other forms of life); 4) S. Schwartz's theory of basic human values; 5) S. Clayton's theory of Environmental Identity; and 6) studies conducted by K.P. Tam on the topic of human empathy with natural objects.

S. Clayton (2003) describes Environmental Identity as a personal sense of connection to the natural environment, based on history, similarity, and feelings of connection. She considers it a self-concept that demonstrates the extent to which people perceive themselves as a part of nature, incorporated into it, and defined by it (Clayton, 2003). EID is one of the multitude of facets of personal identities (along with physical, social, gender, ethnic, and vocational aspects). A sense of Environmental Identity is fundamentally a recognition of one's interdependence with a larger collective, be it social or, in our case, ecological.

Nowadays, studies of wellbeing are gaining ever greater popularity, as people seek a way for humankind to feel happy, relaxed, and healthy. While scientists are discovering more and more connections between wellbeing and certain psychological predictors, our study aimed to investigate the role of nature in our mental health, as well as to discover who benefits more from interaction with natural surroundings, and who would prefer other means of restoration.

There has been a substantial amount of work showing the restorative effects of nature on people's mental health (Maller et al., 2005). It has already been shown that green places play a significant role in soothing human consciousness and relieving stress, even if they are only the view outside your window (Hartig et al., 2003, Raanaas et al., 2012; Pretty et al., 2005; Ulrich, 1984). Other research shows that experience with nature evokes a more intrinsic motivation in the human personality, including making people seek more closeness to other human beings and community, exercise generosity, and care less about gaining fame and wealth (Weinstein, Przybylski, & Ryan, 2009).

While people who are connected to nature tend to care more about each other, they also become more concerned about preserving and helping nature (Kals, Schumacher, & Montada, 1999).

There are a number of studies on the predictive role of Environmental Identity, which reveal the connection between positive environmental attitudes (such as studies of environmental concern) and environmental behavior (nature activism, tending to plants and animals) (Scott & Willits, 1994; Paul, Hartmann, & Apaolaza-Ibáñez, 2012; Modi & Patel, 2016). There is also evidence that a high sense of belonging to nature is linked to more pro-environmental and protective behavior, a sense of efficacy, and feeling responsible for nature (Mobley, Vagias, & DeWard, 2010; Hoot & Friedman, 2010; Nisbet & Zelensky, 2011).

It has also been found that having a high Environmental Identity boosts wellbeing in a broad sense: Hinds and Sparks (2009) suggested that a sense of personal

meaning, obtained from being in the natural environment, is an important aspect of obtaining a sense of Emotional Wellbeing. Regarding the emotional sphere, there are reports that people with salient Environmental Identity are calm, and exhibit increased mindfulness (Howell et al., 2011). There are also studies reporting a link between EID and happiness, life satisfaction, positive emotional affect, vigor (Capaldi et al., 2014), and stress reduction, along with increased attention span (Mayer et al., 2009). Recent studies on Environmental Identity confirm the connection between EID and empathy between people (Clayton, Nartova-Bochaver, & Irkhin, 2019); these results are in line with the findings of K.P. Tam (2013), P.W. Schultz (2000), and Shelton & Rogers (1981).

According to the authors of the Warwick-Edinburgh Mental Wellbeing Scale, Mental Wellbeing, often referred to as positive mental health, covers affective and psychological functioning from both the hedonic and eudemonic perspectives (Tennant et al., 2007). The evidence suggests that the positive effects of experience with nature, condensed in Environmental Identity, account for most of the effects of the listed perspectives of Mental Wellbeing. Hence, we were interested in finding out whether EID connects to Mental Wellbeing, which became the first hypothesis of our study.

It is hard to overestimate the significance of nature for Russian culture, in which nature has strong symbolic, and even religious, meaning, and is masterfully appealed to in literature, music, and visual arts (Gurlenova, 1998; Asaf'ev, 2007; Men'shikova, 2015). In some works of classic Russian literature, the authors use nature as the medium for conveying their philosophical insights; nature's role in a narrative is often as important as that of the characters (Krasnosel'skaya, 2008).

Russia is a country with diverse natural environments. Over the course of its history, it experienced an abrupt transition from a very agricultural country to a heavily industrialized one, and is still dealing with the ecological consequences of that today. Those events have had a noticeable impact on the perception of nature, resulting in a mixture of perspectives ranging from the spiritual to the exclusively materialistic (Oldfield, 2017). Due to these differences, it is important to investigate human-nature relationships in Russia, and to determine whether or not nature is important for the Russian people in terms of their Mental Wellbeing.

Hypothesis 1: Environmental Identity is positively connected with Mental Wellbeing.

Earlier in the paper, we noted various studies of nature's effects on wellbeing. However, we discovered that there has been very little research on this connection in Russia. One of the significant papers demonstrates the soothing effect of nature on death acceptance, and attributes growth in the sense of wellbeing in these cases to the beauty of nature (Chistopolskaya et al., 2017). The current study aims to close the gap in Environmental Identity research in Russia.

Our next objective was to find out whether Environmental Identity is connected to specific personality traits. While analyses have been conducted correlating personality traits with other nature-related concepts — *e.g.*, environmental engagement, environmental concern, and ecological behavior (Milfont & Sibley,

2012; Wuertz, 2015; Markowitz et al., 2012), these have provided little evidence of which personality traits are connected with Environmental Identity. The above-listed studies revealed that nature-related concepts consistently correlate with Openness to Experience (Markowitz et al., 2012), Agreeableness (Wuertz, 2015), and often with Conscientiousness (Milfont & Sibley, 2012). In the current research, we planned to investigate whether certain personality traits are also important in connection with Environmental Identity.

Hypothesis 2: Environmental Identity is positively connected with certain personality traits.

It is known that specific personality traits are connected with Mental Wellbeing, e.g., Emotional Stability (reversed Neuroticism) and Extroversion have been identified as the strongest positive predictors of Mental Wellbeing (Gale et al., 2013). In the study of the tripartite model of Mental Wellbeing, Extroversion, and Emotional Stability have been identified as the strongest positive predictors of Subjective Wellbeing, while Agreeableness and Conscientiousness were also significant, but weaker predictors (Joshnloo, 2019).

So far, we have posited the direct connection between Environmental Identity and Mental Wellbeing; however, we are also interested in finding out whether there is an indirect effect. As mentioned above, there is scientific evidence showing the positive effects of the natural environment. However, we cannot state that the effects are beneficial for everyone in equal measure, regardless of their personality. The idea behind our second hypothesis could be worded as follows: “Do all people benefit from nature in the same way?” It is hard to expect a definitive result, given that we have yet to find the correlates of Environmental Identity among personality traits in the current study. Yet, other studies have shown that personality traits are important for understanding similar nature-related concepts (Lee et al., 2015; Di Fabio & Kenny, 2018; Di Fabio & Rosen, 2019).

Hypothesis 3: Personality traits moderate the connection between Environmental Identity and Mental Wellbeing.

We planned to investigate the link between Environmental Identity and Mental Wellbeing, and observe whether or not the Big Five personality traits act as moderators in these relationships. Finding the specific personality traits that boost or suppress the connection between EID and Mental Wellbeing could provide useful data for further studies on Environmental Identity, as well as for practical areas such as nature-guided therapy (Burns, 1998).

Methods

Participants

Three hundred and twelve (312) students participated in the study; 79.2% of them were females. The majority of the participants (90.4%) were undergraduate students at Russian universities and under 20 years old. There were also middle-aged people between 20 and 40 years old (9.3%), and people between 40 and 60 years old (1%). Those who did not complete their questionnaires were excluded from the study.

Procedure

We used the Environmental Identity Scale, the Short Big Five Personality Test, and the Warwick-Edinburgh Mental Wellbeing Scale.

Social-demographic parameters of age, gender, ethnicity, and residence were combined into a block of short factual questions: “State your gender, ... level of education, ... residence, ... ethnic group.” We also included several questions to evaluate the participants’ nature experience: how frequently they walk in the park, travel to the countryside, or donate to the environmental organizations.

To measure the relationship to nature, we chose the Environment Identity (EID) scale. This scale was developed by Susan Clayton (Clayton, 2003; Clayton, Nartova-Bochaver, & Irkhin, 2019). It utilizes the concept of natural identity, defining it as a way in which people form their self-concept based on a sense of connection to a non-human environment, which means they consider nature to be an important part of themselves and vice versa. The scale consists of 24 statements, each of which represents a different aspect of the relationship between humans and nature. Each respondent was asked to think carefully about each of the statements, visualize them, and answer how well the statement reflects their position regarding their lifestyle (Strongly disagree, disagree, agree, or strongly agree). The EID is a well-known scale with a high level of reliability which has been tested in previous research (Olivos, & Aragones, 2011).

Mental Wellbeing was measured by the Warwick-Edinburgh Mental Wellbeing Scale (WEMWBS). It was developed to facilitate the monitoring of Mental Wellbeing among the general population, and to evaluate projects, programs, and policies which aim to improve Mental Wellbeing (Tennant et al., 2007; Nartova-Bochaver, Podlipnyak & Khokhlova, 2013). The WEMWBS is a 14-item scale with five response categories; added together, they comprise a single score which ranges from 14 to 70. All the items are worded positively and cover both the emotional and functional aspects of Mental Wellbeing, thereby making the concept more accessible. The scale has been widely used nationally and internationally for monitoring and evaluating projects and programs, and investigating the determinants of Mental Wellbeing.

To measure personality traits, we chose the Short Big Five questionnaire, which is used worldwide as a tool for measuring the five most important personality dimensions; these are Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism (the opposite of the Emotional Stability) (Lang et al., 2011). The scale consists of 14 items which describe people’s typical mental states (*e.g.*, “I feel empowered,” “I am interested in something new,” “I am relaxed”). The answers are assessed on a 5-point Likert scale, which registers how often those states occur (from “never” to “usually”). We chose the short version in order to shorten the time needed for completion of the survey.

The questionnaire was created and distributed online via the 1.ka online platform. The analyses were conducted via IBM SPSS Statistics 26 software and a PRO-CESS (ver. 3.5) plug-in for moderation analysis (Hayes, 2012).

Results

The sample is described in *Table 1*.

Table 1
Descriptive characteristics of the participants

Variable	Categories	N	Percent	Cumulative percentage
Gender	Male	65	20.8	20.8
	Female	247	79.2	100
Age	< 20	282	90.4	90.4
	21-40	29	9.3	99.7
	41-60	1	.3	100
Ethnicity	Russian	273	87.5	87.5
	Caucasian	10	3.2	90.7
	Central Asian	5	1.6	92.3
	Other	19	6.1	98.4
	Not specified	5	1.6	100
Residence	City	259	83	83
	Suburbs	43	13.8	96.8
	< 1 hour away from the closest city	8	2.6	99.4
	> 1 hour away from the closest city	2	.6	100

Note. $N = 312$

First of all, we checked whether there was a positive connection between Environmental Identity and Mental Wellbeing. There was a significant correlation between the EID and WEMWBS scales ($r_s = .23$, $p < .01$), telling us that relatedness to nature is connected with Mental Wellbeing, as we hypothesized.

Table 2
Correlations between Big Five traits and EID, WEMWBS scales (Spearman's rho)

Variable	Extraversion	Agreeableness	Conscientiousness	Stability	Openness
Environmental Identity	.11	.13*	.07	-.01	.26**
Mental Wellbeing	.36**	.14*	.29**	.39**	.21**

Note. *Significant at $p < .05$; **Significant at $p < .01$

In describing their Big Five personality traits, the respondents showed high levels of Openness ($M = 5.22$, $SD = 1.01$), Conscientiousness ($M = 4.95$, $SD = 1.34$) and Agreeableness ($M = 4.28$, $SD = .98$), with average scores on Extraversion ($M = 3.92$, $SD = 1.47$) and Emotional Stability (reversed Neuroticism) ($M = 3.52$, $SD = 1.44$). We then added the Big Five traits into a correlation analysis, the results of which are displayed in the *Table 2*.

Statistical analysis revealed significant positive correlations between the degrees of EID and the Big Five traits of Agreeableness and Openness to Experience, partially supporting our second hypothesis. The Agreeableness correlation was less significant ($p < .05$) than Openness to Experience ($p < .01$). All Big Five traits were correlated with Mental Wellbeing. These results are in line with the bulk of the studies, which were thoroughly described in the meta-synthesis study on personality predicting overall health and Mental Wellbeing by Strickhouser, Zell, & Krizan (2017).

In order to find the significant predictors among the Big Five traits and Environmental Identity, we conducted a multiple regression analysis. A significant equation was found ($F(1, 314) = 19.106$, $p < .000$), with an R^2 of .06. The participants' predicted Environmental Identity was equal to $2.237 + .163$ (Openness). Environmental Identity increased .16 points for each point of Openness score. Openness was the only significant predictor of Environmental Identity.

We then proceeded to moderation analysis. In order to meet the required assumptions, we checked the data for outliers and removed them; there were four such cases. The outcome variable for the analysis was Mental Wellbeing, and the predictor variable was Environmental Identity. We have processed each of the Big Five traits as moderator variables. However, the interactions between Openness [$B = .03$, 95% C.I. ($-.07, .12$), $p = .59$], Conscientiousness [$B = .02$, 95% C.I. ($-.04, .09$), $p = .47$], Extraversion [$B = -.04$, 95% C.I. ($-.11, .02$), $p = .20$], Agreeableness [$B = .04$, 95% C.I. ($-.03, .12$), $p = .26$] and Emotional Stability [$B = -.01$, 95% C.I. ($-.06, .04$), $p = .58$] were not found to be statistically significant. The results of the moderation analysis with Openness alone as a moderator variable are displayed in *Figure 1*.

We also conducted a correlational analysis and compared mean scores between several items on the social-demographic block of questions (*Table 3*):

Table 3

Correlations between EID, WEMWBS, and social-demographic data (Spearman's rho)

Variable	Age	Residence	Park walks/ week	Countryside trips/week	Env. organizations membership
Environmental Identity	-.078	.04	.25**	.29**	.23**
Mental Wellbeing	.03	-.06	.21**	.22**	.04

Note. **Significant at $p < .01$

Age and residence were unrelated to Environmental Identity and Mental Wellbeing, while the number of park walks and countryside trips per week were con-

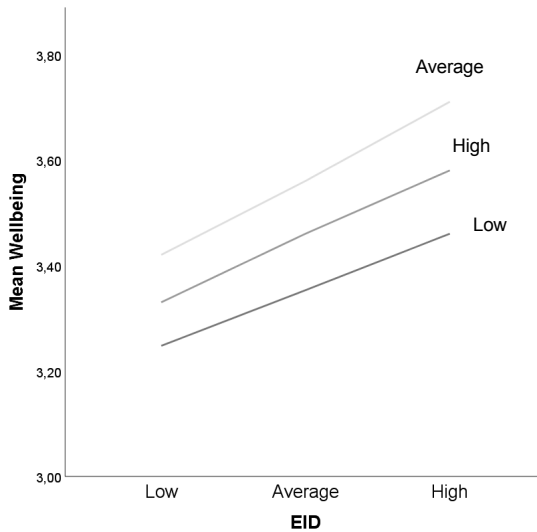


Figure 1. Moderation analysis results with Openness

nected with both EID and WEMWBS. The number of environmental organizational memberships positively correlated only with EID, but not WEMWBS.

We conducted a single samples t-test to compare Environmental Identity scores for the male and female respondents. There was a significant difference between EID scores for male ($M = 2.89$, $SD = .64$) and female respondents ($M = 3.16$, $SD = .71$); $t(310) = -2.83$, $p = .005$. On the contrary, there were no significant differences in Mental Wellbeing scores between the sexes.

ANOVA results showed no significant differences in either Environmental Identity or Mental Wellbeing among ethnic groups; however, the groups were very unevenly represented in our sample (See *Table 1*).

Discussion

As we expected, we confirmed a link between Environmental Identity and Mental Wellbeing, which can mean several things. For example: Urban life, which attracts an increasing number of people, often deprives them of interaction with nature, creating a so-called “nature deficit disorder” (Louv, 2008), and raising their need for it. Nature is often valued as a source of beauty and inspiration (Capaldi et al., 2017); it helps a person to restore attentiveness (Kaplan, 1993) and to recover from stress (Ulrich et al., 1991). Nature is also a valuable resource, which is even demonstrated by the housing market; people tend to pay a higher price for the dwellings with a view of natural landscapes (Jim & Chen, 2009; Cavailhès et al., 2009; Wen, Xiao, & Zhang, 2017).

Our findings suggest that Environmental Identity is important for Russian people in terms of their mental wellness and is in line with similar findings in other countries (Elings, 2006; Hinds & Sparks, 2011; Capaldi et al., 2015; Capaldi et al., 2017). Moreover, the positive connection between Mental Wellbeing, Environmental Identity, and experience with nature (walks in the parks, trips to the country-

side) indirectly supports the idea of the negative effect of urbanization in a narrow sense, and signifies the importance of green areas in megapolises (Hartig et al., 2003, Raanaas et al., 2012; Pretty et al., 2005; Ulrich, 1984).

Our second hypothesis was that Environmental Identity is connected with certain personality traits. We have found that EID correlates significantly with Openness to Experience and Agreeableness traits; however, the correlations were weak. Regression analysis confirmed that Openness was the only significant predictor of Environmental Identity. As we discussed, similar nature-related constructs (environmental concern, connectedness to nature, dispositional empathy with nature) often correlate with Openness to Experience, Agreeableness, and Conscientiousness (Milfont & Sibley, 2012; Tam, 2013; Abdollahi et al., 2017; Strickhouser, Zell, & Krizan, 2017; Di Fabio & Kenny, 2018). The current study provides the first evidence of the relationship between the Big Five personality traits and EID; this follows the tendency of other natural constructs, but needs additional confirmation by other studies.

The results of the moderation analyses were insignificant, which tells us that personality traits have not influenced the connection between Environmental Identity and Mental Wellbeing.

Conclusion

The main goals of the current study were to test the link between Environmental Identity and Mental Wellbeing on a Russian sample, and investigate the role of personality traits in relation to Environmental Identity, and its benefits for Mental Wellbeing. We have successfully confirmed the connection between Environmental Identity and Mental Wellbeing on a Russian sample. Russian people are known for being close to nature from their cultural heritage: the admiration of nature is found in famous works of art by I. Aivazovsky, K. Korovin, A. Kuindzhi, and many others, including many world-famous Russian writers and poets, who have incorporated very emotional and symbolic images of nature into their masterpieces. Our findings suggest that Environmental Identity is important for Russian people in terms of their mental wellness, and are in line with similar findings in other countries (Elings, 2006; Hinds & Sparks, 2011; Capaldi et al., 2015; Capaldi et al., 2017).

While other nature-related constructs have been found to be connected to personality traits, no evidence of Environmental Identity had been found to have that link. Our study closes this gap: we have discovered that Environmental Identity is connected to Openness and Agreeableness personality traits, with Openness being the only significant predictor of EID.

Overall, we have not confirmed our hypothesis regarding the role of certain personality traits as a resource function for Environmental Identity: none of the interactions between Big Five traits and EID were statistically significant. This could mean that humans benefit from being close to nature and identify themselves with it regardless of their personality. On the other hand, our findings are limited by our sample, which appears to have been very homogeneous. So far, it is hard to give a straight answer as to whether personality traits influence the relationship between Environmental Identity and Mental Wellbeing. Perhaps a more varied sample, with more diverse personality profiles, could help to address this specifically.

Limitations

The majority of our sample were Russian undergraduate students, which substantially limits the explanatory power of the study. While the short Big Five inventory allowed us to reduce the survey item count, it could have made the sample too homogeneous to find distinct moderators among personality traits. Perhaps we should use the original 44-item inventory in the future to get more diverse results.

Future research should also include people from a wider age range, with different experiences of nature, including both metropolis and countryside dwellers, active explorers of nature (tourists, survivalists, farmers), and people who are less enthusiastic about nature. It is also important to utilize different methods of measurement (e.g., the Temperament and Character Inventory by R. Cloninger, the 16PF Questionnaire by R. Cattell, etc.) for profiling. With these improvements, we hope to find even more fascinating nuances of the human-nature relationship, and perhaps an easier way for people to find happiness in nature.

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SOCIAL PSYCHOLOGY

The Relationship Between Human Values and Acceptability of Corruption in Russia and Greece

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Background. In both Russia and Greece, corruption is a serious problem. In Greece, the level of corruption is one of the highest in the EU, and in Russia it is one of the highest in the world.

Objective. Three questions were addressed: (1) Are basic human values related to the acceptability of corruption for individuals in both countries? (2) Are these relationships the same in Russia and Greece? (3) Are levels of acceptance of corruption the same in Russia and Greece?

Design. Following S.H. Schwartz's model, four higher-order values were assessed: Conservation versus Openness to Change, and Self-Transcendence versus Self-Enhancement. The studies were conducted in Russia ($N=256$) and Greece ($N=469$). To analyze the associations of individual values with the acceptability of corruption, we constructed a multigroup regression model using structural equation modelling software.

Results. Identical relationships were found in the two countries. Conservation values and Self-Transcendence were negatively related to the acceptability of corruption, whereas Self-Enhancement was positively related to the acceptability of corruption. Russians scored higher on acceptance of corruption. Implications are discussed.

Conclusion. The acceptability of corruption seems to be interrelated with basic human values across different cultural conditions. Our study shows that the relationships between higher-order values on the one hand, measured in the framework of Schwartz's values model, and the acceptability of corruption on the other, are identical in Russia and Greece, suggesting that the acceptability of corruption is related to personal values.

Keywords:
acceptability
of corruption;
basic human
values;
Russia;
Greece

Introduction

Corruption is broadly defined as the abuse of official power or authority for personal gain (Lambsdorff, 2006); it is a complex social phenomenon with a long history. The prevalence of corruption is not limited to specific countries; the problem of corruption remains relevant for economically developed as well as low- and middle-income countries. Although corruption is sometimes seen as “grease for the wheels of the economy”, it is widely viewed as having a negative impact on society. Corruption has been studied from many perspectives (for example, political, sociological, and economic), but not often from a psychological perspective; we focus on individual psychological factors in corruption by examining the role of individual values in accepting corrupt behavior.

Corruption is associated with a number of structural characteristics of society, such as its political, economic, institutional, and sociocultural factors; among the latter, the literature focuses mainly on cultural values. Cultural values “justify” the ways that social institutions function. Cultural norms and values are related to individual behavior through their impact on the ethical perception of situations, and therefore seem to be important factors for the interpretation of corrupt behaviors (Davis & Ruhe, 2003). Individual characteristics have been studied only recently in the context of corruption analysis (Dong, Dulleck, & Torgler, 2012). Sociodemographic characteristics such as educational background, income, and gender have also been addressed. Yet, the role of these characteristics and of psychological variables associated with corruption has not yet been systematically studied. Some authors claim that personality traits such as arrogance and narcissism can be sources of corrupt behavior (Judge, Piccolo & Kosalka, 2009), whereas honesty restricts it. Remarkably, existing studies do not take into account the associations of personal values with attitudes towards corruption, despite the broadly known motivational role of values with respect to attitudes and behavior (Schwartz, 1992). Studies of individual and psychological characteristics tend to pay more attention to the individual correlates of corrupt behavior of the bribe taker. These aspects are important, yet it is also important to analyze the psychological characteristics of people who are willing to pay bribes, because these people support the culture of corruption and help maintain an environment that fosters corruption.

Acceptability of corrupt relations is expressed by a set of positive individual attitudes towards corruption as a means to achieve goals by bribing public officials. Identification of attitudes towards corruption may be an effective indicator of the corruption of a society. Attitudes towards corruption can be divided into two broad groups: attitudes of the (potential) bribe taker and attitudes of the (potential) bribe payer. The focus of this study is on the attitudes of the latter and also the general tolerance towards bribery of both takers and payers. The acceptance of corrupt relations by the individual, or simply “acceptability of corruption” in general, is employed as the dependent variable of this study. The concept has to do with the cognitive component of positive attitudes towards corruption, taking into consideration the “classic” three-component view of the structure of attitudes, consisting of cognitive and affective components, along with predispositions to action (behavioral elements). It is also associated with Katz’s functional theory of attitudes, which conceptualizes the role of attitude as a value-expressive function occurring when

a certain acceptance allows an individual to express an important value; to paraphrase Katz (1960, p. 170), individuals derive satisfaction from expressing attitudes appropriate to their personal values and to their self-concept. Thus, values and attitudes are intertwined in such a way that attitudes express the relevant values and often contribute to self-development or Self-Transcendence in general beliefs. Thus, both values and attitudes often seem to refer to an internally consistent system of beliefs that tend to express evaluative preferences oriented in the same direction.

Values. Values include the basic principles and beliefs regarding what is desirable and important, which are shared by the majority of people in a society and guide behavior across situations. According to Schwartz's (1992) theory of values, they are defined as motivational, cross-situational goals, serving as guiding principles in people's lives. In its original version, the theory described 10 basic human values: power, achievement, hedonism, stimulation, self-direction, universalism, benevolence, tradition, conformity, and security. More recently, Schwartz developed a refined theory of fundamental individual values (Schwartz et al., 2012), which includes 19 values and provides wider heuristic and predictive opportunities than the original theory of 10 values, although it is compatible with the structure of the original theory. The refined theory describes a motivational continuum of 19 values, depicted in a circle, with potentially different motivational meanings.

Schwartz's (1992) original theory postulates a circular order of the values, primarily based on the opposition or compatibility between certain sets of values. The values can be represented in a two-dimensional structure of four higher-order values included in two bipolar value sets: The first set consists of the *Openness to Change* values, which include self-direction and stimulation, versus the *Conservation* values, which include security, conformity, and tradition, reflecting a conflict between values towards change, and voluntary self-restriction, as well as a preservation of traditional practices and defenses. The second set of values is *Self-Transcendence*, which includes benevolence and universalism, versus *Self-Enhancement*, which includes power and achievement. This higher-order set of values reveals a conflict between acceptance of other people as equals and concern for their welfare, on the one hand, and a focus on individual success and dominance on the other (Schwartz et al., 2012). There is no work that compares psychological factors related to corruption across cultures. Schwartz's value model has been extensively tested in cross-cultural studies and provides a good framework to examine differences in the acceptability of corruption. For reasons explained below, we conducted this study in Russia and Greece.

Corruption and Values in Russia and Greece

We analyzed the relationship between values and the acceptability of corruption in Russia and Greece. Why did we select these countries? In both of them, corruption is a serious challenge, though to different extents. According to Transparency International 2016, Russia ranked 131 out of 176 countries in terms of the Corruption Perceptions Index (indicating a high level of perceived corruption), whereas Greece ranked 69. At the same time, Greece is one the most corrupt countries in the European Union (Oltheten, Sougiannis, Travlos, & Zarkos, 2013). Greece (44)

has a lower Corruption Perceptions Index¹ than other countries in the region, such as Italy (47), Romania (48) and Hungary (48) (Transparency International, 2016). Preliminary discussions with experts about our methodology for evaluating the acceptability of corruption showed that many assumptions proposed in this methodology will be well understood in these two countries (Russia and Greece).

If we look at the history of relations between Russia and Greece, it is clear that these countries have many strong *cultural ties* which, in the case of Russia, are weaker with other European countries (despite closer economic relations with them). The Christian Orthodox religion came to Russia from Greece.

In the tenth century, during the reign of Vladimir I the Great, Kievan Rus went through what is called “the Baptism of Rus”, an event of crucial importance that laid a solid foundation for Russian-Greek relations. Religion seems to affect the modes of living of both religious and non-religious people. More than 90% of Greeks consider themselves Orthodox Christians. Studies have found that in cultures with more hierarchical religious systems (such as Catholicism, Orthodoxy, and Islam), corruption is more widespread than in cultures with more egalitarian and individualistic religions (such as Protestantism and Anglicanism) (Treisman, 2000).

Also, at the invitation of Vladimir I the Great, the first Slavic literary language was developed by Cyril and Methodius from the Byzantine Empire’s province of Thessalonica in the ninth century. Such relations suggest that the worldviews of Russians and Greeks have similar elements, which may ultimately be reflected in their attitudes towards corruption.

Russia and Greece also have similarities in ecocultural contexts. The two countries have similar links between regional variability in pathogen prevalence and cultural variability along the individualism/collectivism dimension (Fincher, Thornhill, Murray, & Schaller, 2008).

In addition, we compared higher-order values in Russia and Greece (ESS, 2010, since in that year both countries participated in the survey). The results of the comparison are presented in *Table 1*.

Table 1
Means of Value Sets (Mean Centered) in Russia and Greece

Variable	M		SD		<i>t</i>	<i>df</i>	Cohen’s <i>d</i>
	Russia	Greece	Russia	Greece			
Openness to Change	.37	.29	.71	.66	-4.36***	5212	-.12
Self-Enhancement	.16	.39	.67	.64	12.48***	5271	.34
Conservation	-.22	-.16	.60	.60	3.42**	5271	.09
Self-Transcendence	-.37	-.55	.53	.46	-12.85***	5106	-.36

Note. ****p* < .001, ***p* < .01

Table 1 shows differences between Russia and Greece in higher-order values. However, in all cases Cohen’s *d* is low, which suggests that the significance of some

¹ A higher Corruption Perceptions Index means less corrupt, a lower Corruption Perceptions Index means more corrupt.

differences is due to the large sample sizes (more than 2,000 respondents in each country) used in the ESS (2010). Therefore, these differences are weak, so we can say that Russia and Greece are close in values. The levels of individualism in Russia and Greece, based on G. Hofstede's findings², are equally low (35 and 39 points, respectively).

Four main factors form the cultural background of corrupt behavior in Greece: geography, historical legacy, and the nature of Greek politics and religion (Danopoulos, 2014). Greek geography has prevented people from having much contact or communication. In the 19th century, when the independent Greek state was established (after Ottoman occupation), it was formed by rather separated communities of people with their own cultural traditions and customs, characterized by strong in-group identities and particularism. Modern Greek society has inherited these cultural features, along with a broad political clientelism that often promotes corruption. Therefore, when it comes to finding a job, securing a loan, or gaining admission to a university, Greeks tend to use their strong in-group ties and/or strong ties with a particular political group (Kalyvas, 2015).

Among the most likely cultural factors behind corruption in Russia are the highly hierarchical religious system, high level of collectivism, and high-context culture. Orthodoxy as a highly hierarchical religion is associated with a high level of corruption, because Orthodoxy externalizes responsibility and defers this to authorities (in contrast to religions like Protestantism that emphasize individual responsibility for all behaviors). In high-context cultures (such as those of Russia and Greece), a significant part of communication takes place on the informal level, and success of negotiations can depend more on friendly relations than on formal aspects. In collectivistic cultures, people often may not approve of whistle-blowing, even in case of dishonest behavior within the community (Zhuravlev & Sosnin, 2013).

Research Hypotheses

In the present study we tested whether the acceptability of corruption was different between Russia and Greece and examined whether the association between values and the acceptability of corruption was the same in the two countries. Below we argue in more detail that the four higher-order values in Schwartz's (2012) theory can be taken to predict corruption acceptability (rather than the full set of related lower-order values). We also suggest that the study hypotheses about the relationships between values and acceptability of corruption are the same for Russia and Greece, due to the two countries' cultural similarities.

Hypothesis 1:

Self-Enhancement is positively related to the acceptability of corruption.

Values of Self-Enhancement are related to individuals' intentions to satisfy their own interests (Table 1); these underline the importance of personal social status, position in society, aspiration to leadership, and possession of resources. The achievement value is among the Self-Enhancement values and is related to the suc-

² <https://www.hofstede-insights.com/country-comparison/greece,russia/>

cess associated with social standards and, as a result, social acceptance (Schwartz et al., 2012). The value of achievement, which could presuppose social acceptance, is probably negatively correlated with the acceptability of corruption. Studies show that wielding power increases the risks of corrupt behavior (Bendahan, Zehnder, Pralong & Antonakis, 2015). In cultures where inequality, subordination to power, and intentional display of force are widespread, corruption is common (Basabe & Ros, 2005; Karstedt, 2007). Dissatisfaction with one's family finances weakens the influence of achievement on the acceptability of corruption and increases this acceptability (Pande & Jain, 2014). Moreover, in the calculation of the higher-order value of Self-Enhancement, power values are very important; therefore, we expect that individuals who value Self-Enhancement would accept corrupt behavior in their pursuit of power and achievement.

Hypothesis 2:

Self-Transcendence is negatively related to the acceptability of corruption.

Values of Self-Transcendence reflect humanistic intentions focusing on the equality, justice, tolerance, and well-being of one's group members (Table 1). This higher-order value includes the values of universalism and benevolence. People who appreciate the values of Self-Transcendence feel part of the moral community; they try to be reliable and trustworthy members of society, and care for the welfare of members of the society (Schwartz et al., 2012). Accordingly, they will endorse the view that, if its members avoid corruption and behave honestly, everyone will profit (Carson & Prado, 2016). Seleim and Bontis (2009) found that higher levels of human orientation practices in society are associated with lower levels of corruption. Societies with a strong human orientation emphasize caring, compassion, and personal relations; all these practices are based on the preference of Self-Transcendence values (Benevolence–Caring, Universalism–Concern, Universalism–Tolerance) in the society. Therefore, if values of Self-Transcendence are important for an individual, then corrupt behavior is likely to be disapproved.

For Openness to Change values, we do not formulate a specific hypothesis, as there is evidence for both a positive and a negative association. These values imply an individual's readiness to engage in new things and a desire for change based on freedom of action (Schwartz et al., 2012). We suggest that a strong endorsement of these values is associated with stronger feelings of freedom to think and act. On the one hand, such freedom may be associated with legal violations, including corruption; on the other, openness is positively associated with human and economic development (Welzel & Inglehart, 2010) and other activities that help societies to change and become more attractive for their members, which can be expected to be negatively associated with corruption, as the latter is characterized by secrecy and individual gain.

Hypothesis 3:

Conservation is negatively associated with the acceptability of corruption.

Conservation presupposes self-restraint, order, and avoidance of change. The higher-order value of Conservation includes the motivational values of security at the personal and societal level, tradition, conformity–rules, and conformity–interper-

sonal value. Values of security at the personal and societal level are associated with the desire for safety in an individual's immediate environment and safety and stability in the wider society (Schwartz et al., 2012). In this context, corruption is a risky behavior, because if it is exposed, corrupt persons will face sanctions and may be publicly humiliated as people who violated life's harmony and personal security. In addition, conservative people want a stable and predictable social environment, and corruption challenges this predictability. Accordingly, values of security may be negatively associated with the acceptability of corruption.

The values of "conformity-rules" and "conformity-interpersonal" refer to an individual's intention to comply with rules, laws, and formal obligations, as well as avoidance of upsetting or harming other people. Studies show that the desire to follow the rules is negatively correlated with the acceptability of corruption (e.g., Sundstrom, 2016). The value of tradition could have an ambiguous link with the acceptability of corruption. For example, bribery might be grounded in the past and constitute a crucial part of tradition. In general, it may be assumed that if Conservation is important for an individual, then he/she is inclined to follow rules and laws and would find corrupt behavior unacceptable.

Hypothesis 4:

The level of acceptability of corruption is higher in Russia than in Greece.

We expect to find differences in the acceptability of corruption between Russia and Greece. According to the Transparency International (2016), Russia and Greece have different scores on the Corruption Perceptions Index (CPI). We expect that this perception is relevant for acceptability; therefore, we expect that acceptability of corruption is higher in Russia than in Greece (Transparency International, 2016).

Method

Instruments. We used a number of existing or specially developed scales to analyze (1) the basic individual values in these two countries; and (2) the degree of acceptance of corrupt behavior.

Values. We used the new version of the PVQ-RR questionnaire that includes 57 questions to assess the 19 individual values (Schwartz et al., 2012). Participants responded to each item on a six-point scale, ranging from "not at all like me" to "very much like me". Then we calculated the average level for each of the four higher-order values. Cronbach's α for the four higher-order values were (Russia/Greece): Self-Enhancement (.87/.84), Self-Transcendence (.81/.83), Openness to Change (.76/.79), and Conservation (.86/.88).

Acceptability of corruption. We adapted the scale developed by Kubiak (2001) for measuring the acceptability of different types of everyday corruption by individuals. The Acceptability of Corruption Scale items, developed for the specific purpose of this study on the basis of the Kubiak method, assess the degree of approval of corrupt behavior (see Appendix). Situations were described in such a way that the forms of corrupt behavior were relevant for Russia and Greece. Respondents were asked to evaluate eight situations describing different types of corrupt behavior using a five-point scale (from "not acceptable" to "acceptable").

Then, the overall average was calculated for the scale. Cronbach's α values for the acceptability of corruption were adequate: Russia: .84, Greece: .75. A demographic section was added at the end of the questionnaire addressing gender, age, educational background, occupation, nationality, religious identity, and level of religiosity.

Participants. The study was conducted in 2015–2016. Snowball sampling was used. In total, 725 respondents filled out the questionnaire, 256 were ethnic Russians, and 469 were ethnic Greeks. Initially, our samples were larger; however, after the data collection, we used only data of ethnic Russians and ethnic Greeks. This gave us the opportunity to exclude additional effects that could be introduced into the results by representatives of other ethnic groups (*Table 2*).

Table 2
Characteristics of the survey sample

Country	N	%		Age
		Male	Female	(M/SD)
Russia	256	34.0	66.0	35.1/9.8
Greece	469	40.0	60.0	30.3/13.7
Total	725	37.8	62.2	32.0/12.7

Education in the group of Russian respondents was: secondary and secondary vocational education, 11%; higher, 71.1%; PhD, 12.5%; no answer, 5.5%. Education in the group of Greek respondents was: secondary and secondary vocational education, 27.7%; higher, 71.2%; PhD, 1.1%.

Russian respondents' employment status was as follows: employee, 53.1%; self-employed/entrepreneur, 30.5%; education (student), 1.6%; housework/looking after children, 4.7%; military service, 2.7%; retired, 2.0%; unemployed, 1.6%; other, 3.9%. Greek respondents' employment status was as follows: employee, 32.0%; self-employed/entrepreneur, 7.9%; education (student), 46.1%; housework/looking after children, 1.7%; military service, 2.1% retired, 3.2%; unemployed, 4.7%; other, 2.3%.

All respondents were Orthodox Christians. In addition, we measured the level of religiosity in two samples, using an 11-point scale (from 0 to 10) to measure the level of religiosity of our respondents. The mean level of religiosity in the Russian sample was 4.58 ($SD=2.64$) and the mean level of religiosity in the Greek sample was 4.14 ($SD=2.77$). This difference was statistically significant ($t(545.6)=2.07$, $p<.05$).

Procedure. The questionnaire was back-translated by native speakers in both groups. Sample details are found in *Table 2*. The Greek sample was collected in Athens. The Greek data were selected via an electronic version of the questionnaire in a Google Form format, created for the purpose of this study. Each participant was required by the format to answer all questions; it was also possible to stop answering before all the items were completed, save the answers, and continue later. The total sample was selected through the snowball method; an initial group of

87 university students in the field of Psychology filled out the questionnaire, then recruited their friends, neighbors, parents, and other family members. They asked them, either face-to-face or by a phone call, to participate in the research study, and to those who agreed they sent the research link via their e-mail accounts, with a reminder after approximately a week.

The Russian sample was collected in Moscow through an electronic version of the questionnaire (we used the OneClickSurvey platform – <https://www.1ka.si/d/en>). The strategy of data collection was the same as in Greece, and the sample was also selected through snowballing. We asked students to fill out the questionnaire and then distribute the link among their relatives and friends and ask them to distribute the link.

Results

Invariance of the Acceptability of Corruption Scale. In the first phase of analysis, the Acceptability of Corruption Scale was examined (Table 3).

Table 3

Invariance of the Acceptability of Corruption Scale (Russia and Greece)

<i>Model</i>	<i>CFI</i>	Δ <i>CFI</i>	<i>RMSEA</i>	<i>AIC</i>	<i>chi square</i>	<i>df</i>	<i>p</i>
Unconstrained ^a	.997		.018	72.43	12.43	10	.257
Measurement weights ^b	.997	.000	.017	69.09	17.09	14	.251
Measurement intercepts ^c	.812	.185	.114	238.93	196.93	19	<.001

Note. CFI — comparative fit index; AIC — Akaike information criterion; RMSEA — root mean square error of approximation. ^a Configural invariance; ^b Metric invariance. ^c Scalar invariance.

We ran a Multigroup Confirmatory Factor Analysis assuming one latent factor (acceptability of corruption), which included eight indicators. Then we tested the invariance of the loadings and intercepts in both samples. In a first analysis, we used MGCFAs to test the invariance of the whole version of the scale (comprising 8 items). We obtained an unsatisfactory metric invariance. Then we analyzed the factor loadings of items in the Russian and Greek samples and found that three of the items had very different factor loadings. We removed these three items from the scale and tested the invariance again. The metric invariance was satisfactory in the 5-item version of the scale. Accordingly, we believe that it is necessary to use a 5-item version of the scale (as we did in our study), because only this version had a good metric invariance.

Looking through the situations that reduced the invariance of whole instrument, we found that all of these were related to the illegal obtaining of favors for relatives. We can assume that in Russia and Greece there may be a different attitude to such situations and in one of these two countries (most likely in Russia) illegal favors for relatives may not always be considered by ordinary people as corruption, but rather as useful and sometimes even necessary assistance to relatives. Thus,

these situations can be understood differently in Russia and Greece, as the analysis of invariance has demonstrated. Therefore, we deleted these items from our instrument in the study. As a result, five out of eight situations were retained for further analyses: 3, 4, 6, 7, and 8 (see Appendix). Table 2 presents fit statistics for the various levels of invariance and the final model showed metric invariance.

Mean Differences in Acceptability of Corruption and Values. Table 3 shows the results of the significance test of the differences between the mean scale scores. The results of the test should be interpreted with caution, as we did not find scalar invariance. To assess the significance of the mean differences, we used a *t*-test, as well as Cohen's *d* effect size. The acceptability of corruption was higher in Russia than in Greece. Mean differences of values scores reached significance only for Conservation and Self-Transcendence; the Greek sample scored higher on both values (Table 4).

Table 4
Means of scales and group differences

Variable	M		SD		<i>t</i>	<i>df</i>	Cohen's <i>d</i>
	Russia	Greece	Russia	Greece			
Acceptability of Corruption	2.28	1.46	1.00	.63	11.93***	370	1.24
Openness to Change	4.82	4.78	.60	.64	.86	557	.07
Self-Enhancement	3.53	3.62	.97	.89	-1.23	488	.11
Conservation	4.11	4.48	.77	.74	-6.33***	508	.56
Self-Transcendence	4.27	4.78	.72	.67	-9.17***	490	.83

Note. ****p* < .001.

Relations of the Four Higher-Order Values and the Acceptability of Corruption. The correlations of all measured variables in both samples before control for background variables (age, gender, and education) are displayed in Table 5.

Table 5
Bivariate correlations among the measured variables (Russians above the diagonal/Greeks below the diagonal)

Variables	1	2	3	4	5
1. Acceptability of Corruption	1	-.32***	-.06	.24***	-.23***
2. Self-Transcendence	-.41***	1	.33***	-.03	.43***
3. Openness to Change	-.07	.38***	1	.36***	-.13*
4. Self-Enhancement	.28***	-.15**	.30***	1	.03
5. Conservation	-.20***	.35***	.05	.17***	1

Note. **p* < .05. ***p* < .01. ****p* < .001.

To analyze the associations of individual values with the acceptability of corruption, we constructed a multigroup regression model using structural equation modelling software (Figure 1); all variables in this model were controlled for background variables in previous regression analyses (age, gender, and education). As can be seen in Table 6, all fit indices pointed to the adequacy of the structural weights model.

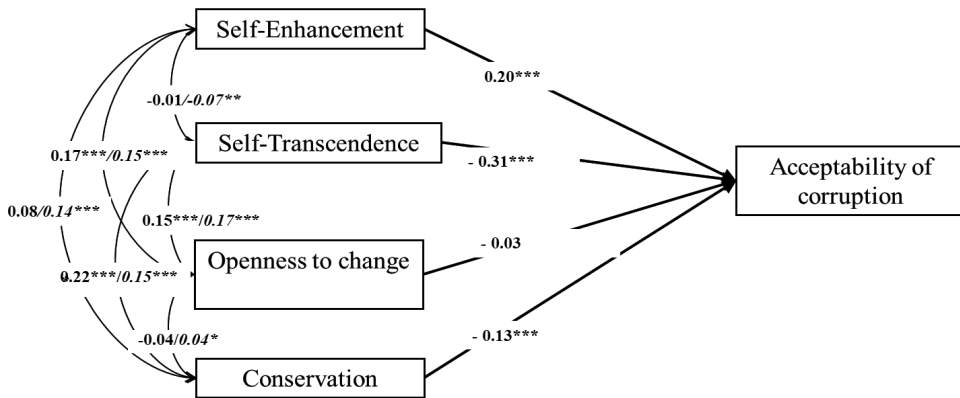
Table 6

Invariance for the model of relationships of the four higher-order values and the acceptability of corruption (controlled for age, gender, and education)

Model	CFI	ΔCFI	RMSEA	AIC	chi square	df
Unconstrained ^a	.992		.05	62.42	6.41*	2
Structural weights	.990	.002	.04	59.41	11.04	6
Structural covariances	.958	.032	.05	67.86	37.86***	15

Note. CFI — comparative fit index; AIC — Akaike information criterion; RMSEA — root mean square error of approximation. ^a — Configural invariance. * — $p < .05$; *** — $p < .001$.

So, identical links between values and acceptability of corruption were found for both countries. Our findings suggest that the links between individual values and the acceptability of corruption are the same for Russia and Greece (Figure 1).



$R^2 = .12$, $\chi^2/df = 1.90$, CFI = .992, PCLOSE = .710, RMSEA = .04

Figure 1. Model of relationships of the four higher-order values and the acceptability of corruption (universal both for Russia and Greece, unstandardized weights)

Notes. a) controlled for age, gender and education; b) covariations among values for Russia are shown in regular type and for Greece in italic (Russia/Greece).

As expected, corruption was more acceptable in Russia than in Greece. Studies have shown that people living in countries with a lower level of corruption have a higher level of corruption perception (Nezlek et al., 2019) or view corruption as less acceptable in the terms of the present study. At the same time, according to

the obtained model, there was no difference in the relationships between the four higher-order values and the acceptability of corruption between Russia and Greece. Higher-order values that seem incompatible with corruption are Conservation and Self-Transcendence. The higher-order value contributing most to the acceptability of corruption is Self-Enhancement (comprising the lower-order values of power-resources and power-dominance). The relationship between Openness to Change and acceptability of corruption was not statistically significant (*Figure 1*). Thus, hypotheses 1, 2, and 3 were confirmed. No significant associations were found for Openness to Change. According to the obtained model, individual values explain 12% of the total variance for the acceptability of corruption. Thus, the relation between individual values and the acceptability of corruption is significant, but values do not seem to be the main determining factor.

Discussion

The main questions of our study were: (1) Are basic human values related to the acceptability of corruption at the individual level? (2) Are these relationships the same in Russia and Greece? (3) Are levels of acceptance of corruption the same in Russia and Greece? The results of our cross-cultural study showed that acceptance of corruption is higher in Russia than in Greece. These results correspond to data of Transparency International (2016) about actual corruption. We also evaluated which basic values were associated with levels of acceptance of corruption in Russia and Greece. We found mean differences in scores only for Conservation and Self-Transcendence; the Greek sample scored higher on both values. Using Multigroup Structural Equation Modelling, we found that the higher-order values that presumably prevent the acceptability of corruption are Conservation and Self-Transcendence. The higher-order value that statistically contributes most to the acceptability of corruption is Self-Enhancement, while Openness to Change was not statistically correlated. All these associations were identical for Russia and Greece, suggesting that the same values are drivers of the acceptability of corruption in both countries.

The finding that among the four higher-order values only Self-Enhancement values are positively associated with the acceptability of corruption may suggest that endorsement of corrupt behavior is associated mostly with the individual's desire to achieve success and to influence others. Previous studies have underlined that people in powerful situations tend to estimate their own importance as much higher than the importance of other people. They often believe that norms of morality adopted "by everybody" and meant "for everybody" are not necessarily applicable to them. Possession of power seems to be associated with lowering one's moral standards, possibly due to an increased likelihood that the individual will attempt to manipulate others (Kipnis, 2006).

High acceptance of Conservation values seems to go along with low acceptance of corruption. People who value their own safety, safety in their immediate environment, and their stability in the wider society try to maintain and preserve cultural, family, or religious traditions and to comply with rules and laws that prohibit corrupt behavior. They probably feel that participating in corrupt activities is associated with the risk of self-exposure and sanctions, thereby reducing their sense

of security. Trying to follow the socially accepted rules and norms is incompatible with the endorsement of and engagement in corrupt activities, since corruption is against the law. Corruption is considered to be an immoral set of behaviors that prevent justice in society and contradict the religious canons. Specifically, some studies indicate a negative relationship between the level of corruption and the proportion of religious people (Chang & Golden 2007). So, both the values of conformity–interpersonal, and of tradition, as basic components of the higher-order Conservation values, are associated with low acceptability of corruption.

In modern Greek culture, during 30 years of developing social welfare (1974–2004) and before the current economic crisis starting in 2009, many powerful groups have managed to directly influence the socio-political affairs of the country. They have also managed, through specific political strategies, to manipulate the benefits that great parts of the Greek population acquired, which produced more and more corruption and also a growing indifference to corrupt activities. It is not surprising that in 2013, Greece ranked 80th in the world on the Corruption Perceptions Index (CPI) of Transparency International (Konstantinidis & Xezonakis, 2013).

The scope of grand corruption in Russia is massive. The General Prosecutor of Russia in a public interview (Chaika, 2016) assessed the economic damage inflicted by corrupt actions as reaching 43.8 billion rubles (approximately 625 million euros). According to the Judicial Department of the Supreme Court, the number of persons sentenced for corruption in Russia increases annually on average by 1,500. In 2012, some 6,000 people were convicted for corruption crimes in Russia and in 2015 the figure was 11,500. Many of these persons were condemned for giving bribes (2,000 in 2012 and 5,200 in 2015).

Our results show that, despite the differences in values and corruption between the Greek and Russian samples, the correlation between values and the acceptability of corruption is the same for both samples. These associations might apply to various other countries, but they could also be interpreted as a consequence of the cultural similarities between Russia and Greece described above. Religion is an important source of cultural similarities between Russia and Greece; religious affiliation and language are the “cultural background” of corruption (Houston & Graham, 2000) and religion can be used as an instrument of social control (Adenugba & Omolawal, 2014). Acceptance of corruption by individuals may be influenced, directly or indirectly, by a common religious faith and customs. For example, in contrast to Protestantism, which has not incorporated a system of donations in exchange for God’s mercy (Houston & Graham, 2000), Catholicism adopted the custom of offering donations to the church which, from the perspective of an outsider, can be regarded as a kind of “bribe” to God in exchange for his blessing. Orthodox Christianity also has a long tradition of such donations.

The Greek Orthodox Church, the institution behind the dominant and national religion in Greece, retains its institutional and symbolic position of power in all social, educational, and economic affairs of the country, and this is an important indicator of the acceptance of its power, somewhat similar to the role of the Catholic Church in Ireland or Poland, which may influence acceptance of corruption (Kalyvas, 2015).

Direct or indirect exposure to corruption could be an important factor in internalizing positive attitudes towards corruption. The association between values and the acceptability of corruption was similar in Russia and Greece, although the level of corruption and the degree of higher-order values acceptance appear to be different. In general, individuals who are socialized in societies with high levels of corruption seem to have a greater likelihood of being exposed to and engaging in corrupt behavior than those who grow up in a society with a low level of corruption (Barr & Serra, 2010).

Limitations

The main limitation of this study is related to its sampling frame. We employed convenience samples. Therefore, we do not claim applicability of our results to all Greeks and Russians. Yet, it is telling that our findings largely complied with theoretical expectations, which suggests a rather broad applicability of our findings across groups in both countries. Moreover, we studied (only) two European countries, which have the same religion and share historical bonds. Therefore, we do not claim that the results can be generalized to other countries. Further research that will employ clusters of countries with high scores versus low scores of acceptability of corruption could help to further clarify the relationship between individual higher-order values and positive attitudes towards corruption.

Another limitation is that this study focuses on the perceptions of corruption, but not behaviors per se, whereas cross-cultural differences between perception and behavior can be significant (Kafetsios & Nezlek, 2012).

Conclusion

The acceptability of corruption seems to be interrelated with basic human values across different cultural conditions. Our research results underline that the relationships between higher-order values, measured in the framework of Schwartz's values model, and the acceptability of corruption are similar in Russia and Greece, suggesting that the acceptability of corruption is related to personal values. Power and dominance, both linked to self-development and Self-Enhancement, are more associated with acceptance of corruption, whereas values of Conservation and Self-Transcendence, which are linked to maintaining cohesion and unity in society, are more associated with rejection of corruption. Thus, acceptance of corruption seems to be associated more with a focus on individual freedom to act independently and less on rules and self-restrictions, whereas rejection of corruption is more associated with a focus on positive group relations and respect for others.

Higher-order values of Openness to Change do not seem to be good predictors of the acceptability of corruption in Russia and Greece. This finding is in line with what was mentioned in the introduction, that openness has a certain ambiguity vis-à-vis corruption. It could be conjectured that Openness to Change would be more predictive if a distinction were made between transparency (negatively associated with acceptability of corruption) and tolerance for activities that serve individual interests, even if these are detrimental for society as a whole (positively correlated with acceptance of corruption).

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Appendix

Acceptability of Corruption Scale

How acceptable to you are the types of behavior below?

	Not acceptable	Most likely not acceptable	Neither acceptable nor unacceptable	Most likely acceptable	Acceptable
1 A state employee accepts for work in a public office someone from his/her family or friends, and not another candidate with higher qualifications. <i>(was removed)</i>	1	2	3	4	5
2 One member of a married couple offers money to the surgeon to operate on her husband (or his wife) ahead of those on the waiting list in a state hospital. <i>(was removed)</i>	1	2	3	4	5
3 It normally takes between 3 and 6 months to issue building permits. A businessman offers a public servant money to get a permit within 2 weeks.	1	2	3	4	5
4 A driver has committed a serious violation, and to avoid losing his driver's license, he offers money to the policeman.	1	2	3	4	5
5 A parent offers money to the director of a prestigious school to accept his son without further testing. <i>(was removed)</i>	1	2	3	4	5
6 A businessman offers money to the tax inspector to avoid a fine.	1	2	3	4	5
7 A patient offers money to a doctor in order to give him a definitive diagnosis that will allow him to obtain benefits.	1	2	3	4	5
8 A parent offers money to the director of a public kindergarten so that his child will be accepted out of turn.	1	2	3	4	5

Practical Universalism and Multiple Social Categorization: Can Different Social Biases Counterbalance Each Other?

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Background. Normative universalism involves making evaluations and decisions according to a universal rule, irrespective of one's affiliation and relations with other people. Social categorization is the main cognitive mechanism underlying deviations from universalism. When there are several salient alternative social identities, there is a possibility of counterbalancing effects among different social biases, leading to unbiased decisions or judgments (*i.e.*, practical universalism).

Objective. The present study investigates whether multiple categorization can induce alternative social biases, which counterbalance each other and produce universalistic solutions at both the individual and group levels.

Design. A socially heterogeneous sample of Russian participants (N=300) made a series of binary choices in a hypothetical situation posing two social alternatives, each of which was presented as a set of social categories unrelated to the task: country, gender, age, and sector of employment.

Results. When faced with a series of choices involving multiple social categorization, the participants tended to pursue different types of biased strategies. The most frequent were country ingroup preference (31.7%) and low status aversion (17.7%). Practical universalism was identified in 2% of cases. Group-level results showed strong ingroup preference and high-status preference, which are two independent sources of bias. At the same time, the diversity of individual strategies allowed the participants to identify conditions (specific combinations of social attributes) under which the biases counterbalanced each other and resulted in universalistic solutions.

Conclusion. Individuals respond strategically to multiple categorization. Universalistic strategies are seldom applied at the individual level, but the diversity of individual strategies provides opportunities for universalistic solutions at the group level.

Keywords:
universalism;
particularism;
multiple social
categorization;
social bias;
social status

Introduction

Universalism is a normative idea, which calls for making judgments, evaluations, and decisions according to a universal rule, irrespective of one's affiliation and relations with other people (Parsons, 1937; Trompenaars & Hampden-Turner, 2012; Ma & McLean Parks, 2007). Universalism means that when some of a person's social attributes are not relevant to a given situation or task, such information about them should be ignored during evaluations or decision-making. Universalistic reactions imply that a rule be applied in the same way irrespective of a target's social attributes, which are not relevant for the task or situation.

Particularistic reactions allow exceptions from a universal rule depending on a target's social characteristics or personal relations with the actor. A typical example is a police officer stopping a car driver for speeding. According to a universalistic approach, the driver should be fined no matter who he/she is. However, in real life, deviations from this rule can often be made when a driver is a friend of the police officer, a celebrity, or has some other meaningful social attributes. In a narrow sense, particularism means that a given universal rule is violated due to the existence of personal relations between individuals (*e.g.*, when a policeman lets a driver exceeding the speed limit go because he/she is a friend). In a broader sense, particularism leads to the violation of a rule because the object of judgment falls into some specific social category (*e.g.*, a driver is female)

Universalism is not reducible to "rights" or the allocation of rewards, but implies the readiness to follow a specific rule, standard of behavior, or evaluation. According to T. Parsons (1937), universalism-particularism is treated as a "standard variable" characterizing various levels of action systems: cultures, institutions, and individual dispositions. Although empirical studies of universalism-particularism *per se* are relatively infrequent, they demonstrate the effects of particularism at various levels and in different domains.

Comparative studies conducted by F. Trompenaars and C. Hampden-Turner (2012) revealed important differences between countries in the degree to which people accept particularistic violations of the rules. Italian economists consider universalism-particularism as a latent factor underlying social capital, and use several proxies (*e.g.*, trust or associational activity) to study the differences across countries and regions (DeBlasio, Scalise, & Sestio, 2014). Ma and McLean Parks (2007) proposed a measure of particularism (in its narrow sense) at the individual level. Importantly, the concept is applicable to institutions as well as to individuals or cultures. For example, science is proposed to be an institution stressing universalism as its functionally necessary principle (Merton, 1957), but that does not mean that it always functions in universalistic manner (*e.g.*, Fisman et al., 2018).

Universalism as a normative principle should be distinguished from universalism as a characteristic of a solution to a given situation provided by an individual, collective, or institutional actor. The two types can be called normative and practical universalism, respectively. Whereas the former indicates that an actor should apply the standard in one and the same way, the latter shows whether it is actually applied that way in a given situation. Basically, normative universalism is about intentions and normative orientations, and practical universalism is about actual outcomes. Beyond the question of whether and when universalism should be ex-

pected and promoted in individual or collective behavior, there is a question of how and under what conditions it can actually be implemented.

Although the notion of universalism is very abstract and transcends disciplinary boundaries, it is directly related to social psychological notions of social bias, prejudice, and discrimination, which are the well-known effects of social categorization. Asymmetrical cognitive, attitudinal, and behavioral reactions to people with different social attributes are widely documented and seen as deeply rooted in an individual's psychological, cognitive, and neural make-up (e.g., Tajfel et al., 1971; Oakes, 2003; Van Bavel & Cunningham, 2011; Kawakami, Amodio, & Hugenberg, 2017; Liberman, Woodward, & Kinzler, 2017).

As a psychological process, social categorization produces particularistic effects by making some groups preferable to others. Although such effects can differ and be moderated by many factors, there is a general tendency to prefer one's own group and make decisions in favor of it, *i.e.*, ingroup favoritism — a tendency which is well-documented but remains controversial in terms of its theoretical explanation (Balliet, Wu, & De Dreu, 2014; Greenwald & Pettigrew, 2014; Everett, Faber, & Crockett, 2015). As a cognitive process, social categorization determines the way people classify others into groups or categories, thus providing the lines along which the universalistic principle is violated.

A lot of effort has been spent in social psychology to identify the possible ways of reducing prejudice and discrimination, and thus promote fairer reactions and behaviors that correspond to the principle of universalism. Potential strategies include: reducing explicit prejudice via normative and institutional pressure; retraining and attitude change; increasing intergroup contacts; individuation; establishing common identity; and others, up to direct brain stimulation (Oscamp, 2008; Sellaro et al., 2015). What these strategies share is the intention to change long-term personal dispositions and improve intergroup relations. Setting aside the question of how realistic such hopes are, given the evolutionary logic underlying social categorization, there is also the question of how universalistic solutions can be obtained when eliminating biases and prejudice is impossible — probably a more typical and realistic situation.

One way that universalistic solutions in social situations may still be possible is through the cognitive complexity of most social situations and, particularly, multiple social categorizations (Stangor et al., 1992; Crisp & Hewstone, 2006; Kang & Bodenhausen, 2015). Multiple social categorization — *i.e.*, classification of a target according to several distinct attributes — is considered a possible way to reduce prejudice, as it permits increased individuation and the counterbalancing effects of several single categorizations (Crisp & Hewstone, 2007; Prati et al., 2016). When a situation involves different identities, the biases associated with them can overlap and partially compensate each other, and the very cognitive complexity of social targets can reduce bias. At the same time, such positive effects of multiple categorization are not inevitable. Hewstone et al. (2006, p.282) point to three possible factors reducing its effectiveness: the functional dominance of one social dimension; the correlation of categories; and group threat.

Most studies of multiple categorization focus on its ability to reduce prejudice in one specific social dimension, such as race or ethnicity. However, in many real-life situations, there is often no a priori information on which social dimension can

become salient and influence actual decisions, such as in hiring a worker. Thus, it is not always clear how interventions targeting one specific social attribute will affect other available social categorizations. Furthermore, the ability to make universalistic decisions does not necessarily mean the reduction of prejudice toward a specific social group. That ability can be counterbalanced by other biases and prejudices or by the top-down control mechanisms (Cunningham et al., 2004).

Two other limitations of existing studies on multiple categorization are worth mentioning. First, most of them are conducted in Western societies, which are generally more universalistic and provide larger normative pressure on individuals to control their actual decisions. Second, by looking for strategies and interventions to reduce individual prejudices, psychological studies seem to ignore group-level solutions. Although social categorization underlies the psychology of intergroup relations as such (Oakes, 2003), the ability to find a universalistic solution to a social problem is not always due to changes in attitudes or behaviors. Social situations involving biases are not necessarily situations of intergroup relations, as in the case of making expert judgments on a politically sensitive issue. Thus, involving fundamental mechanisms of social categorization may extend the psychology of intergroup relations to find solutions to important social problems without improving intergroup relations as a necessary prerequisite.

Assuming that there can be different possible solutions in a situation involving multiple categories, one can expect that the aggregation of individual reactions at the group level can lead to more universalistic solutions. The present study addresses the afore-mentioned issues and investigates the possibility of universalistic solutions via different social biases counterbalancing each other, on either an individual or group level.

Methods

Participants

A socially heterogeneous sample of 300 individuals (61% female, mean age = 36.7, SD = 10.6) from Russia participated in a web-based study. Russia has a specific cultural profile favoring deviation from universalism. In a study by Trompenaars and Hampden-Turner (2012), Russia was classified as a highly particularistic culture according to all the three measures used by the researchers. In the GLOBE study, Russia showed a significant prevalence of ingroup collectivism over institutional collectivism, which can also indicate the preference for particularistic solutions (House et al., 2004). Additionally, in the Hofstede model, Russia was characterized as very high in the Power Distance dimension, which can be another source of particularism based on social status (Hofstede, Hofstede, & Minkov, 2010). In sum, Russia is an example of a culture which is rather unfavorable for universalistic judgments and decisions.

The sample consisted of people from different regions and strata of Russian society. Participants were recruited via an online panel provided by an independent service provider, IOM Anketolog (<https://anketolog.ru>), and were paid for their participation. All the materials used in the study were moderated and approved by the service provider, and collected according to its rules. The mean time spent for filling the forms was 6:28 min, ranging, with one exception, from 2:18 to 32:13 min.

Procedure

The design of the study was based on the forced-choice paradigm, which resembles the conjoint analysis frequently used by marketers to identify customers' preferences (Green, Krieger, & Wind, 2001). Participants made a series of choices between two alternatives in a hypothetical situation. The task was described in the following way: "Imagine that mankind contacted a different civilization and someone has to represent and speak on behalf of all humans on Earth. Below you will be presented with several pairs of potential candidates to be such a representative. All candidates are represented by numbers and will be displayed in random order. Each of them is described by four characteristics <...>. Assuming that all the candidates' other characteristics which are important for this role are comparable, who do you think is most fit for this role?"

The four social descriptors included a candidate's country, gender, age, and sector of employment. The "Country" descriptor was used to manipulate two distinct social attributes: ingroup/outgroup (I/O) based on nationality or citizenship, and social status. I assumed that countries differ in how they are perceived by lay people, and that the hierarchical dimension is an essential part of this perception. I used two measures to identify the social status of a country: GDP and GDP per capita. The use of objective measures of economic power instead of subjective perception relies on the assumption that potential respondents have sufficient common knowledge to perceive the relative status of a country. I computed a list of all countries using GDP per capita as a multiplier for GDP. The countries were then classified into three categories:

- High-status outgroup (HSO): countries ranking 10 or more positions higher than Russia in the list (Germany, Japan, USA);
- Same-status outgroup (SSO): countries ranking within 10 positions of that of Russia (Argentina, Brazil, Turkey).
- Low-status outgroup (LSO): countries ranking 10 positions lower than Russia (Albania, Algeria, Azerbaijan, Cambodia, Colombia, Ghana, Jordan, Kenya, Moldova, Paraguay, Philippines, Sri Lanka, Vietnam).

In selecting specific countries, I also followed two additional rules. First, I tried to select countries which met the criteria mentioned above on both initial measures as well as a joint one. Second, I relied on common sense to make sure that the target country would be adequately perceived by a typical Russian participant, and avoided countries which could be perceived as too ambiguous (*e.g.*, China), or too exotic. Finally, to minimize the possible effect of specific stereotypes associated with a particular country, each category was represented by several countries. For HSO and SSO, only a limited number of countries are available for inclusion, whereas many more countries fit the criteria for LSO.

Country and gender are the primary social dimensions compared in the study. As there are four different "Country" categories (Ingroup, HSO, SSO, LSO) and two gender categories (male (M) — female (F)), 13 different types of choices involving at least one ingroup-outgroup difference can be analyzed: IM/IF; IM/HSOM; IM/HSOF; IM/SSOM; IM/SSOF; IM/LSOM; IM/LSOF; IF/HSOM; IF/HSOF; IF/

SSOM; IF/SSOF; IF/LSOM; and IF/LSOF. To directly test the effect of social status, four additional types of comparison have been included: HSOM/LSOM; HSOM/HSOF; HSOF/LSOM; and HSOF/LSOF. Each of the 17 types of choice appeared twice in the study, in order to counterbalance the order of presentation (left-to-right or up-or-down, depending on a user’s device) and increase the reliability of the results. In sum, each participant made 34 choices among 68 different social profiles. An example of a choice situation is presented in *Figure 1*.

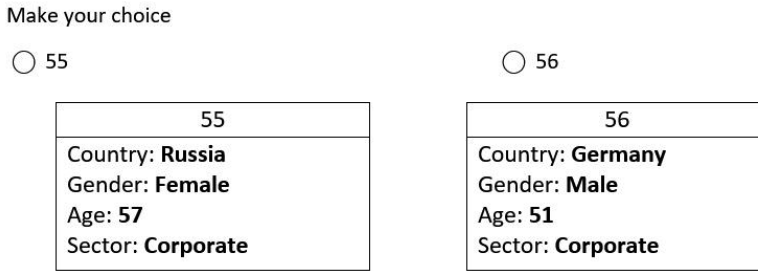


Figure 1. Example of a choice

Age and sector were two other social descriptors included in each profile to make the choice more complex and plausible. Both of them were included for each profile based on the randomization procedure, and were fixed for every participant. The age descriptor was randomly determined from a range between 35 and 70 years. The lower limit of 35 years old was chosen to make the choice situation more plausible (for example, 35 years is minimum age for becoming president in Russia). Candidates’ sectors of employment were randomly selected from the three possible options: “corporate,” “governmental/public,” and “non-governmental.”

The core assumption of the design was that not all social attributes in the profiles are relevant to the task. The instructions stressed that all relevant characteristics of candidates are equivalent, and that the focus on “the interests of all humans on Earth” can function as a kind of recategorization, which posits a higher-order common identity. It was assumed, that under the given conditions, not all the descriptors were relevant to the task and all the candidates should be treated equally, according to a universalistic approach (practical universalism). All systematic violations then should be treated as biases (particularistic solutions).

Measures

According to the key assumption of the study, the universalistic solution for a given situation implies equal chances for each candidate to be selected for the role. Unlike normative universalism, which is related to personal predispositions, practical universalism involves actual outcomes of situations involving social categorization. Thus, a simple measure of universalism is the absence of systematic bias across multiple choices. In statistical terms, this means that the universalistic solution is equivalent to the null hypothesis (none of the social descriptors affect the prospects for each alternative). The present design allows us to analyze the effects of social categorization on both a group and individual level.

Group-Level Measures

According to the null hypothesis (*i.e.*, universalistic solution), all candidates have equal chances to be selected by the participants. If the group as a whole prefers one option in each pair, it should be treated as a measure of bias, *i.e.*, particularism. The larger the difference between the group solution and the choice by chance, the more particularistic it is.

First, each of the 34 choices can be analyzed in terms of acceptance or rejection of the null hypothesis using a one-sample binomial test. Second, the frequencies of choices can be combined to measure the preference for each specific social category of interest.

Every choice situation can be described in terms of a specific social preference: primary ingroup over outgroup, primary ingroup over HSO, male over female, etc. If a group as a whole behaves in a universalistic manner, the expected frequency of each chosen alternative is 50% (of all the situations where such a choice is possible). Any deviations from this number averaged across all the relevant social comparisons is a simple and direct measure of particularism.

Individual-Level Measures

Individual preferences for a specific social group can also be measured directly, by computing all choices in favor of each category of interest (primary and gender ingroup, high or low status, etc.). The degree of favoritism (particularism), *i.e.*, the preference for a particular category for each dimension, is measured as

$$P_{cat} = \text{Number of } cat \text{ choices} - n/2,$$

where *cat* is a specific social category of interest (ingroup, high status, male, etc.), and *n* is the total number of choices when this category has an alternative (*e.g.*, I vs O, HSO vs LSO, etc.)

Here, $P_{cat} = 0$ is equivalent to a universalistic solution, and the more it deviates from 0, the larger is a participant's specific social preference. Positive numbers mean positive discrimination in favor of *cat*, whereas negative numbers mean negative discrimination. Individual strategies can be identified according to preferences for specific social categories.

Results

Group-Level Results

The average response frequencies across all 34 choices diverged from the universalistic solution by 14.78 percentage points. This means that, on average, one of two alternatives has been chosen 64.78% of the time, and the other, 35.22% of the time. This number is the direct overall measure of particularism in a given situation.

To understand the main sources of such a deviation from a universalistic solution, similar measures were calculated for each social attribute (*Table 1*).

Table 1

Mean violations from universalistic solutions for key social categories across all the choices in which they were compared

Contrast (bias type)	Deviation from the expected distribution 'by chance' across all the relevant choices, percentage points	Mean absolute value of all the deviations across relevant choices, percentage points
I > O	13.12	14.32
I > HSO	6.53	8.80
I > SSO	13.29	14.61
I > LSO	19.54	19.54
HSO > LSO	13.91	16.34
M > F	3.63	15.38
Gender I > O	3.79	15.38
Younger > Older	1.65	14.78
Corporate sector bias	-0.15	16.45
Governmental sector bias	0	17.33
NGO sector bias	0.28	14.03

Notes: I = ingroup; O = outgroup; HSO = high-status outgroup; SSO = same-status outgroup; LSO = low-status outgroup; M = male; F = female. Positive meanings of the "deviation" variable mean discrimination in favor of the first element of the contrasted categories; negative numbers show bias for the second one. The absolute mean value of deviation indicates how biased the choices, included in the computation, are on average.

As shown in Table 1, primary ingroup-outgroup distinction based on affiliation with a country, and perceived social status were the two main sources of particularism in the sample. The participants, on average, preferred candidates from their own country and candidates of higher status, even though the task implied taking the perspective of all humankind. The fact that the ingroup preference increased gradually when contrasted with high-, same- and low-status outgroups, confirmed that the method of country classification by status was effective.

The group also demonstrated a moderate preference for male candidates and, at the same time, for a gender ingroup, along with some preference for younger candidates. There was no effect of the employment sector.

The fact that at least three social attributes contributed to the group's particularism implies that, under some conditions, particular biases can counterbalance each other and produce a universalistic solution. One-sample binomial test ($\alpha=0.5$) allowed me to estimate the group's solution for each of 34 choices. In 26 cases, the null hypothesis was rejected, *i.e.*, the group decisions were particularistic. However, the remaining eight cases could be treated as universalistic. Table 2 describes key information about these choices.

Table 2

Key social attributes of universalistic choices

Main contrast	Age difference, years	Younger social group	Sector difference (1=yes, 0 = no)	Outgroup country
IF-HSOM	6	HSOM	0	Germany
IF-HSOM	13	HSOM	0	Japan
IF-HSOF	20	HSOF	1	Germany
IF-HSOF	9	HSOF	0	USA
IM-HSOM	14	HSOM	0	Germany
IF-SSOF	33	SSOF	1	Brazil
LSOF-HSOF	9	LSOF	1	Moldova-USA
LSOM-HSOM	13	LSOM	0	Jordan-USA

Looking at these universalistic cases, one might suggest that the country-based ingroup favoritism can be counterbalanced by the other candidates' higher status, younger age, and probably gender. All the other choices are particularistic. Interestingly, the two most particularistic choices, with more than 30 p.p. deviation from the choice "by chance," did not involve the primary ingroup and were based on status dimension (HSOF>LSOF and HSOF>LSOM).

Individual-Level Results

According to the study design, the participants faced a decision point which was relatively complex and cognitively challenging. The necessary trade-off between several social attributes might lead to an explicit or implicit choice of a particular strategy, or a rule (set of rules) for deciding each situation. Analysis of the frequency distributions for each social attributes showed that the participants significantly differed in their biases (*Figure 2*).

The participants demonstrated very diverse biases in terms of both direction and strength. In most cases, the distribution of preferences was close to normal, including preferences regarding the sector of employment (not depicted). Most notable was the asymmetrical distribution for the main ingroup-outgroup contrast, where a significant portion of female participants always chose their country whenever it was compared to other countries. However, two-sample t-tests ($\alpha=0.05$) showed there were no statistically significant differences between male and female participants for all contrasts except the preference for their gender ingroup. Here, the difference was significant: t-criterion = 5.15 (df=298, $P<0.001$). This means that, although both male and female participants tended to prefer their gender ingroup (mean preference is 1.81 and 0.03, respectively), women more frequently preferred their gender outgroup.

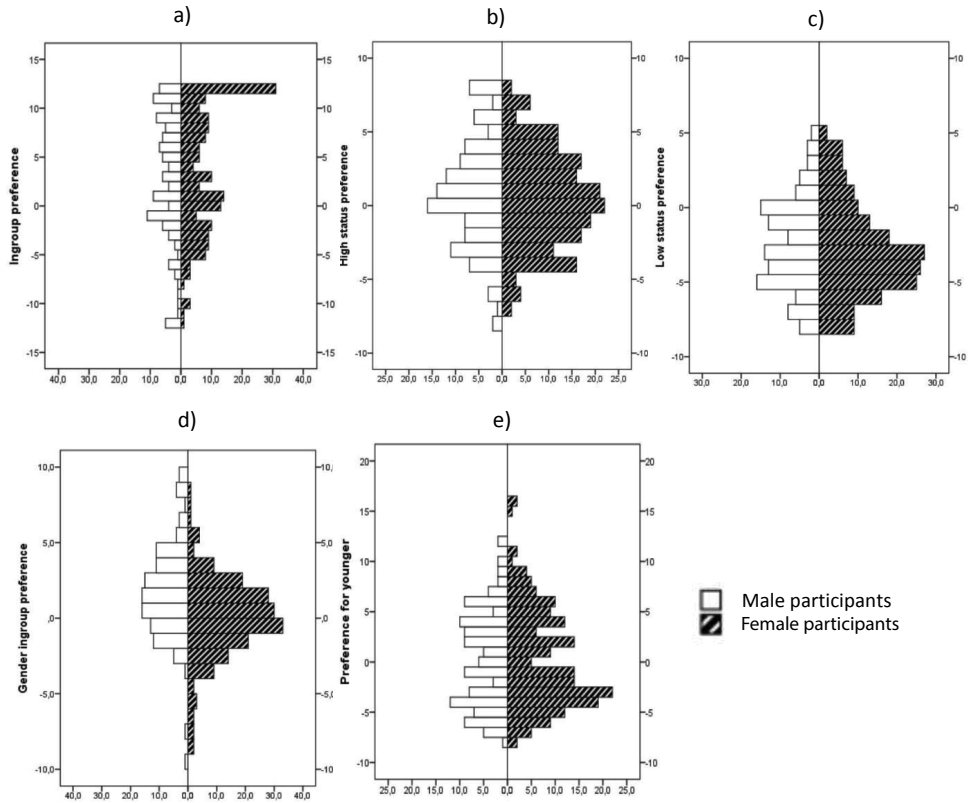


Figure 2. The distribution of individual preferences for each social attribute (P_{cat}), male and female participants.

Notes. Axis X = frequency; axis Y = Preference for: a) country ingroup ($I>O$); b) high status ($HSO>I$ and $HSO>LSO$); c) low status ($LSO>I$ and $LSO>HSO$); d) Gender ingroup (gender $I >$ gender O); e) younger candidates (younger $>$ older). Left panel — male participants, right panel — female participants

The correlational analysis showed how different types of bias were related to each other (see Table 3).

Table 3
Coefficients of correlations for key types of bias

Preference	Country ingroup	High status	Low Status	Male	Gender ingroup	Younger
Country ingroup	–	–0.68**	–0.63**	–0.01	0.08	–0.76**
High status		–	–0.10	0.08	–0.11	0.39**
Low Status			–	–0.04	0.00	0.65**
Male				–	0.03	0.02
Gender ingroup					–	–0.09

Note. **correlations significant at level 0.01.

Country ingroup preference negatively correlated with both status measures. More interestingly, high- and low-status preferences were not correlated with each other in the current research. Additionally, age-based preference for younger candidates was negatively correlated with country ingroup bias, and positively with both status biases. Age bias was not correlated with the age of participants. Gender was not associated with any other type of bias.

To better understand the nature of individual strategies followed by participants, their values of all types of bias (P_{cat}) were analyzed and combined. For this purpose, every preference scale was transformed into a universal ordinal bias scale ranging from (-2) to (2). Correspondingly, all participants were classified as having high (-2; 2) moderate (-1, 1) or low (0) bias in every social dimension. The percentages of those having a high bias in at least one social dimension, are shown in *Table 4*.

Table 4

Percentage of participants with high bias in one social dimension

High bias type	% of all participants
Ingroup preference	31.7
Outgroup preference	5.0
High-status preference	8.7
High-status aversion	4.0
Low-status preference	–
Low-status aversion	17.7
Gender ingroup preference	4.7
Gender outgroup preference	2.7
Preference for younger	2.3
Preference for older	–

Most of the other participants pursued strategies based on moderate bias types in various combinations. This means that the current combination of social categories does not lead to a counterbalancing effect and practical universalism in most cases. There was only a small portion of participants (2.0%) with low bias in all social dimensions, *i.e.*, those who pursued the most universalistic strategies. In sum, the data confirmed a variety of bias types which underlie individual strategies for choosing the best alternative at every decision point.

Discussion

The present study interprets the effect of multiple categorization on perception and behavior in terms of practical (rather than normative) universalism, *i.e.*, the actual outcomes of situations involving several systems of social categorization not relevant to the nature of a decision. Although the hypothetical situation used in the current design may seem too artificial, it emulates the logic of many real-life

situations. Examples include choosing among candidates for a job position or a role (when only job-related characteristics should be evaluated); assessment of employees' or students' achievements; evaluating judgments on policy issues; selecting which scientific articles on a topic to read and rely upon; and many others. There are many situations where ignoring social attributes that are not relevant for the task are crucial and expected.

This study showed that a sample of Russian participants has a strong tendency to make particularistic choices based on social attributes. The fact that the null hypothesis used to measure the lack of bias was rejected in the majority of choices, indirectly validates the possibility of using this approach in the study of multiple categorization. However, precautions should be noted before concluding that the statistical lack of choice preference is actually the result of social cognition mechanisms.

Deviation from universalism occurred despite the fact that the situation was not motivationally significant for individuals, and that a higher-order common identity was salient. This may be not very surprising since Russia has been found to be among the most particularistic and status-sensitive countries (Trompenaars & Hampden-Turner, 2012; Hofstede, Hofstede, & Minkov, 2010). Even the results regarding gender bias are consistent with Russia's cultural profile. Although there is an identifiable male preference in the current study, its effect is relatively small. Both country-level and cross-cultural studies show that, although there is some gender inequality in favor of men in Russia, this inequality is not very high, and egalitarian views in gender relations are widely accepted (Inglehart et al., 2014; Pew Research Center, 2019).

What is more interesting is the diversity of the participants' biased responses and their strategic nature. Whereas a particularistic normative system makes actual deviations from universalism more acceptable, it does not specify the nature of the social attributes according to which such deviations can be aligned. Discussions in the field of multiple or cross-categorization, make different predictions on how individuals should respond to a situation when the information about several social dimensions is available. According to Nicholas, de la Fuente, & Fiske (2017), there are two general theoretical models which predict that when a person faces two or more competing social dimensions of a target, the effect on their social attitudes can be based either on combining biases and preferences for each category (algebraic models), or on the complete dominance of one specific category (non-algebraic models). The present study shows that these alternative models are not necessarily contradictory and can be considered as different cognitive mechanisms involved in actual decision-making.

Deciding on a complex social situation involving lots of objects and various social dimensions can be better explained as a matter of strategic choice. Such a strategy, either implicitly or explicitly, includes making the decision as to which information should be prioritized, and how it should be combined with other information. The individuals making decisions in the present study differed in their strategies and followed different rules, probably reflecting differences in personal dispositional traits.

Some of them always chose their own (country) group, others always chose outgroups, some always chose objects of higher status, others always rejected them,

some only chose a specific gender, etc. Many others used more complicated strategies which combined various social information in a more balanced way. There is evidence that specific stereotypes of a particular group can contribute to a decision, as well as abstract relational structures (*e.g.*, ingroup-outgroup, high-low status). Finally, a small portion of participants demonstrated low bias across all the dimensions.

This variety of individual strategies challenges the view that multiple social categorization can necessarily reduce particular bias or prejudice (Prati et al., 2016; Kang & Bodenhausen, 2015). People seldom have access to only one type of social information. Rather, they typically face the complexity of social information about others, and then seek to reduce it and develop specific rules to make decisions and evaluations faster and easier.

The question is how the available social information is prioritized and structured. The current research showed that, in the absence of contextual or motivational factors, two social dimensions are especially important to a person making the choice. A strong negative correlation between ingroup affiliation and social status suggests there is a significant trade-off between these two social attributes. Taking into account that affiliation and social hierarchy are two qualitatively distinct types of social relations (Fiske, 1992; Gilboa-Schechtman & Shachar-Lavie, 2013), one can suggest that this trade-off is in fact between the two cognitive mechanisms which support processing affiliation- and hierarchy-related social information. A similar conclusion has recently been made regarding the neural processing of race and social status by Mattan et al., (2018).

Gender and age are two other social dimensions contributing to deviations from universalism. Importantly, the results of the study indicate that gender categorization is separate from other types of categorization. This corresponds to some previous findings which showed that gender is a specific social category independent of other types of social knowledge (Sidanius et al., 2004).

Turning back to the key question of the possibility of, and conditions for, universalistic solutions in multiple categorization situations, the findings of the present study are twofold. On the individual level, there is little evidence that different biases can effectively counterbalance each other. Rather, individuals facing a series of identical situations, tend to pursue a specific type of bias resulting in particularistic solutions. However, evidence of a trade-off between different social categorizations indicates that some balancing effects of alternative biases exist, and may contribute to partial inhibition of particularistic choices. Further research is needed to better understand the conditions and situations where such a balance can be achieved in individual judgments and decisions.

At the same time, the diversity of biases and individual strategies opens interesting opportunities for the avoidance of particularism at the group level. Although there was a group of participants who pursued universalistic strategies, it was relatively small. However, the fact that participants were biased in different ways means that under some conditions, a group of people with counterbalancing strategies of social categorization can produce universalistic solutions as a whole. The present study included examples of such situations, in which specific combinations of social attributes resulted in equal distribution of choices. This means that, for a

given group of people, there exists a combination of salient social attributes which induces biases to counterbalance each other.

To see the practical significance of this information, consider the situation when the task is to choose a candidate for a specific role, or evaluate someone's achievement, judgment, or behavior. From the present research, we might conclude that for the situations described in *Table 2*, the group we studied could make unbiased judgments and decisions.

Alternatively, we can conclude that for any given situation involving multiple categorization, it is possible to find a group of biased individuals who can jointly produce a fair evaluation, judgment, or decision. One can imagine a hypothetical mechanism for assembling a collective body which is able to make universalistic decisions irrespective of both individual biases and institutional solutions for such purposes as, perhaps, a blind review in science. Juries, expert boards, or commissions are examples of such collective actors, which are supposed to be able to produce unbiased judgments and/or solutions. Importantly, even particularistic and non-democratic societies need the ability to produce unbiased solutions – for example, in making expert judgments or evidence-based decisions.

Whether the pattern of reactions in our sample of Russian participants is generalizable to other types of situations and in other societies is a matter for further research. A direct comparison with samples from various cultures would be especially important. In particular, one might expect that participants from more universalistic and egalitarian cultures will generally pursue more universalistic strategies in their choices.

The situation, however, can be more complicated. Social categorization is an objective source of biases and prejudices, but in universalist cultures, greater normative pressures can counterbalance them in behavioral outcomes. However, the very complexity of multitude social choices provided by the current design makes it difficult to balance all the possible biases arising from social categorization. The attempt to compensate for implicit biases and prejudice may well result in positive discrimination, which also violates universalistic rules and which was found in the present research.

In support of this view, a recent study by Kteily, Sheehy-Skeffington, and Ho (2017) found that people with both egalitarian and anti-egalitarian views differ in their perception of inequality. It is thus possible to suppose that in more universalist cultures, a greater share of biases toward outgroup and low-status groups can be expected due to the cognitive inability to perfectly adjust control over one's biases. Thus, group-based solutions exploiting the diversity of individual social biases can be a promising new way to practical universalism in various social and cultural settings.

Conclusion

Social categorization is the source of asymmetrical cognitive, attitudinal, and behavioral reactions which deviate from universalistic norms and inhibit the ability of people to act in a non-biased, unprejudiced, and non-discriminatory way. When faced with complex social information and multiple categorization, individuals have to develop a strategy to deal with this complexity. The present study, con-

ducted in a country with a particularistic value system, explores the possibility that alternative social categorizations can produce biases which counterbalance each other in a given situation, without changing long-term personal attitudes toward specific social groups. The study allows us to suggest that multiple social categorization can indeed produce alternative biases, which may act in opposite directions.

In particular, the effect of country ingroup favoritism can potentially be diminished by high-status preference. However, the counterbalancing effect of this ‘conflict of biases’ in practical behavior is limited. When an individual faces a series of similar situations involving multiple categorization, he or she tends to develop a strategy, implicitly or explicitly, which mainly relies upon one specific type of bias. Strategies of country-ingroup preference and low-status aversion are the two most frequent.

At the same time, the diversity of biases and strategies adopted by individuals can allow the achievement of universalistic solutions at the group level. The present study sheds light on the conditions under which universalistic solutions are possible even in particularistic societies. A group of biased individuals can behave in an unbiased way, when the social attributes of the targets, or the individuals’ own social biases, counterbalance each other. This finding shows the possibility of social designs exploiting the cognitive and psychological mechanisms of social categorization, which allow the creation of reliable social systems from unreliable elements.

Limitations

There are several limitations of the current study which can affect its significance and generalizability. First, although the sample used was more representative than in many psychological studies, it still lacked the representativeness of a good sociological study. At the same time, the idea behind the present study was that *any* heterogeneous group can, in principle, produce unbiased solutions.

Second, the study design focused only on two main social descriptors: country and gender. The data regarding the two other descriptors was less reliable.

Third, the social profiles of the alternatives had a fixed structure and order in which the social descriptors were organized. This could have affected the relative importance of various social dimensions.

Fourth, the current design and data analysis techniques did not allow us to differentiate between universalistic strategies based on rational decisions, and those which originated from the participants’ dishonesty and chaotic responses. Additionally, the use of the “null hypothesis” interpretation of practical universalism can be problematic and result from factors which are not controlled in the study. Finally, the study was conducted in only one country, and assessing the role of cultural values requires additional studies.

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EDUCATIONAL PSYCHOLOGY

The Construct Validity of the Russian Version of the Modified Academic Self-Regulation Questionnaire (SRQ-A) among Elementary and Middle School Children

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Background. The Academic Self-Regulation Questionnaire (SRQ-A) is a useful self-report measure of academic motivation grounded in self-determination theory (E. Deci & R. Ryan).

Objective. The aim of the present study was to evaluate the utility of the Russian version of the SRQ-A by reporting psychometric properties, examining the factorial structure of the SRQ-A, and assessing its construct validity in a large sample of primary and middle school children.

Design. To validate the Russian version of the SRQ-A, two cross-sectional studies were conducted, one with primary school children, and the second with middle school children.

Results. We developed and tested the Russian version of the SRQ-A on a sample of 1215 children, Grades 3–7, from three primary and three secondary (middle) schools in Russia. The multidimensional factorial structure of the original measure was tested with bifactor exploratory structural equation modeling (B-ESEM) and confirmatory factor analysis (CFA). Construct validity was tested using correlational analyses with convergent and divergent measures. The SRQ-A showed good internal consistency for all subscales, with Cronbach's α ranging between 0.65 and 0.77 for the primary school children (Study 1), and 0.74 and 0.82 in a sample from the middle school children (Study 2). In both studies a simplex-structure pattern was confirmed, and the CFA model, with seven first-order factors and two second-order factors for intrinsic regulation and extrinsic regulation, had an acceptable fit. The results of both studies demonstrate that the subscales show good convergent and discriminant validity with respect to basic psychological needs, attitudes toward school, school well-being, and general well-being scales.

Conclusion. In sum, the 26-item Russian SRQ-A is a reliable and valid self-report instrument for the assessment of self-determined types of motivation for primary and middle school children.

Keywords: motivation; questionnaire; validation; self-determination theory (SDT); children (8–14); academic motivation; measurement; Academic Self-Regulation Questionnaire (SRQ-A)

Introduction

Motivation refers to the reasons that underlie behavior. Self-Determination Theory (SDT) is one of the most influential contemporary theories of human motivation and has an impressive amount of empirical support (Ryan & Deci, 2017). According to SDT, motivation differs not only in quantity, but also in quality, where quality refers to the individual's relative degree of autonomy or self-determination (Ryan & Deci, 2000). To reflect this, SDT distinguishes between extrinsic motivation, which is based on some contingency separable from the behavior itself, and intrinsic motivation, which is based on the satisfaction inherent in the behavior itself.

Furthermore, SDT measures extrinsic motivation along a continuum reflecting degrees of self-determination, which are traditionally marked as external, introjected, identified, and integrated (Ryan & Connell, 1989). External motivation, which involves acting in order to avoid punishments or receive rewards, lies on one extreme of the continuum; this motivation feels less autonomous, because the individual feels induced or pressured to act by an external contingency. Next along the continuum is introjected motivation, which implies acting to avoid feelings of guilt, or to prove oneself worthy; this motivation is somewhat more internalized or autonomous than external motivation. Next comes identified motivation, which reflects acting in accord with one's own values. A child acting from identified motivation has found the behavior in question to be personally important, and has accepted it as his own. Lastly, some SDT researchers also distinguish integrated motivation as the most self-determined type of extrinsic motivation. Actions characterized by integrated motivation share many qualities with intrinsic motivation, but they are still considered extrinsic because they are performed in order to attain separable outcomes, rather than for their own sake.

As previously noted, SDT distinguishes extrinsic motivation from intrinsic motivation, which technically is not on the continuum and has the highest degree of self-determination; the person acting with intrinsic motivation acts out of pure enjoyment of the activity itself.

It has been shown that in the educational domain, the quality of the student's motivation, with respect to the continuum, is associated with a number of important cognitive, behavioral, and emotional outcomes. Students who express more autonomous types of motivation (intrinsic and identified types of motivation) are more persistent and cognitively involved in their tasks, and display more positive coping styles and higher quality learning. By contrast, students who are motivated in a more controlled fashion (introjected and external types of motivation) expend less effort, are more easily distracted, experience more anxiety and other negative emotions, and have lower grades (Guay, Ratelle, & Chanal, 2008; Ryan & Connell, 1989; Taylor et al., 2014; Ryan & Deci, 2017; Gordeeva, Sychev, Gizhitskii, & Gavrichenkova, 2017).

There have been many instruments devised to measure academic motivation. The two most widely used questionnaires include the Academic Motivation Scale (AMS) and the SRQ-A. Vallerand and his colleagues (1989) developed the AMS, which assesses three types of intrinsic motivation (knowledge, accomplishment, and stimulation), three types of extrinsic motivation (identified, introjected, and external), and amotivation. The Russian version of the AMS was developed by Gordeeva et al. (2017) and is used for middle and high school students.

The Academic Self-Regulation Questionnaire (Ryan & Connell, 1989) is a self-report measure that has become one of the most prominent tools for assessing academic motivation within the primary and middle school context. This instrument deals with the reasons why the respondent carries out a certain behavior (Why do I do my homework? Why do I work on my classwork? Why do I try to answer hard questions in class? Why do I try to do well in school?). It also provides various possible preselected reasons that represent different motivational qualities with respect to the degree of relative autonomy — *i.e.*, intrinsic motivation, identified regulation, introjected regulation, and external regulation.

The SRQ-A has been widely used and applied across different cultures, including in North America (Grolnick, Ryan, & Deci, 1991); Germany (Kröner, Goussios, Schaitz, Streb, & Susic-Vasic, 2017); Belgium (Vansteenkiste, Sierens, Soenens, Luyckx, & Lens, 2009); Italy (Alivernini, Lucidi, & Manganello, 2011); Turkey (Bağçeci & Kanadli, 2014); Japan (Yamauchi & Tanaka, 1998); and China (Vansteenkiste, Zhou, Lens, & Soenens, 2005). It was also adapted into Spanish (Pichardo et al., 2018) and Portuguese (Gomes et al., 2019).

In general, these studies have provided support for the reliability and validity of the SRQ-A; however, since some of them did not confirm the four-factor structure of the questionnaire and some scales showed low reliability, they also highlight the need for some adjustments, including research concerning its psychometric characteristics in different socio-cultural and school contexts. Some researchers have reduced the length of the questionnaire (Pichardo et al., 2018), and others have created their own versions of questionnaires based on the SRQ-A (Hayamizu, 1997; Chanal, Cheval, Courvoisier, & Paumier, 2019).

Study 1

Methods

Participants

The participants were 635 elementary and secondary school students (third and fourth graders) drawn from five regular schools located in Moscow and Biysk. The total sample comprised 325 girls and 304 boys (six children did not specify gender); the median age was 9.62, $SD = 0.69$, age range 8–11 years. The sample size was determined on the basis of the recommendation (see Kyriazos, 2018) that a sufficient sample for the analysis of ordinal data with WLSMV estimator must be comprised of no less than 200-500 participants.

Procedure

The questionnaires were administered to the students in group settings during regular class hours. The research was introduced as “a study of children’s views on life and study.” Parental consent to participate was obtained for all students.

Measures

Development of the Academic Self-Regulation Scale (Russian version). For the purposes of this study, we created the Russian version of the Academic Self-Regulation Questionnaire (SRQ-A) by adapting 32 items from the Ryan and Connell (1989)

questionnaire. This questionnaire explores the reasons why the respondent displays a certain behavior, with questions such as: Why do I do my homework? Why do I work on my classwork? Why do I try to answer hard questions in class? Why do I try to do well in school? It also provides various possible preselected reasons that represent different motivational types — *i.e.*, intrinsic regulation, identified regulation, introjected regulation, and external regulation.

First, translation and back-translation of items from the original SRQ-A were performed by researchers fluent in both Russian and English, and expert in SDT; discrepancies were discussed and resolved by developing and pilot testing additional items similar in content to the original ones.

Then, in order to create a more robust, brief measurement tool which would correspond to the latest research in SDT, the main scales were reduced to four items per type of motivation, instead of the 7–8 items in the original questionnaire. Additional scales were developed which captured more broadly the dimensions of intrinsic motivation, positive introjection, and the two types of external motivation.

To specify: Following Vallerand's ideas on diversity of intrinsic motivation (Vallerand et al., 1993), we developed two intrinsic regulation subscales, one to measure motivation to learn (a sample item is, "I do my homework because I like knowing new things"), and another for self-development motivation (a sample item is "because I like to improve myself"). In line with previous SDT research (Assor, Vansteenkiste, & Kaplan, 2009; Sheldon, Osin, Gordeeva, Suchkov, & Sychev, 2017), we also differentiated two introjected subscales, which capture self-controlled behavior by such processes as positive contingent self-esteem, concern with recognition, and feelings of pride (positive introjection); and shame, guilt, and negative contingent self-esteem (negative introjection). Sample items are "because I'll respect myself more if I'll do it" (positive introjection) and "because I'll feel ashamed of myself if I don't" (negative introjection). Finally, following Gagné et al.'s work (2015) on the development of a work motivation scale which would capture more precisely the variety of external pressures that force people to work, we created a scale that assesses students' perceptions of external pressures from teachers that force them to learn. Exemplary items are: "I have no choice, I have to work in class" (General), and "because my teacher would be happy if I do well in school" (Teachers). (See the full text of the questionnaire in Appendix).

To establish convergent validity, we used questionnaires to measure the students' perceived autonomy support and autonomy frustration, perceived competence, and perceived relatedness. To evaluate the divergent validity of the scale, we administered questionnaires measuring attitude towards school, attitude towards teachers, and general sense of well-being, including satisfaction with life and self.

Basic psychological needs. Need satisfaction and frustration were measured with a questionnaire based on the Basic Psychological Need Satisfaction and Frustration Scale (Chen et al., 2015), which was adjusted for school children by a group of three experts in SDT, including two professors and one graduate student.

The questionnaire included six scales, each of which comprised four items. The six were: 1) autonomy satisfaction ($\alpha = 0.65$); 2) autonomy frustration ($\alpha = 0.63$); 3) competence satisfaction ($\alpha = 0.79$); 4) competence frustration ($\alpha = 0.64$); 5) relatedness satisfaction ($\alpha = 0.76$); and 6) relatedness frustration ($\alpha = 0.75$). Participants responded to the options by completing the phrase, "Today in school I..." using

a four-point Likert scale (1 = “Disagree” to 4 = “Agree”). Examples are: “I felt free and could choose what to do — я чувствовал себя свободным и мог выбирать, что мне делать” (autonomy-support), “I was forced to do many uninteresting things — я был вынужден делать слишком много неинтересных вещей” (autonomy-frustration), “I was successful in my studies — я был успешным в учебе” (competence-support), “The teacher criticized me for my errors — учитель критиковал меня за мои ошибки” (competence-frustration), “I had warm feelings towards those who were around me — у меня были теплые чувства к тем, кто был рядом” (relatedness-support), “I felt like my classmates didn’t need me and were not interested in me — я чувствовал, что не нужен и не интересен своим одноклассникам”. We tested the model with six interdependent factors (relevant to the scales) in this sample and obtained satisfactory values for the fit indexes: $\chi^2 = 557.17$; $df = 260$; $p < 0.001$; CFI = 0.911; TLI = 0.897; RMSEA = 0.042; 90%-CI for RMSEA: 0.038-0.047; PCLOSE = 0.995; $N = 635$.

Students’ satisfaction with school and life. The students’ satisfaction with school life was assessed via the Perception of School subscale from the Multidimensional Students’ Life Satisfaction Scale (MSLSS; Huebner, 1994; Russian adaptation by Sychev, Gordeeva, Lunkina, Osin, & Sidneva, 2018). An additional scale was created by the authors to measure students’ relationships with teachers. Both the Perception of School and the Relationships with Teachers scales had six items, with items rated on 5-point Likert scales. Exemplary items are: “I do not really like my school” (School), and “I like to listen to my teachers” (Teachers). Cronbach’s alphas in the present sample were 0.87 and 0.89 respectively.

Additionally, a nonverbal measurement of general attitude towards school and towards life was employed (Andrews & Withey, 1976). It featured 7 faces with different expressions, ranging from most happy to least happy.

Data Analysis

Following the recommendations of Howard et al. (2018; 2020), we applied bifactor exploratory structural equation modeling (B-ESEM) to analyze the factor structure of the proposed questionnaire. It was recently shown (Howard et al., 2018) that bifactor analysis may be more suitable for questionnaires elaborating SDT because the general factor corresponds to the self-determination continuum itself, while the specific factors may capture different types of self-regulation. This method was successfully used for analysis of the structure of such instruments as the Multidimensional Work Motivation Scale (Howard et al., 2018; Howard et al., 2020), Academic Motivation Scale (Guay et al., 2015; Litalien et al., 2017), and several other questionnaires (Howard et al., 2020) in samples of children and adults. However, we failed to find any publications describing application of this method to the SRQ-A, which has a more complicated structure.

In our research the B-ESEM method was specified with a priori expectations about the factor structure, which included eight factors: A general (self-determination) factor and seven specific factors relevant to the scales of questionnaire:

1. Intrinsic motivation: to know (IM),
2. Intrinsic motivation: self-development (SM),
3. Identified regulation (ID),

4. Introjected positive regulation (IP),
5. Introjected negative regulation (IN),
6. External regulation: general (EM),
7. External regulation: teacher (ET)

Analysis was conducted in Mplus 8 (Muthén & Muthén, 2015) using Bi-Geomin orthogonal target rotation: item loadings on the a priori motivation factors were freely estimated, and all cross-loadings were also freely estimated but “targeted” to be as close to zero as possible (Asparouhov & Muthén, 2009).

Further analysis of the factor structure of the SRQ included testing a series of alternative models using confirmatory factor analysis (CFA) in Mplus. Given the relatively small number of answer categories (four), we used a weighted least squares mean and variance adjusted (WLSMV) estimator in the ESEM and CFA analysis. Also, the “complex” type of analysis was used in the CFA to account for the nested sampling structure. Other statistical procedures, including descriptive statistics, correlations analysis, and t-tests, were carried out using R.

Results

We started analysis of the factor structure of the proposed questionnaire with B-ESEM and analyzed the 8-factor solution, which showed good fit: $\chi^2 = 218.89$; $df = 145$; $p < 0.001$; CFI = 0.991; TLI = 0.980; RMSEA = 0.028, $N = 635$. As expected, factor loadings on the general factor for the items from the three autonomous regulation scales were high (more than 0.62); for the items from the introjected regulation scales, the loadings were moderate (from 0.26 to 0.48); they were negative or close to zero for the items of the external regulation scales (from -0.20 to 0.01).

Specific factor 1 corresponds to the first scale of intrinsic regulation, although the values of the loadings were quite moderate (from 0.20 to 0.32). Specific factors 4–7 correspond well to the four scales of introjected and extrinsic regulation. At the same time, the specific factors 2 and 3, relevant to the scales of intrinsic regulation (to develop oneself) and identified regulation, contained low factor loadings. Although most items from these two scales showed weak loadings on the a priori factor, their loadings on the general factor were high (from 0.63 to 0.79), suggesting that these items were more efficient at tapping into global self-determination than specific autonomous motivation.

Four alternative models of the proposed questionnaire were tested with confirmatory factor analysis (CFA). The first model was a first-order model with seven factors reflecting the postulated scales. The second, alternative model replicated the seven-factor model, but added two second-order factors, representing intrinsic regulation and extrinsic regulation (see *Figure 1*). In the third model, the positive introjected regulation and negative introjected regulation factors were united into a single, second-order factor, so that the model contained three second-order factors representing intrinsic, introjected, and extrinsic regulation. In the fourth model, identified regulation was added into the second-order factor along with intrinsic and self-development motivation, forming the factor of autonomous regulation. The fourth model thus contained three second-order factors, reflecting autonomous, introjected, and extrinsic regulation. In every model no cross-loadings were hypothesized, and covariance between the latent factors was allowed.

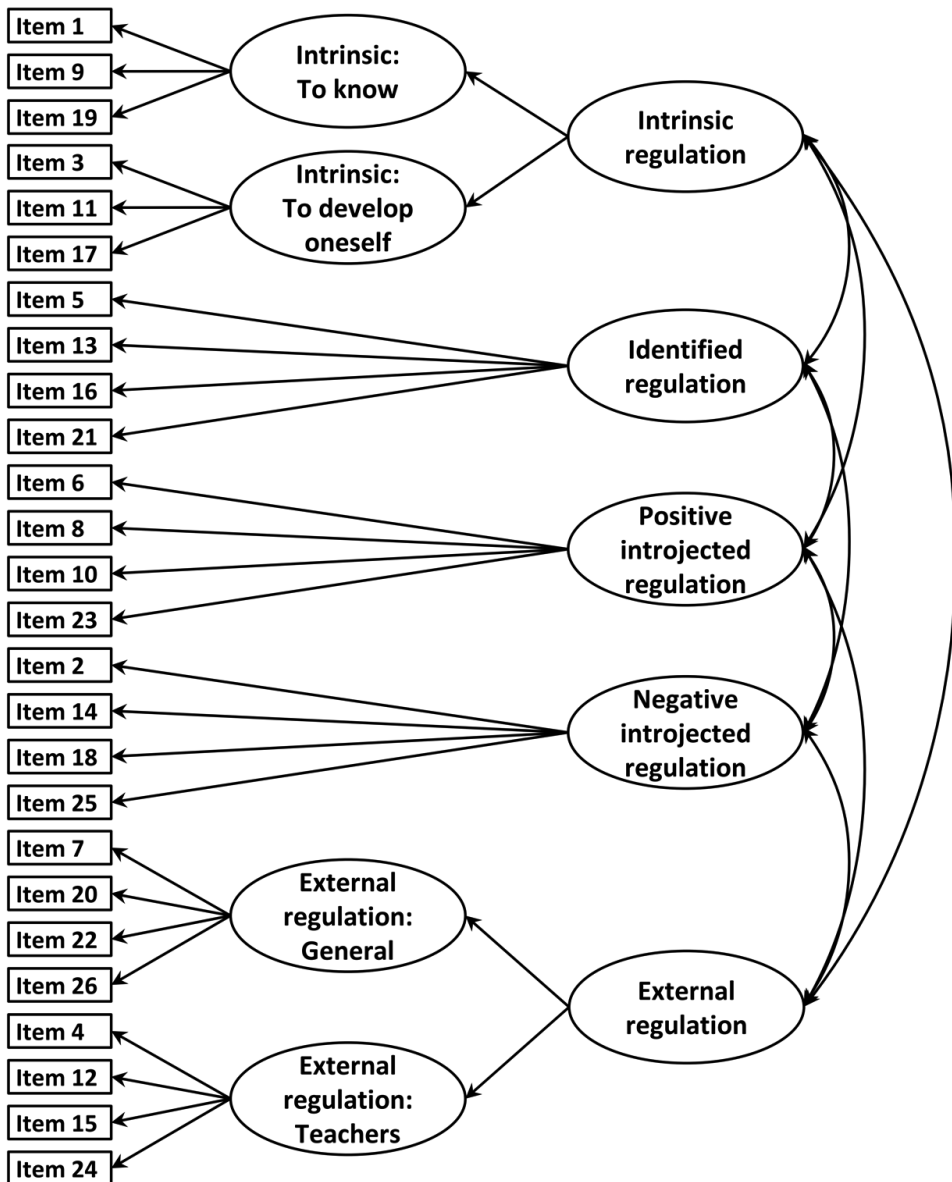


Figure 1. Factor structure of the academic motivation scales questionnaire (alternative model 2).

Fit indexes for these four models were within the acceptable range, and for the second and third ones, the values of the CFI, TLI, and RMSEA were best and almost identical (see Table 1). The fourth model showed a slightly worse fit. All things being equal, the second model, with second-order factors for intrinsic and extrinsic regulation (see Figure 1), was considered preferable, based on the acceptable fit across the reported indexes, and the parsimony of the model relative to Model 3. It was also confirmed to be the best model in Study 2, as reported below. All factor loadings for items in this model were higher than 0.50 and significant at $p < 0.001$.

Table 1

Comparison of the different CFA models (Study 1, N = 635)

Model	χ^2	df	P-Value	CFI	TLI	RMSEA	SRMR
1. One-level model with seven factors	464.79	278	< 0.001	0.969	0.964	0.033	0.052
2. Two-level model with two second-level and three first-level factors	460.01	285	< 0.001	0.971	0.967	0.031	0.052
3. Two-level model with three second-level and one first-level factors	461.46	287	< 0.001	0.971	0.967	0.031	0.052
4. Two-level model with three second-level factors	481.97	289	< 0.001	0.968	0.964	0.032	0.054

Note. *df* = degrees of freedom; CFI = comparative fit index; TLI = Tucker-Lewis index; RMSEA = root mean-square error of approximation; SRMR = root mean square residual.

Correlations, reliability coefficients, and descriptive statistics of the seven subscales are presented in *Table 2*. As expected, the two intrinsic regulation scales and identified regulation were highly correlated ($r > 0.71$; $p < .001$). The two subscales for extrinsic regulation (teachers and general) were also strongly correlated, although the values of the coefficients were somewhat lower ($r = 0.64$; $p < .001$). In line with SDT, there was no positive association between intrinsic and extrinsic regulation, while both scales for introjected regulation, which occupy the middle of the self-determination continuum, showed positive correlations with both intrinsic and extrinsic types of regulation.

Table 2

Descriptive statistics and correlations for academic motivation scales (Study 1, N = 635)

	1	2	3	4	5	6	7
1. Intrinsic: to know	–	0.71***	0.66***	0.26***	0.27***	–0.07	–0.10*
2. Intrinsic: to develop oneself	0.72***	–	0.73***	0.31***	0.30***	–0.08	–0.11**
3. Identified regulation	0.67***	0.73***	–	0.37***	0.41***	–0.10*	–0.12**
4. Positive introjected	0.26***	0.31***	0.37***	–	0.48***	0.26***	0.26***
5. Negative introjected	0.28***	0.31***	0.42***	0.49***	–	0.26***	0.22***
6. Extrinsic: general	–0.09*	–0.08*	–0.12**	0.25***	0.24***	–	0.65***
7. Extrinsic: teachers	–0.11**	–0.11**	–0.13***	0.25***	0.21***	0.64***	–
Cronbach's α	0.77	0.75	0.71	0.77	0.65	0.70	0.73
Mean	2.78	3.20	3.25	2.88	3.10	2.83	2.78
SD	0.89	0.76	0.70	0.84	0.72	0.82	0.84
Skewness	–0.33	–0.92	–0.99	–0.45	–0.82	–0.33	–0.41
Kurtosis	–0.90	0.26	0.54	–0.73	0.23	–0.78	–0.67

Note. * $p < .05$; ** $p < .01$; *** $p < .001$. Above the diagonal partial correlations controlling for gender are presented. Numbers of variables in columns correspond to the numbers of variables in rows.

The values of Cronbach's α for most of the scales were sufficient ($\alpha > .70$, see Table 2), indicating good reliability of all scales except the negative introjected regulation scale, which had a lower but still acceptable reliability ($\alpha = .65$). The moderate negative coefficients of skewness indicated that relatively high scores were more typical for all the scales.

Next, we analyzed gender differences. T-tests revealed that girls had significantly higher intrinsic regulation (on both scales), identified regulation, and negative introjected regulation, while boys were significantly higher on the scale of general extrinsic regulation (see Table 3). The profile of academic motivation among girls, who on average had higher scores on identified and intrinsic self-development regulation, was more autonomous than was the boys'. Girls also demonstrated significantly higher satisfaction with school ($t(623) = 3.14, p < 0.01$), teachers ($t(623) = 3.40, p < 0.001$), and self ($t(623) = 2.28, p < 0.05$); better attitudes toward study ($t(627) = 5.14, p < 0.001$); and a higher satisfaction of the autonomy need ($t(627) = 2.53, p < 0.05$) and less frustration of this need ($t(627) = 4.61, p < 0.001$). Given the strong associations of gender with some measured variables, we used partial correlations to control for the impact of gender during further analysis.

Table 3

Gender differences by measured SRQ-A scales (study 1, N (girls) = 325, N (boys) = 304)

	Means		SD		Student's t	df	p-value	Cohen's d
	Girls	Boys	Girls	Boys				
Intrinsic: to know	2.92	2.63	0.84	0.92	4.20	627	< .001	0.34
Intrinsic: to develop oneself	3.28	3.10	0.72	0.80	2.99	627	0.029	0.24
Identified regulation	3.39	3.11	0.63	0.74	5.10	627	< .001	0.41
Positive introjected regulation	2.94	2.81	0.81	0.88	1.89	627	0.060	0.15
Negative introjected regulation	3.18	3.02	0.69	0.74	2.94	627	0.003	0.23
Extrinsic regulation: general	2.72	2.95	0.83	0.80	-3.55	627	< .001	-0.28
Extrinsic regulation: teachers	2.73	2.84	0.81	0.87	-1.65	627	0.100	-0.13
RAI	0.26	-0.02	0.80	0.77	4.42	627	< .001	0.35

Note. SD — standard deviations; RAI — relative autonomy index. Significant differences marked in bold.

Simplex pattern. In line with prior empirical and theoretical work in SDT, the continuum of relative autonomy suggests that construct validity for the SRQ-A can be demonstrated when all its subscales are more strongly and positively correlated with those that are theoretically adjacent, than with those that are more distant (Ryan & Connell, 1989). The results of correlation analysis demonstrated that, in spite of the large number of scales, the overall pattern of correlations (see Table 1) supported the simplex pattern postulated by SDT.

To examine in a more formal manner the congruence between the pattern of obtained correlations and the simplex pattern, we calculated the value of the congruency coefficient (Ryan & Connell, 1989). The resulting value was 0.64, indicat-

ing satisfactory congruence between the empirical and theoretical patterns of correlations. Given that the hypothesis underlying the autonomy continuum had been confirmed, an unweighted relative autonomy index (RAI) was calculated following Sheldon et al. (2017), showing the relative dominance of autonomous regulation over controlled regulation. The RAI was calculated as the difference between the average value of the four relatively autonomous regulation scales (two intrinsic, identified, and positive introjected), and the average value of the controlled regulation scales (negative introjected and two extrinsic).

Table 4

Partial correlations between academic motivation scales and antecedents and outcome variables, controlling for gender (study 1, N = 629)

Variable	IM	SM	ID	IP	IN	EM	ET	RAI
Autonomy need: satisfaction	0.55***	0.52***	0.46***	0.31***	0.25***	0.04	0.00	0.38***
Autonomy need: frustration	-0.23***	-0.20***	-0.16***	0.10*	0.10*	0.39***	0.43***	-0.44***
Competence need: satisfaction	0.45***	0.48***	0.47***	0.29***	0.22***	-0.03	-0.07	0.39***
Competence need: frustration	-0.07	-0.06	-0.08	0.17***	0.14***	0.31***	0.22***	-0.24***
Relatedness need: satisfaction	0.30***	0.30***	0.29***	0.24***	0.16***	0.04	0.03	0.21***
Relatedness need: frustration	-0.08*	-0.09*	-0.08*	0.13***	0.11**	0.24***	0.23***	-0.22***
Satisfaction with school	0.69***	0.57***	0.55***	0.17***	0.22***	-0.16***	-0.21***	0.56***
Satisfaction with teachers	0.56***	0.49***	0.49***	0.22***	0.23***	-0.07	-0.14***	0.44***
Satisfaction with myself	0.36***	0.36***	0.34***	0.31***	0.14***	0.03	0.02	0.29***
Attitude toward school	0.60***	0.54***	0.50***	0.13***	0.20***	-0.16***	-0.16***	0.49***
Attitude toward life	0.24***	0.27***	0.24***	0.11**	0.05	-0.08*	-0.06	0.25***

Note. * $p < .05$; ** $p < .01$; *** $p < .001$. IM — Intrinsic regulation: to know; SM = Intrinsic regulation: To develop oneself; ID = identified regulation; IP = positive introjected regulation; IN = negative introjected regulation; EM = extrinsic regulation: General; ET = extrinsic regulation: teachers; RAI = relative autonomy index.

Convergent validity of the academic motivation scales was supported by correlations with other variables (see Table 4). As expected, the scales of basic psychological need satisfaction demonstrated moderate or high correlations with the autonomous regulation scales ($0.29 \leq r \leq 0.55$; all $p < .001$), and moderate correlations with the introjected regulation scales ($0.16 \leq r \leq 0.31$; all $p < .001$). Correlations of basic psychological need satisfaction with extrinsic regulation were close to zero and insignificant. Autonomy need frustration showed moderate positive correlations with both types of extrinsic regulation ($r = 0.39$ for EM and 0.43 for ET;

both $p < .001$), weak positive correlations with introjected regulation ($r = 0.10$ for both scales; $p < .05$), and was negatively correlated with the autonomous regulation scales ($-0.23 \leq r \leq -0.16$; all $p < .001$). Frustration of competence and relatedness needs showed almost zero negative correlations with intrinsic motivation scales, but they were positively correlated with extrinsic motivation scales ($0.22 \leq r \leq 0.31$; all $p < .001$).

The divergent validity of the scales was also confirmed. Satisfaction with school was especially strongly correlated with intrinsic regulation and identified regulation ($r \geq 0.55$; all $p < .001$). On the other hand, correlations of this variable with both extrinsic regulation subscales were weak and negative. The satisfaction with teachers scale showed high correlations with autonomous regulation ($0.49 \leq r \leq 0.56$; all $p < .001$), whereas its correlation with external (teachers) regulation was negative ($r = -0.14$; $p < .001$). Scales of attitude toward school and life showed a similar pattern of correlations. In general, all these scales were highly or moderately positively correlated with autonomous regulation, weakly positively correlated with both types of introjected regulation, and weakly negatively or insignificantly correlated with extrinsic regulation.

Next, we conducted Study 2 to test the reliability of the Russian SRQ-A and its applicability for middle school children, grades 5–7.

Study 2

Methods

Participants

The participants were 580 secondary school students drawn from two schools for specially selected (gifted) girls ($N = 352$ and $N = 228$). When we tested for differences between the groups on key study variables, none were found; hence we combined the samples for all subsequent analyses. Across this full sample ($N = 580$), the children were distributed thus: grade 5 ($N = 192$); grade 6 ($N = 194$); and grade 7 ($N = 194$).

Procedure

The same procedure was used as in Study 1.

The questionnaires were administered to the students in group settings during regular class hours. The research was introduced as “a study of children’s views on life and study.” Parental consent to participate was obtained for all students. Of the full sample ($N = 580$), at the end of the school year we obtained information on the academic achievement of 228 school children (final marks for four main subjects) from the respective school administrations.

Measures

The same scales of academic self-regulation and basic psychological needs as in Study 1 were used, with the exception of the scales on satisfaction with school life. In this study we used only one scale to measure need frustration (the autonomy

need, given its central importance). The four factor model of the basic psychological needs scale, including three factors of basic need satisfaction and a factor for autonomy-frustration, showed sufficient fit: $\chi^2 = 271.42$; $df = 98$; $p < 0.001$; CFI = 0.950; TLI = 0.938; RMSEA = 0.055 (90% CI = [0.048, 0.063]); PCLOSE = 0.128; $N = 580$. Cronbach's α for the scales of basic needs ranged from 0.71 to 0.88. Cronbach's α for academic self-regulation are presented in *Table 7*.

Data analyses

We applied the same data analysis procedures as in Study 1.

Results

As in Study 1, we started with B-ESEM. The eight-factor solution showed a good fit ($\chi^2 = 234.02$; $df = 145$; $p < 0.001$; CFI = 0.991; TLI = 0.981; RMSEA = 0.033) and the expected pattern of loadings on the general self-determination factor. As in Study 1, the specific factors relevant to the scales of intrinsic regulation (to develop oneself) and identified regulation contained low factor loadings. At the same time, factor loadings of the items from these two scales on the general factor of self-determination were high (from 0.74 to 0.87). The remaining specific factors corresponded well to the scales of the questionnaire.

The results of CFA for the four alternative factor models (the same ones used in Study 1) for the Academic Self-regulation Questionnaire are presented in *Table 5*. The best fit, although slightly worse than in Study 1, was obtained for the second model, which included two second-order factors for intrinsic and extrinsic regulation (see *Figure 1*). All factor loadings for items in this model were higher than 0.50 and significant at $p < 0.001$.

Table 5

Comparison of the different CFA models (Study 2, N = 580)

Model	χ^2	df	P-Value	CFI	TLI	RMSEA	SRMR
1. One-level model with seven factors	923.87	278	< 0.001	0.944	0.934	0.063	0.065
2. Two-level model with two second-level and three first-level factors	898.60	285	< 0.001	0.947	0.939	0.061	0.065
3. Two-level model with three second-level and one first-level factors	1203.47	287	< 0.001	0.920	0.910	0.074	0.079
4. Two-level model with three second-level factors	1235.60	289	< 0.001	0.917	0.907	0.075	0.081

Note. df = degrees of freedom; CFI = comparative fit index; TLI = Tucker-Lewis index; RMSEA = root mean-square error of approximation; SRMR = root mean square residual.

Correlations, reliability coefficients, and descriptive statistics of the seven subscales are presented in *Table 6*. The values of Cronbach's α for all scales were high ($\alpha > .74$), indicating good reliability. The scales of self-development and identified regulation had strong asymmetry, while the other scales had moderate asymmetry.

The pattern of correlations between the scales was quite similar to that found in Study 1 and met expectations based on SDT. The congruency coefficient was a bit lower than in Study 1, but remained satisfactory (0.56), which confirmed the simplex pattern assumption.

Table 6
 Descriptive statistics and correlations for academic motivation scales (study 2, N = 580)

	1	2	3	4	5	6	7
1. Intrinsic: To know	–						
2. Intrinsic: To develop oneself	0.71***	–					
3. Identified regulation	0.74***	0.75***	–				
4. Introjected regulation (positive)	0.35***	0.36***	0.41***	–			
5. Introjected regulation (negative)	0.16***	0.16***	0.27***	0.41***	–		
6. Extrinsic regulation (general)	–0.26***	–0.22***	–0.20***	0.09*	0.36***	–	
7. Extrinsic regulation (teachers)	–0.25***	–0.24***	–0.18***	0.04	0.32***	0.67***	–
Cronbach's α	0.82	0.78	0.75	0.81	0.74	0.74	0.76
Mean	3.27	3.61	3.59	3.24	3.01	2.48	2.52
SD	0.66	0.49	0.48	0.65	0.67	0.73	0.73
Skewness	–0.78	–1.26	–1.29	–0.94	–0.63	0.07	–0.02
Kurtosis	0.13	1.25	1.56	0.69	–0.02	–0.61	–0.44

Note. * $p < .05$; ** $p < .01$; *** $p < .001$. Numbers of variables in columns correspond to the numbers of variables in rows.

Convergent validity of the academic motivation scales was supported by correlations with the four basic psychological needs subscales (see Table 7). Again, all the scales of satisfaction of basic psychological needs demonstrated moderate or high correlations with autonomous regulation scales ($0.36 \leq r \leq 0.61$; all $p < .001$), moderate correlations with positive introjected regulation ($0.26 \leq r \leq 0.33$; all $p < .001$); zero correlations with introjected negative regulation; and negative correlations with extrinsic regulation ($-0.30 \leq r \leq -0.17$; all $p < .001$). Similar correlations, but in the inverse direction, were obtained for autonomy frustration.

Divergent validity of the scales was also confirmed. Attitude toward school was highly correlated with the autonomous regulation scales ($0.53 \leq r \leq 0.62$; all $p < .001$), while correlations with extrinsic regulation scales were weak and negative (-0.25 for EM and -0.22 for ET; both $p < .001$). Attitude toward life moderately correlated with autonomous regulation scales ($0.32 \leq r \leq 0.36$; all $p < .001$), and correlations with extrinsic regulation scales were weak and negative. The highest and most significant correlation with academic achievement was obtained for the scale of identified motivation ($r = 0.26$; $p < .001$), while other scales correlated more weakly with GPA ($r \leq 0.20$), and with lower p-values.

Table 7

Correlations between academic motivation scales and antecedents and outcome variables (Study 2)

Variable	N	IM	SM	ID	IP	IN	EM	ET	RAI
Autonomy support	575	0.61***	0.50***	0.53***	0.26***	0.07	-0.26***	-0.22***	0.49***
Autonomy frustration	575	-0.53***	-0.46***	-0.45***	-0.17***	-0.05	0.34***	0.29***	-0.50***
Competence support	575	0.57***	0.47***	0.51***	0.33***	0.02	-0.24***	-0.30***	0.48***
Relatedness support	575	0.41***	0.36***	0.41***	0.28***	0.02	-0.17***	-0.22***	0.35***
Attitude toward school	575	0.62***	0.53***	0.54***	0.25***	0.08	-0.25***	-0.22***	0.50***
Attitude toward life	580	0.36***	0.32***	0.32***	0.17***	0	-0.14***	-0.10*	0.29***
Academic achievement	228	0.16*	0.19**	0.26***	0.20**	0.12	-0.16*	-0.19**	0.19**

Note. * $p < .05$; ** $p < .01$; *** $p < .001$. IM = intrinsic motivation: to know, SM = intrinsic motivation: self-development, ID = identified regulation, IP = introjected positive regulation, IN = introjected negative regulation, EM = external regulation: general, ET = external regulation: teacher.

Discussion

The aim of the present study was to evaluate the utility of the Russian version of the SRQ-A as a self-report measure for academic motivation, by reporting psychometric properties, examining the factorial structure of the SRQ-A, and assessing construct validity in a large sample of primary and middle school children. Internal consistency for the four original subscales showed moderate to high reliability, ranging from 0.62 to 0.82 (Ryan & Connell, 1989). The results of both studies with Russian samples also indicated adequate levels of internal consistency for all subscales of the Russian version of the SRQ-A.

The factor structure of the questionnaire was analyzed using two approaches: B-ESEM and CFA. The results of the B-ESEM supported the conclusion that the scales of the questionnaire occupy the expected place in the self-determination continuum. The results of the CFA indicated that the hierarchical model of the questionnaire's structure is preferable; *i.e.*, the one where second order factors of intrinsic and external regulation combined the relevant subscales.

Such a hierarchical structure may explain some difficulties in extracting specific factors of autonomous regulation in the B-ESEM. The reason why the factor loadings relevant to the scales of intrinsic regulation (to develop oneself) and identified regulation (autonomous types of motivation) were low may reflect the fact that the SRQ-A questionnaire includes four different learning situations. Results from previous studies revealed that autonomous motivation was more specific to the situational level than was controlled motivation (Chanal & Guay, 2015; Chanal & Paumier, 2020).

In both studies, correlations among the seven SRQ-A subscales revealed a simplex pattern consistent with the assumption of the continuum of self-determination, where theoretically adjacent subscales have stronger positive correlations than more distant subscales (Ryan & Connell, 1989). The results of both studies also demonstrated that the subscales showed good convergent and discriminant validity with measures of basic psychological needs, attitudes toward school, school well-being, and general well-being.

The results showed that at the primary school age (Study 1), children had a certain amount of trouble differentiating between positive and negative introjected motivation. As a result, shame and pride in their accomplishments had similar associations with both motivational antecedents and outcome variables. However, during adolescence (Study 2), such a differentiation increased (together with reliability of these scales), and the distinction between these two types of introjected regulation became justified and meaningful.

The pattern of gender differences in academic motivation which was demonstrated in the first study, which indicated greater autonomous and less external regulation in girls, adequately explains the higher academic achievement of girls, and completely coincides with a similar pattern recently discovered in a sample of German school children (Kroner et al., 2017).

Conclusion

We developed the Russian version of the modified Academic Self-Regulation Scale (SRQ-A), and tested its factorial structure and validity in two samples of Russian children in primary and middle/secondary school. The results from the Russian version of the SRQ-A were related in the expected directions with other constructs, antecedents, and outcomes of academic motivation.

Limitations

The present version of the Russian SRQ-A has been validated in an academic context with students attending grades three to seven. Thus, its application to earlier age groups remains to be tested. Also, the Russian SRQ-A is a self-report questionnaire, and hence is subject to various distortions in perception. It is recommended for future studies to investigate teacher and parental reports, which might be useful in gaining a more holistic insight into the students' motivational mechanisms. Also, since the sample of middle school students (Study 2) was restricted to girls, its validity and generalizability for boys should be confirmed. However, previous studies (Kröner et al., 2017), as well as our own data on elementary school children, show, among other things, that boys and girls do not differ much in their patterns of motivation.

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Appendix**SRQ-A (Russian)**

Инструкция: Внимательно прочти приведенные ниже утверждения, ничего не пропуская и отметить ответ, наиболее подходящий для тебя. (Instructions: Carefully read the statements below and mark the answer that is most suitable for you.)

Неверно (НЕТ), Скорее неверно, Скорее верно, Верно (ДА)
(Not at all true, Not very true, Sort of true, Very true)

Почему я делаю домашние задания?**А. Я делаю домашние задания, потому что...
(Why I Do Things?)****А. Why do I do my homework? I do my homework because...**

1. мне нравится делать уроки (I like to do my assignments).
2. мне стыдно получать плохие отметки (I am ashamed to get bad grades.)
3. мне нравится знать и уметь все больше и больше (I like to know and be able to do more and more.)
4. если не сделаю, учитель будет ругать меня (If I don't, the teacher will scold me.)
5. мне самому важно делать домашние задания (It's important for me to do my homework.)
6. я буду хорошо думать о себе, если сделаю задания (I will think well of myself if I do the assignments.)
7. родители контролируют меня и проверяют мои оценки (My parents control me and check my grades.)
8. выполнив домашнюю работу, я себя больше уважаю (When I've done my homework, I respect myself more.)

Б. Почему я работаю над заданиями в классе? Я работаю над заданиями в классе, потому что...**(B. Why do I work on my classwork? I work on my class assignments because ...)**

9. мне это интересно (It's interesting to me.)
10. я буду больше уважать себя, выполнив эти задания (I will respect myself more by completing these tasks.)
11. мне приятно развиваться (I enjoy developing my skills.)
12. от меня этого требует учитель (The teacher requires me to do it.)
13. я сам хочу выучить новый материал (I myself want to learn new material.)
14. мне будет стыдно за себя, если я их не сделаю (I will be ashamed of myself if I do not.)

В. Почему я стараюсь ответить на трудные вопросы в классе? Я стараюсь ответить на трудные вопросы в классе, потому что...**(C. Why do I try to answer hard questions in class? I try to answer hard questions in class because ...)**

15. учитель требует, чтобы я пытался отвечать на эти вопросы (The teacher requires me to try to answer these questions.)
16. я сам хочу отвечать на трудные вопросы (I myself want to answer difficult questions.)
17. мне нравится учиться думать (I like learning to think.)
18. я буду плохо о себе думать, если не отвечу (I will think badly of myself if I do not answer.)

Г. Почему я стараюсь хорошо учиться в школе? Я стараюсь хорошо учиться в школе, потому что...

(D. Why do I try to do well in school? I try to do well in school, because...)

19. мне доставляет удовольствие учиться (It gives me pleasure to study.)

20. я обязан(а) учиться, иначе у меня будут проблемы (I'm obligated to study, otherwise I will have problems.)

21. для меня важно хорошо учиться (It is important for me to do well in school.)

22. если я стану хуже учиться, то меня накажут (If I begin to study worse, then they will punish me.)

23. я буду гордиться собой, если буду учиться хорошо (I will be proud of myself if I study well.)

24. я должен стараться, чтобы учитель не ругал (I must try so that the teacher does not scold me.)

25. мне будет стыдно учиться плохо (I will be ashamed to study poorly).

26. родители требуют, чтобы я хорошо учился (My parents require me to study well.)

Scoring key for SRQ-A-ru.

Intrinsic motivation: to know 1, 9, 19,

Intrinsic motivation: self-development 3, 11, 17,

Identified regulation 5, 13, 16, 21,

Introjected positive regulation 6, 8, 10, 23,

Introjected negative regulation 2, 14, 18, 25,

External regulation: general 7, 20, 22, 26,

External regulation: teacher 4, 12, 15, 24.

Perceived Paternal Attitudes Predict Test Anxiety Beyond the Effect of Neuroticism: A Study in the Context of the University Entrance Examination in Turkey

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Background. In Turkey, university education is highly valued, and is considered a key to success and happiness in life. The gatekeeper for a university education is a central entrance exam. The entire process is lengthy, hard, and anxiety-provoking.

Objective. Our study aimed to investigate the factors associated with test anxiety related to the university entrance exam. The effects of the perceived attitudes of the student's mother and father on his or her test anxiety are examined separately, and beyond the effect of other risk factors.

Design. The participants were 102 high school students and recent graduates between the ages of 14 and 19. Data was collected just before a test anxiety workshop, which was designed as part of an open day activity in a private, non-profit university. The workshop featured an interactive presentation about general anxiety, test anxiety, and coping strategies, which was followed by a progressive relaxation exercise.

Results. It was found that having a lower GPA score, being female, and having an increased level of neuroticism, as well as an increased level of perceived paternal acceptance and paternal control, were associated with higher levels of test anxiety.

Conclusion. The university entrance exam preparation period in Turkey is quite stressful for the students and creates an economic strain for their families. Considering that fathers are usually the financial authority figure within the households, paternal attitudes might predominantly affect the test anxiety level experienced by the student. In addition to paternal control, paternal acceptance might also be a source of stress since it, like control, includes "expectations" for the student's success.

Keywords:
test anxiety;
paternal attitudes;
neuroticism;
high school students;
high school graduates;
university entrance exam

Introduction

Being evaluated can be an anxiety-inducing procedure, and tests are one of the most common means of evaluation. According to Spielberger and Vagg (1995), test anxiety is a person's inclination to react to being evaluated with intense worry, mental disorganization, intrusive thoughts, strain, and physiological tension. If a student cannot achieve his or her optimal performance on the exams due to anxiety, and thus gets a low grade, then it can be said that the student suffers from test anxiety (Spielberger & Vagg, 1995).

Test anxiety is said to be prevalent among 20-35% of adults and 40% of children (McDonald, 2001; Zeidner, 1998). Congruently, Arnold (2002) indicated that the level of test anxiety decreases with age; indeed, second grade students score significantly higher in test anxiety when compared to sixth graders. Moreover, according to a current meta-analytic review, test anxiety is more prevalent among middle school students (Von der Embse, Jester, Roy & Post, 2018). In terms of gender, it has been shown that females have higher levels of test anxiety than males (Arnold, 2002; Núñez-Peña, Suárez-Pellicioni, & Bono, 2016; Ely & Jastrowski-Mano, 2019; Danthony, Mascaret, & Cury, 2019). A study conducted among elementary school children concluded that central exams are more anxiety-provoking than classroom testing (Segool, Carlson, Goforth, von der Embse, & Barterian, 2013). In addition to these, test anxiety was found to be a significant negative predictor for life satisfaction, self-esteem, and optimism among Turkish high school students (Çıkırıkçı, Erzen, & Akistanbullu-Yeniçeri, 2019).

The University Entrance Examination in Turkey

Transition to a university can be a stressful occasion. Wilson and Gillies (2005) have stated that lower levels of self-efficacy are associated with higher levels of stress in relation to the transition to university. In Turkey, there is stiff competition for entering the university, which leads to high anxiety among the candidates. After 12 years of primary and secondary education, students have to struggle to attend a university.

Each year, a central university exam is organized by the Measurement, Selection, and Placement Center (ÖSYM). The exam is conducted in two sessions, and only those who surpass the minimum required score in the first session can move on to the second stage of the exam. Millions of students compete to achieve the scores necessary for registering in universities. In 2019, only 904,176 of more than 2.3 million applicants were able to enter a higher education institution, including degree and associate degree programs in both state and private, non-profit universities (ÖSYM, 2019).

The style, duration, content, and even the name of the exam changes almost every year. In such a competitive and chaotic environment, a network of people is involved in helping students qualify to enter the universities. To achieve this aim, private after-school classes and/or private tutoring sessions are designed to prepare the students for this vital exam. This extremely expensive preparation system is carried out in addition to the regular high school structure. Çolak (2009) argued that in Turkey, the university entrance exam is considered the only way of acquiring a profession, and this requires eliminating others and succeeding in the exam. She argued that the system should be transformed into a less anxiety-provoking one.

A study conducted in Turkey with applicants to the university entrance exam, which takes place during the senior year of high school, revealed that these students were potential sufferers from depression (Yıldırım, Ergene, & Munir, 2006). Suicidal thoughts and attempts were also found to be high among a similar group of students in a study by Eskin, Ertekin, Dereboy, & Demirkıran (2007). Erzen and Odacı (2016) conducted a study among Turkish senior high school students in which they found that test anxiety is negatively correlated with secure attachment and self-efficacy. It was positively correlated with dismissive and fearful attachment styles. In addition, they found that the onset of anxiety about the university entrance exam occurs very early (Şahin, Günay, & Batı, 2006). This study also revealed that female students and students who did not study regularly felt more anxiety in relation to the exam.

Test Anxiety in Relation to Personality and Parental Attitudes

Personality and parental factors have been given great attention in the literature in relation to test anxiety. Indeed, the association between test anxiety and personality has become a major research topic. For example, Akbari, Bakht, Khaledi, Bajvar, and Hovayzaee (2012) examined the association between the Five Factor personality traits and test anxiety, and found that among personality factors, neuroticism and extraversion significantly and positively correlated with test anxiety. On the other hand, Khosravi and Bgdeli (2008) found that neuroticism and test anxiety correlated positively, but there was no correlation with extraversion.

In terms of this controversy, van de Velde (2015) claimed that “unlike neuroticism, which has a high negative connotation, the meaning of extraversion is not so clear cut” (p. 9). Hoferichter, Raufelder and Eid (2014) stated that high quality student-student relationships were associated with low levels of neuroticism and low levels of test anxiety. In fact, the results of other studies investigating the relationship between extraversion and test anxiety provided contradictory outcomes (Dobson, 2000; Khosravi & Bgdeli, 2008). However, the literature has been consistent about the positive correlation between neuroticism and test anxiety (Akbari et al., 2012; Khosravi & Bgdeli, 2008; van de Velde, 2015).

Parental attitudes towards their children have been another major research area among the studies related to test anxiety, and particular parental behaviors were shown to influence children’s performance in a negative way. For example, the families’ expectations were found to have a positive correlation with the children’s test anxiety levels (Brandmo, Braten, & Schewe, 2019). Moreover, it was claimed that when a child internalizes the parent’s expectations or restraints related to success, the child’s subsequent level of test anxiety increases (Fan & Chen, 2001).

Likewise, some of the findings addressed the association between parental perfectionism and children’s test anxiety (Besharat, 2004). In terms of socially prescribed perfectionism, Sarason (1960) claimed that test anxiety occurs when a student’s performance does not fit into a parent’s unrealistically high expectations. In fact, when the parents’ expectations or criticism levels were high, they could contribute to creating perfectionism in adolescents (Damian, Stoeber, Negru & Băban, 2013) and young adults (Yoon & Lau, 2008).

The levels of parental control, parental support and acceptance, and parental involvement in their child’s academic studies have been among other research areas focusing on the link between parental attitudes and test anxiety. In terms of con-

trol, it has been stated that when the level of parental control is high, a child's test anxiety increases, and his or her academic success decreases (Assor, Kaplan, Kanat-Maymon, & Roth, 2005). Similarly, according to the study conducted by Gherasim and Butnaru (2012), if parental control is strong, then students have higher levels of stress and worry related to academic studies.

On the other hand, parental support and acceptance predicted academic resilience (Bodovski, & Youn, 2010). Not surprisingly, according to a study conducted among eighth graders, the students who lacked family support had higher levels of test anxiety, whereas spending time with family members decreased their level of test anxiety (Durualp & Aral, 2008). In addition, positive parenting was related to lower levels of anxiety among high school students (Li & Prevatt, 2008). In terms of parental involvement in academic studies, the findings suggest that a student's perception of the level of parental "over-involvement" in academic work enhances his or her test anxiety (Shadach & Ganor-Miller, 2013).

A study conducted among Chinese adolescents compared mothers' and fathers' warmth and academic pressure on test anxiety. Academic pressure imposed by fathers had stronger effects than mothers' behavior on test anxiety (Quach, Epstein, Riley, Falconier, & Fang, 2015). Four facets of test anxiety (worry, emotionality, interference, and lack of confidence) were examined among German adolescents. It was found that for girls, perceived maternal pressure was positively associated with emotionality and interference; on the other hand, for boys, perceived paternal pressure and support were positively associated with interference and worry (Ringeisen & Raufelder, 2015).

The Current Study

In Turkey, becoming a university student is a culturally valued accomplishment, and qualifying for university entrance involves a lengthy and painful process. University graduation is perceived to be the prerequisite for a reputable job and higher social status. Therefore, this pressure leads to high levels of test anxiety among students. The issue of test anxiety among university entrance exam applicants in Turkey has highly practical implications for public-health-related outcomes.

The present study aimed to investigate the factors associated with test anxiety related to the university entrance exam. Although the university entrance exam is a highly significant topic in Turkey, parental effects on test anxiety have not been specifically investigated. The authors hypothesized that parental attitudes significantly predict test anxiety even after the effects of neuroticism, which has an established positive association with test anxiety, were controlled for. Specifically, control by either parent was expected to be positively associated with test anxiety, whereas acceptance by either the mother or father was expected to be negatively associated. Since gender and GPA are also expected to be associated with test anxiety, their effects were statistically controlled for in the preliminary steps of the analysis.

Therefore, the main aim of this present study was to examine the effects of the mothers and fathers' attitudes separately on the test anxiety of their children, beyond the effect of other risk factors. The rationale for this hypothesis was based on Turkey's cultural context in terms of autonomy and relatedness within the framework of Kağıtçıbaşı (1996). She pointed out that Turkish culture has individualistic and collectivistic aspects that influence both parenting and teaching practices.

Method

Participants

One hundred and two participants (77 females and 25 males) between the ages of 14 and 19 ($M = 16.67$, $SD = 1.26$) constituted the sample for the study. Among the participants, 95.1% were high school students (grades 9 to 12) and 4.9% had graduated from high school within the past 12 months and were preparing to take the next university entrance exam for the second time. Their current GPA scores (or those at the time of graduation) ranged from 57 to 98 on a scale of 100 ($M = 85.07$, $SD = 9.92$). A total of 4.9% of the participants did not report their GPA score.

Instruments

The following instruments were distributed to the participants in a counter balanced manner.

Test Anxiety Inventory (TAI): The TAI was developed by Spielberger (1980), and its Turkish standardization was completed by Öner (1990). The inventory consists of two subscales (worry and emotionality) and has 20 items in total. It is 5-point Likert-style scale ranging from “1 = never” to “5 = always.” The Turkish form of the inventory has adequate psychometric properties and test-retest reliability ($r = .70-.90$ for both subscales and total score). The internal consistency coefficient for the total score was .46, and it was .43 for both subscales. The total score of test anxiety was used in the analysis of the current study, and the internal consistency was calculated as $a = .94$.

Measure of Child Rearing Styles (MCRS): The MCRS was developed by Sümer and Güngör (1999) with a Turkish sample in order to assess perceived parenting styles. The scale aims to assess two main parenting dimensions (acceptance/involvement and strict control/supervision) via 22 items. It is 4-point Likert-style scale ranging from “1 = totally incorrect” to “5 = totally correct.” The internal consistency coefficient for the perceived parental acceptance by both mother and father was .94, whereas those for the perceived strict control/supervision of mother and father were .80 and .70, respectively. In the present study, participants rated the perceived parenting styles for both parents separately. The internal consistencies for perceived strict control/supervision by mother and father were .85 and .83, whereas those for acceptance by mother and father were .90 and .91, respectively.

Basic Personality Traits Inventory (BPTI): The BPTI is a 45-item inventory developed in Turkish culture to assess six dimensions of personality based on the Big Five personality model: 1) openness to experience; 2) conscientiousness; 3) extraversion; 4) agreeableness; 5) neuroticism; and 6) negative valence (Gençöz & Öncül, 2012). It is a Likert-style scale with 5 points ranging from “1 = does not apply to me” to “5 = definitely applies to me.” The scale’s internal consistency coefficients range between .71 and .89. However, in the current study, the internal consistencies of the five scales ranged from .73 to .85, except for the sixth, *i.e.*, the negative valence subscale, for which Cronbach’s alpha was found to be .49. Thus the negative valence factor was excluded from the analysis due to its low reliability coefficient. Therefore, the original five personality traits were used in the current analysis.

Procedure

Approval was obtained from the university's ethics board. The prospective participants were the applicants for the central university examination, who were invited to the campus for an open day event. For the students whose ages were lower than 18 years, parental approvals were sought. They attended presentations about the academic programs, campus life, and real-time classes of their choice.

In addition to those presentations, the applicants had the option of attending a three-hour long workshop on test anxiety; that was the group which ultimately constituted the sample for the current study. The fact that only volunteers attended that workshop on test anxiety, indicates that they might have had some sort of anxiety relative to the university entrance exam. Participants in the workshop were invited to participate in "research which aims to investigate the causes of test anxiety." In the first part of the workshop, informed consent forms were provided, and the questionnaire packages were administered to the participants just before the seminar. In the second part, an interactive seminar about general anxiety, test anxiety, and coping strategies was led by the second author, followed by a progressive relaxation exercise administered by the third author.

Results

In order to investigate test anxiety, we conducted a series of analyses. Initially, Pearson Correlation analyses were undertaken to examine the zero-order associations of the predictor variables with the levels of test anxiety (criterion variable). We counted correlations greater than .30 as moderate, and those greater than .60 as high (Dancey & Reidy, 2007); the results revealed mostly low to moderate correlations among the variables.

Among personality traits, test anxiety was found to be positively correlated with neuroticism ($r = .48, p < .01$) and negatively correlated with extraversion ($r = -.23, p < .05$). Among perceived parenting attitudes, test anxiety was positively correlated with paternal control ($r = .26, p < .01$) and maternal control ($r = .24, p < .05$). Finally, test anxiety was positively associated with a low GPA ($r = .43, p < .01$).

A hierarchical multiple regression analysis (via the stepwise method) was conducted to examine the predictive values of the perceived parental attitudes, beyond the effect of personality traits and the other risk factors on test anxiety (see *Table 1* for the results). Prior to the analysis, the variables were assessed for multicollinearity by examining the variance inflation factor (VIF); no predictor was found to be affected by multicollinearity.

Within the hierarchical regression analysis, the ordering of the sets of predictors was determined in line with the proposed hypotheses. The variables were entered via the stepwise method into the equation in three steps: first, age, gender, and GPA (control variables); second, the six basic personality traits (*i.e.*, openness, conscientiousness, extraversion, agreeableness, neuroticism, and negative valence); and third, four perceived parental attitudes (*i.e.*, paternal control, paternal acceptance, maternal control, and maternal acceptance). The stepwise method revealed the significant predictors in each step within the regression analysis. (see *Table 2*).

Table 1

Descriptive statistics for the measures

	Range (Min.-Max.)	Mean	Standard deviation
<i>Test Anxiety</i>	1.20–4.90	2.82	.88
<i>Personality Traits</i>			
Extraversion	1.25–5.00	3.78	.79
Conscientiousness	1.25–5.00	3.50	.84
Agreeableness	2.75–5.00	4.36	.51
Neuroticism	1.33–4.89	2.99	.78
Openness	1.50–5.00	3.85	.65
<i>Parental Attitudes</i>			
Mother Acceptance	1.27–4.00	3.14	.63
Mother Control	1.27–3.91	2.38	.57
Father Acceptance	1.09–4.00	2.88	.67
Father Control	1.00–4.00	2.22	.54

Table 2

Hierarchical regression results for variables predicting test anxiety

Criterion Variable	Test Anxiety					
	F _{change}	df	T (within set)	β	pr	R ²
<i>Set of Predictors</i>						
<i>Control variables</i>						
GPA	12.27**	95	-3.5**	-.34	-.34	.11
Gender	10.73**	94	3.28**	.32	.32	.21
<i>Personality Traits</i>						
Neuroticism	25.35**	93	5.04**	.43	.46	.38
<i>Parental Attitudes</i>						
Paternal Control	8.03*	92	2.83*	.23	.28	.43
Paternal Acceptance	7.98*	91	2.82*	.23	.28	.47

Note: *df* = degree of freedom. * $p < .01$, ** $p < .001$

The analysis regressing the test anxiety measure revealed (see *Table 1*) significant associations of the control variables with test anxiety in the first step. Accordingly, GPA ($\beta = -.34$, $t [95] = -3.5$, $p < .001$) explained 11% of the variance ($F_{\text{change}} [1, 95] = 12.26$, $p < .001$), and gender ($\beta = .32$, $t [94] = 3.28$, $p < .001$) increased the explained variance to 21% ($F_{\text{change}} [1, 94] = 10.73$, $p < .001$).

In the second step, neuroticism was significantly associated with test anxiety ($\beta = .43$, $t [93] = 5.04$, $p < .001$), and it increased the explained variance to 38%, ($F_{\text{change}} [1, 93] = 25.35$, $p < .001$).

In the third and last step, paternal control ($\beta = .23$, $t [92] = 2.83$, $p < .01$) revealed a significant association with test anxiety, which increased the explained variance to 43% ($F_{\text{change}} [1, 92] = 8.03$, $p < .01$). Paternal acceptance ($\beta = .23$, $t [91] = 2.82$, $p < .01$) was also significantly associated with test anxiety, and it increased the variance to 47%, ($F_{\text{change}} [1, 91] = 7.98$, $p < .01$).

Although the zero-order correlation of paternal acceptance with test anxiety was not significant, the regression coefficient was found to be significant in the relevant multiple regression model. Horst (1941) defined this statistical case as the *suppression effect* (as cited in Watson, Clark, Chmielewski, & Kotov, 2013).

To determine the suppressor variables in the model, a series of multiple regression analyses was conducted, by omitting the predictors one at a time, and then examining the changes in the beta coefficients. Accordingly, the inclusion of paternal control and paternal acceptance together in the model results in classic suppression and improves the predictive power of both predictors on test anxiety (see also Watson et al., 2013). Zero-order correlations among these variables were also examined and showed that paternal acceptance was not significantly correlated with paternal control ($r = -.19$, $p > .05$) and test anxiety ($r = .12$, $p > .05$). Maternal control and acceptance were not significant predictors and thus were excluded in the final model.

To sum up: Five factors had significant associations with test anxiety. They were GPA, gender, neuroticism, paternal acceptance, and paternal control. According to these results, having a lower GPA score, being female, showing an increased level of neuroticism, and reporting an increased level of perceived paternal acceptance, as well as perceived paternal control, were associated with higher levels of test anxiety.

Discussion

University education is highly valued in Turkey, and the central testing procedure is lengthy, difficult, and anxiety provoking. This study was conducted to explore the factors (*i.e.*, demographics, GPA, personality characteristics, and perceived parental attitudes) related to test anxiety. The results revealed that having a lower GPA score, being female, showing an increased level of neuroticism, as well as increased levels of paternal control and paternal acceptance, were associated with higher levels of test anxiety. Therefore, the control variables and personality factors revealed the expected results, in line with the literature (Akbari et al., 2012; Arnold, 2002; Assor et al., 2005; van de Velde, 2015).

In discussing parental attitudes, the literature suggests that parental control has a positive association with test anxiety, whereas parental acceptance has a negative one (Assor et al., 2005; Bodovski, & Youn, 2010; Gherasim, & Butnaru, 2012). Therefore, the results of the present study were in line with previous findings and supported the presented hypothesis based on perceived control by fathers (paternal control). They indicated that the more control the adolescents perceived from their fathers, the more anxiety they experienced relative to the university entrance exam.

But a positive relationship was also unexpectedly found between test anxiety and paternal acceptance. According to the results of a recent study conducted with Turkish university entrance exam applicants, test anxiety is significantly associated with attachment styles and maternal variables such as mothers' anxiety levels (Yılmaz-Aydın, 2018).

Surprisingly, that was not the case in our study. Indeed, no significant association was observed in relation to maternal variables in the regression model, either for control or acceptance. This difference in the findings may be a result of the divergence of the focal points, because the previous research did not integrate the variables associated with fathers, only focusing on state-trait anxiety levels of mothers. This divergence in the findings suggests the need for discussion in relation to the sociocultural and economic norms of Turkish society.

The university entrance exam preparation period creates an economic burden for families in Turkey (Tansel & Bircan, 2004). This process involves private afterschool preparation classes and extensive private tutoring. These classes and tutoring, as well as purchasing printed material, are indeed expensive. Although times are changing, the father is still the financial authority figure within Turkish culture, even though he may not be the only breadwinner or the head of the household (Kaya, 2014; Şimsek & Öner, 2015; Sunar & Okman-Fişek, 2005). Adolescents who acknowledge and appreciate the economic burden on their fathers imposed by their education, can thus perceive their father's acceptance (*i.e.*, approval and support) as a source of stress.

This can also explain the suppressor effect observed in the regression model when the paternal attitude variables are included together. Paternal control and acceptance variables might share a common factor such as "induced expectations," when examined in association with performance/success related variables such as test anxiety. Therefore, paternal acceptance, inherently a positive factor, might be perceived negatively by an adolescent. Parental acceptance can refer to psychological pressure to succeed and meet the expectations of the financial source (the father), which in turn leads to increased levels of test anxiety. Indeed, during the discussions between the researchers and the participants at the seminar sessions, the students reported their anxiety about putting an economic burden on their families, and the possibility of disappointing their parents by not being able to meet their expectations.

Conclusion

The results of the present study revealed that the explained variance accounted for by these predictors (*i.e.*, GPA, gender, neuroticism, paternal control, and paternal acceptance) was substantially high (47%), indicating the crucial contribution of these risk factors to test anxiety. Therefore, further implications of this study can be discussed within clinical application settings, particularly for similar cultural contexts and systems. Ergene (2003) stated that more research is necessary regarding the test-day anxiety reduction programs for primary, secondary, and high school students. In line with that suggestion, the results of the current study revealed that test anxiety intervention programs must involve the students and their parents to-

gether; in particular, fathers' collaboration should be emphasized. Furthermore, addressing a student's emotional stability, and improving his or her academic performance with the involvement of available education resources, can also help to decrease test anxiety.

Although the system relating to the university entrance exam in Turkey changes frequently, it seems unlikely that it will ever eliminate the pressure on the students and their families. Needless to say, the schools and the afterschool preparation agencies function within the same hectic environment. All the public and private schools in Turkey, as well as the above-mentioned agencies, integrate counsellors and psychologists into their systems. However, their work is mainly focused on issues relating to academic achievement, such as teaching tactics to improve scores, or concentration and time management. Therefore, the work relating to test anxiety is fairly limited.

Although the systems vary, university entrance procedures are critical in most countries. This study could therefore contribute to the test anxiety phenomenon relating to the university entrance exam not only at the national level but also internationally.

The results of this study indicated that the concept of test anxiety is not only related to the testing procedures but is also associated with perceived family relations. Bearing this in mind, school psychologists should focus on the students' perceptions in individual sessions. Involving the parents in this counselling system could also be beneficial. The school system might take these findings into consideration to design and implement test anxiety interventions at the individual and familial levels. Offering short-term intervention sessions within high schools might be a solution. Providing alternative pathways for university entrance rather than a central exam might help reduce the test anxiety among applicants. Obviously, this approach might require more global attention.

Limitations

This study had interesting outcomes, but they should be discussed within its strengths and limitations. The participants were recruited through an invitation to a test anxiety workshop held by the psychology department of a university. Thus, they already had concerns about test anxiety, and although they were not diagnosed, many of them reported already having some physical symptoms of anxiety. Therefore, this group can be considered as more of a subclinical group rather than a normal section of the society, which might provide more information about the nature of the test anxiety

Additionally, the sample was relatively small, with the number of females triple that of males. The mean GPA of the participants was also relatively higher than any average high school student ($M = 85.07$), indicating that the present sample of students represented high achievers with high expectations and anxiety. Although the sample was not normally distributed and homogeneous on these variables, these variables were statistically controlled for in the preliminary steps of the present analysis, and their predictor values were not part of the main hypothesis of the present study.

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‘Diagnosis of Basic Learning Skills Task Battery’ Modified for Engineering Students

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Background. The higher education system today requires students to be able to conduct independent academic work outside the educational system. Some data has been developed on the general educational skills of students; however, the available works are most often devoted to the skills of students in the humanities, yet in technical fields such as engineering, scientific knowledge becomes outdated much faster, which is associated with the global digitalization of society.

Objective. To assess the Diagnosis of Basic Learning Skills Task Battery (Metodika diagnostiki osnovnykh uchebnykh umenii) as modified for engineering students.

Design. The study was conducted in several stages. First, we created six sets of tasks for assessment of basic learning skills, based on the subject matter of engineering disciplines for students at three educational stages (first-year students, fourth-year students and second-year master students). Next, engineering students at different educational stages at Moscow Technological University (N = 135) took part in testing of the proposed task battery. They were also administered the Diagnosis of Supplementary Learning Skills Inventory by Ilyasov (questions for self-assessment), and a survey of academic performance and socio-demographic variables. Skills of memorization and consolidation of knowledge were not assessed in the current study.

Results. Confirmatory factor analysis allowed us to establish high convergent validity of the task battery ($p = 0.001$). Internal consistency of the separate scales of the battery was acceptable (Cronbach’s α ranged from 0.692 to 0.839). There were significant positive connections between the modified task battery for diagnosis of basic learning skills and the battery for diagnosis of supplementary learning skills, academic performance, and educational stages.

Conclusion. The results demonstrate that the modified battery is a valid and reliable tool for measuring basic learning skills.

Keywords: educational psychology, learning skills, engineering students, task battery, convergent validity

Introduction

Composition and Properties of the Learning Skills

The modern system of university education in the Russian Federation is characterized by an increased ratio of unaided, self-sustained student activity in acquisition of subject knowledge and skills. The reason is the transition to the European educational model, characterized by increasing social and professional mobility of under- and postgraduates, conversion to a system of continuous and dual education, and the need to improve graduates' competitiveness. The main goal of the ongoing modernization of the higher educational system is to develop the student's educational independence. The formation of learning skills, the universal ability to carry out educational activity unrelated to its subject matter, has a particular influence on the development of that independence (Hattie, Biggs, & Purdie, 2013; Mamaril, Li, Usher, Economy, & Kennedy, 2016; Mitrofanova & Simonyan, 2016, Marra, Kim, Plumb, Hacker, & Bossaller, 2017; Uden & Dix, 2004).

The organization of this activity for students is associated with the increasing role of the concept of Lifelong Learning (Butenko et al., 2017; Knapper & Cropley, 2000). The ability to learn throughout life is crucial for engineering students, as they must treat their careers and skill sets as dynamic and permanent update required (ABET, Inc., 2013; Smerdon, 1996).

There are two groups of researchers studying learning skills. The first group understands them as the capacity for metacognition. These skills include memory, thinking, and intelligence through schematization of concepts, learning strategies, self-reflection in learning, motivation, and control (Feuerstein, Rand, Hoffman, & Miller, 1980; Flavell, 1987; Zimmerman, 2002). The second group adheres to the competence approach, according to which the primary role in the ability to learn belongs to the needs of society. For them, the ability to learn is characterized by competent behavior, which includes a cognitive component, control of affect and socialization, general educational and subject skills (Hautamaki et al., 2002; Raven & Stephenson, 2001).

It is important to note some commonality among these concepts. In general, learning skills can be subdivided into the *basic skills* of acquisition, construction, and consolidation of subject knowledge in the student's experience, and *supplementary skills*, as a conscious processing of psychological and pedagogical factors affecting basic learning skills (Ilyasov & Simonyan, 2018).

From this point of view, we rely for our theoretical background on Ilyasov's concept of the composition and properties of learning skills (see, e.g., Graf, Ilyasov, & Lyaudis, 1981; Ilyasov et al., 1984; Ilyasov, 1986; Ilyasov, 2016; Ilyasov & Simonyan, 2018; Lyaudis, Ilyasov, Malskaya, & Mozharovskii, 1989).

According to Ilyasov's concept, the process of constructing knowledge consists of perception, logical and creative thinking, and the understanding of speech. These can be carried out dependently (based on information provided), independently, or by combining dependent and independent types of knowledge construction (Ilyasov et al., 1984). Learning skills are cognitive and mnemonic processes and their development, along with the assimilation of subject knowledge in various fields of science and practice, is the essential task of any training program (Khutorskoy,

2003; Kraevsky, 2003; Marra et al., 2017). Cognitive and mnemonic processes are in turn linked with such psychological functions as motivation and will, emotions, and self-awareness, influencing cognition as a whole (Gordeeva & Sichev, 2017; Hautamaki et al., 2002; Ilyasov, 2016; Leontiev & Klein, 2017; Raven & Stephenson, 2001).

The development of supplementary learning skills can be described as a reflective influence on psychological and pedagogical factors in the learning process. Those skills develop through the increase of a person's awareness of their qualities, abilities, and environmental characteristics (Griffin, 2018).

Students' academic performance may depend only on more than self-regulation, metacognition, and motivation. Some authors have found that less than half of first-year engineering students end up graduating in engineering (National Academy of Sciences, 2005). Predictors of engineers' academic success include: high school GPA, quantitative skills (ACT, SAT, or GRE), and math scores (Veenstra, Dey, & Herrin, 2008). These can be used as criteria for admission to university, where the students can acquire basic learning skills.

The development of basic learning skills can be represented as the change and increasing sophistication of those skills throughout the learning process. This development takes place continuously in the process of interaction with the student's environment, both subjective and social, and is primarily spontaneous and non-reflective. Often this happens in the process of subject learning at its various stages (Ilyasov & Kostrova, 2017). The combination of reflective and non-reflective factors in the process of subject learning underlies the construction and development of learning skills.

Diagnosis of the cognitive components of learning skills is carried out in many countries when students enter universities as undergraduate and graduate students (SAT, GRE, PISA). However, the data obtained are not considered in terms of the development of abilities, with changes by learning stage and age; the evaluations are more likely to be subject-specific (Griffin, 2018; Sternberg, 2004).

There is some data on the development of students' general learning skills; however, the available works are most often devoted to the skills of students in the humanities, yet in technical fields such as engineering, scientific knowledge becomes outdated much faster, which is associated with the global digitalization of society.

In Russia, there is no commonly adapted tool for diagnosing students' cognitive skills (general learning skills), but an instrument for diagnosing basic (and supplementary) learning skills in the humanities was developed by Ilyasov (2016).

However, the curricula of the humanities and engineering disciplines are naturally quite different. In the humanities, there are courses in knowledge, cognition, teaching and learning (such as philosophy, logic, psychology, pedagogy). The curriculum of engineering courses, on the other hand, includes no courses on cognition other than philosophy, and there are many technical disciplines that are expected to develop students' analytical and logical abilities.

This article presents a modification of Ilyasov's Diagnosis of Basic Learning Skills Task Battery, designed by Aslanova for engineering students in different courses. We present the initial results of the testing and structural validation of this task battery, intended for research and practical purposes.

Methods

Content of the Validated Material

The research used two methods of diagnosing learning skills, one for basic and one for supplementary skills assessment. We also collected personal data (gender, age, year of study) and the academic performance scores of the respondents. The latter was represented by mean scores (academic ratings), rounded to the whole according to mathematical rules to simplify further analysis.

The method for basic learning skills diagnosis was based on technical disciplines, according to the curricula of engineering students. There were six variants of the task battery, each containing 25 tasks to assess students' abilities to construct knowledge in various ways (see Appendix A). We did not include the consolidation of knowledge at this stage of the research.

The first part of the battery tested students' abilities to construct knowledge provided to them in finished form (dependent knowledge). It included five tasks to check their information-decoding abilities, such as perception of the sign form of the elements; actualization of the meaning of linguistic units; reproduction of content; the contextual meaning of words and the ability to distinguish the meaning of words and to use them correctly.

The second part consisted of 11 tasks to diagnose the skills of independent knowledge construction by induction, deduction, and hypothesis formation (using comparison, discrimination, identification, etc.). To do that, the participants had to use their previously acquired subject knowledge.

The third part of the task battery was diagnosing knowledge construction skills involving both dependent and independent methods. This part included eight tasks on the ability to determine the thematic composition, structure, and layout of a text with its graphic image, characteristics of phenomena, types of knowledge presented, etc.

Table 1
Correspondence of the stages of learning

	First stage (first-year students)					
	Second stage (fourth-year students)					
	Specialists: Third stage (second-year master students)					
Bachelors	1st course		1st course		1st course	
	2nd course		2nd course		2nd course	
	3rd course		3rd course		3rd course	
	4th course	Specialists	4th course	Specialists at MSU	4th course	
	Graduated		5th course		5th course	
Masters	1st year		Graduated		6th course	
	2nd year				Graduated	
	Master degree					

Approbation was made on the student samples belonging to the three stages of learning: first-year students, fourth-year students and second-year master students (Table 1).

The Diagnosis of Supplementary Learning Skills Inventory is a self-reporting questionnaire measuring students' level of reflection on their ability to utilize factors of learning (Ilyasov, 2016). The inventory consists of 26 questions for self-assessment related to studying at the university ("When studying at the university, I ..."), with possible answers "never", "rarely", "often", and "always", on a Likert-like scale from 0 to 3 points. The following scales were distinguished:

- Students' processing of psychological factors of learning, with the following subscales: impact on motivation and will; consideration of one's own cognitive abilities; emotional state regulation; time management while performing educational tasks;
- Students' processing of pedagogical factors of learning, including overcoming learning obstacles.

Processing of the training process was not included in the current research.

Participants

The total sample (N = 135) comprised students from technical universities in Moscow, 65.9% men and 34.1% women, aged from 18 to 33 years (M = 21.6, SD = 3.2). Among them, 37.8% were first-year students, 37% were fourth-year students, 25.2% were second-year master students and graduates.

Procedure

Respondents completed the tasks mainly in groups. Participants from the first-year students group were tested in the second semester of the 2017–2018 academic year and received a pen-and-paper variant of the tasks. Students from both senior groups were tested in the first semester of the 2018–2019 academic year and received computerized variants of the task battery.

The following hypotheses were tested:

1. There are direct positive correlations between basic and supplementary learning skills.
2. Students' academic performance is positively linked to the level of their basic learning skills.
3. Students in first-year courses have a low level of basic learning skills.

Results

Factor Structure of the Task Battery

The factor structure of the task battery was checked to analyze convergent validity. We also performed a reliability test of the scales based on the tasks with the highest factor loadings and a correlation analysis.

The main criterion for validation was the student's academic performance. Relationships were established between the scales of the proposed modified task battery and the indicators of supplementary learning skills and level of education.

A confirmatory factor analysis was performed using IBM SPSS Amos software, during which we relied on the initial assumption of a 3-factor structure of the method. The factors were:

- *Dependent* construction of knowledge;
- *Independent* construction of knowledge;
- *Mixed* construction of knowledge, combining both variants above.

Then, due to the results of the analysis, the original theoretical model was transformed to increase the validity (see Figure 1).

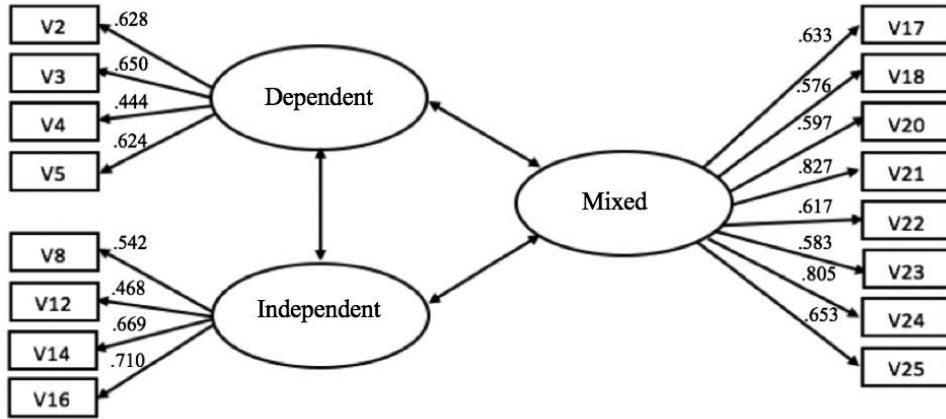


Figure 1. Parameters of the structural model of the Diagnosis of Basic Learning Skills Task Battery scales (N = 135)

Factor loadings of the tasks, indicating high empirical validity of the model are shown in Figure 1. The factors were consistent with the original theoretical scales, but had a lower degree of consistency, so the decision was made to reduce the number of tasks in each factor. This reduction significantly improved the parameters of the structural model (Table 2).

Table 2
Model Fit Summary

Model	CFI	RMSEA	Degrees of freedom	Chi-square	NFI Delta1	AIC
Default model	.931	.058	87	125.777	.819	255.777

Note. CFI = Comparative Fit Index; RMSEA = Root Mean Square Error of Approximation; NFI = Normed Fit Index; AIC = Akaike’s Information Criterion

Internal Consistency of the Scales

The scores’ distribution on the scales was normal or close to normal. The asymmetry values ranged from -0.21 to -0.78, the excess was from -0.78 to 0.52.

The internal consistency of the tasks on the scales was acceptable, so the scales needed no further changes. As expected, with the general sample, the scales showed high positive correlations with each other (measured by Spearman correlation coefficient; significant at $p < .01$) (Table 3).

Table 3

Internal correlations (Spearman correlation coefficient) and descriptive statistics for the scales with the total sample (N = 135)

Scale	Dependent construction of knowledge	Independent construction of knowledge	Mixed construction of knowledge
Dependent construction of knowledge	1	.426**	.420**
Independent construction of knowledge		1	.664**
Mixed construction of knowledge			1
Average value	7.32	5.92	10.62
Standard deviation	2.52	2.05	5.98
Asymmetry	-0.787	-0.374	-0.215
Excess	0.592	-0.023	-0.787
Cronbach's a	0.692	0.719	0.839

Note. ** $p < .01$

Those correlations were repeated when the general sample was split into three parts.

Relationships Between the Scales of the 'Diagnosis of Basic Learning Skills Task Battery' and Students' Academic Performance

Analysis of the relationships of the task battery scales with students' academic performance identified significant correlations (Table 4).

Table 4

Correlation between scales of the test battery and academic performance

Scale of the method	Dependent construction of knowledge	Independent construction of knowledge	Mixed construction of knowledge
Academic performance	.253**	.277**	.282**

Note. ** $p < .01$

The students were then divided into three subgroups (low, average, high), according to the diagnosis of their basic learning skills, using cluster analysis (K-means clustering). An assessment of the differences between clusters (by the Kruskal-Wallis test) confirmed their significance (Table 5).

Table 5

Sample clustering according to the level of basic learning skills (Kruskal-Wallis)

	Low	Average	High	Significance of differences (Kruskal-Wallis H-test)
Dependent construction of knowledge	5.43	7.93	8.41	25.527 p = 0.000
Independent construction of knowledge	3.97	6.36	7.41	51.056 p = 0.000
Mixed construction of knowledge	2.95	11.39	17.85	113.281 p = 0.000
N	37	61	34	

Based on the results of the cluster analysis, it was possible to assess the distribution frequency of various levels of academic performance (ratings) by the levels of their basic learning skills (*Table 6*).

Table 6

Cross-tabulations of differences in learning skills with academic performance

		Level of basic learning skills		
		Low	Average	High
Academic rating	3	45.0%	40.0%	15.0%
	4	28.3%	54.3%	17.4%
	5	22.7%	42.4%	34.8%

The table shows that students whose average rating was close to the “satisfactory” mark (3) mostly demonstrated low (45%) or average (40%) basic learning skills. Students with the rating “good” (4) generally had average learning skills (54.3%). Students with an average rating close to “excellent” (5) showed average and high basic learning skills.

Relationships Between the ‘Diagnosis of Basic Learning Skills Task Battery’ and the ‘Diagnosis of Supplementary Learning Skills Inventory’

The correlational analysis (Spearman correlation coefficient) between the scales of the Diagnosis of Basic Learning Skills Task Battery and the Diagnosis of Supplementary Learning Skills Inventory showed significant positive correlations between the Mixed construction of knowledge scale and the psychological factors of learning subscale (*Table 7*). The total score in the Diagnosis of Basic Learning Skills Task Battery also had significant positive correlations with the cognitive abilities subscale and the time management subscale of the Diagnosis of Supplementary Learning Skills Inventory.

Table 7

Correlations (Pearson correlation coefficient) between the Diagnosis of Basic Learning Skills Task Battery and the Diagnosis of Supplementary Learning Skills Inventory, with the general sample (N = 135)

	Dependent construction of knowledge	Independent construction of knowledge	Mixed construction of knowledge	Total
Motivation	-	-	.195*	
Cognitive abilities	-	-	.273**	.237**
Emotional state	-	-	.193*	
Time management in the educational process	-	-	.187*	.183*

Note. ** $p < .01$, * $p < .05$.

We used Multiple Regression Analysis (MRA) to specify the relationships between the scales of the two inventories. The differentiated parameters of each of the two inventories functioned as predictors of the other's total score.

In the first regression model, we found a significant influence of the ability to perform Mixed construction of knowledge on the level of supplementary learning skills (Table 7.1). The other scales of the proposed modified method did not have a significant impact.

Table 7.1

First regression model for the scales of the Diagnosis of Basic Learning Skills Task Battery and subscales of the Diagnosis of Supplementary Learning Skills Inventory

Regression model	Standardized values	t	Level of significance
	Beta		
Constant	36.558	22.340	.000
Mixed knowledge construction	.216	2.522	.013

The inverse regression model also showed a significant contribution of the cognitive abilities subscale in the development of basic learning skills (Table 7.2).

Table 7.2

Second regression model for the scales of the Diagnosis of Basic Learning Skills Task Battery and subscales of the Diagnosis of Supplementary Learning Skills Inventory

Regression model	Standardized values	t	Level of significance
	Beta		
Constant	17.061	6.532	.000
Cognitive abilities	.237	2.778	.006

Differences in Basic Learning Skills Depending on the Stage of Learning

There were significant differences between the students from different stages of higher education in their basic learning skills, according to the proposed modified method. On average, students increased their basic learning skills (on all the scales) while proceeding through the learning stages (see *Table 8*). The most significant gain was in the Mixed construction of knowledge scale.

Table 8

Differences in the level of basic learning skills depending on the stage of learning (points)

	First-year students	Fourth-year students	Second-year master students	Significance of differences (Kruskal-Wallis H-test)
Dependent construction of knowledge	5.76	8.0	8.5	27.526 p = 0.000
Independent construction of knowledge	4.8	6.2	7.2	29.261 p = 0.000
Mixed construction of knowledge	7.7	10.8	14.6	28.670 p = 0.000
N	51	50	34	

Discussion

Based on the analysis of the results, it can be argued that the modified battery is a valid and reliable tool for measuring basic learning skills. This is consistent with earlier findings that the level of basic learning skills is a predictor of academic performance of engineering students (ABET, Inc., 2013; Veenstra, Dey, & Herrin, 2008). The internal consistency between the tasks on the scales of the modified battery was acceptable.

Our research revealed the structure of basic learning skills for Russian engineering students; however, our Diagnosis of Basic Learning Skills Task Battery is suitable for use in all countries that adhere to Bologna system of education. Our results confirm earlier findings that general learning skills today play a valuable role in higher education (Hattie et al., 2013; Mamaril et al., 2016; Marra et al., 2017).

Correlational analysis showed significant correlations with psychological factors of learning for the Mixed construction of knowledge scale of the Diagnosis of Basic Learning Skills Task Battery. Multiple regression analysis revealed a significant effect of the ability to use Mixed construction of knowledge on the level of supplementary learning skills development. This is consistent with results that cognitive and mnemonic processes are linked with such psychological functions as motivation and will, emotions, and self-awareness (Gordeeva & Sichev, 2017; Hautamaki et al., 2002; Ilyasov, 2016; Raven & Stephenson, 2001).

Evaluation of the frequency distribution of students' academic rating depending on their proficiency in basic learning skills revealed that the students whose

average academic rating was close to the "satisfactory" mark demonstrated mostly low basic learning skills; students with a rating of "good" generally had average learning skills, while students with an average rating close to "excellent" showed average and high learning skills. This proved that the characteristics of academic success for engineering students include their learning skills (Veenstra, Dey, & Herrin, 2008).

The research showed significant differences in learning skills among the three stages of learning represented in the sample. So, as students went through various learning stages, their learning skills increased on all the scales, which is consistent with earlier findings that the process of basic learning skills development can be represented as the change and increasing sophistication of those skills throughout the learning process (Ilyasov & Kostrova, 2017).

Thus, our hypotheses were confirmed. In general, the results were consistent with the theoretical principles and demonstrated the structural validity of the Diagnosis of Basic Learning Skills Task Battery, which can be used to solve diagnostic problems.

Limitations

The research had some limitations. All participants were students from Moscow, and the number of participants was not equal in the different samples. In addition, the only criterion for validation at this stage is academic performance, in the absence of external validity of the test.

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Appendix A

Example of a Task from the Dependent Scale of the ‘Diagnosis of Basic Learning Skills Task Battery’ for First-Year students

Read the passage and answer the question based on the text:

A trigger is the simplest memory element. All other nodes are based on triggers. Processor memory is usually divided into two essentially opposite types: internal (cache memory) and external (RAM). At the same time, the cache memory is absolutely static and has arbitrary access. Its main advantage is its speed.

Question:

In this context, what property of RAM is present indirectly?

Describe it here:

Suggested answer: The author mentioned that the two types of memory are essentially opposite, which means that RAM is dynamic, with a complex access system and low performance.

Explanation of the answer: In the answer to this question, it is important to mention the dynamism of RAM, since the author talks about the type of “movement “ of cache memory, and also explains that the two types of memory are essentially opposite to each other.

Appendix B

Example of a Task from the Independent Scale of the ‘Diagnosis of Basic Learning Skills Task Battery’ for fourth-year students

To complete the task, you must remember the law of non-contradiction:

Two incompatible propositions cannot be simultaneously true, one of them must be false (it is not true that A and not A).

Question:

In the technical wing of the University, the physics and computer science classrooms are located opposite each other. Fourth-year students decided to make fun of the first-year students and hung signs on the doors of classrooms:

1. “In one of these classrooms is the computer science room”, on the door of room A;
2. “The physics room is not located here”, on the door of room B.

The first-year students know that both inscriptions are either true or false. Provide a brief solution to the problem and fill in the table (“+” — Yes; “-“ — no) in accordance with the correct location of the rooms.

	A	B
The physics Room		
The computer science room		

Explanation of the answer:

If the sign on room A is correct, then:

	A	B
The computer science room	+	+

Logical equation: $X = A \mid B$ (or)

If the sign on room B is correct, then:

	\bar{A}	\bar{B}
The physics room	+	+

Logical equation: $Y = \bar{A}$ (not A)

Remember the law of non-contradiction:

$(\bar{X}\bar{Y}) \mid (XY) = 1$, that means

$$((A \mid B) * \bar{A}) \mid ((\bar{A} \mid \bar{B}) * \bar{\bar{A}}) = 1$$

Simplify the equation step by step:

1. $((A \mid B) * \bar{A}) = (A\bar{A}) \mid (B\bar{A})$
2. $((\bar{A} \mid \bar{B}) * \bar{\bar{A}}) = \bar{A}\bar{B}$
3. $(A\bar{A}) \mid (B\bar{A}) = 0 \mid B\bar{A}$
4. $\bar{A}\bar{B} = 0$

Let's go back to the original equation:

$$0 \mid B\bar{A} = 1$$

$$B\bar{A} = 1$$

Thus, B and not A are true; that is, a correctly filled out table will take the form:

	A	B
The physics room	+	-
	\bar{A}	\bar{B}
The computer science room	-	+

Appendix C

Example of a Task from the Mixed Construction Scale of the 'Diagnosis of Basic Learning Skills Task Battery' for Fourth-Year Courses

Read the passage and answer the question, whether the proposed conclusion is correct.

<p>Any information system functions in an environment that is a source of input and a consumer of output information. Within such a system, from logging in to exiting, the information flow goes through several stages of processing. As you know, the main stages of information processing include the collection, registration, and primary processing of information, its transmission over the communication channel from the source to the PC, the creation and maintenance of information arrays, processing and formation of output forms, transmission over communication channels from computers to consumers, as well as conversion to a form convenient for the user.</p>		
<p>Conclusion: Information that enters the information system in one way or another forms an information array.</p>		
a) The conclusion is correct	b) The conclusion is not correct	c) Insufficient information for the conclusion

The expected answer: b) The conclusion is not correct.

Explanation of the answer:

The author touches on two main themes in the text: the relationship of information systems with the external environment and the stages of information processing.

The proposed conclusion does not directly affect either of them; however, information about the creation and maintenance of information arrays, as one of the stages of information transformation, is still present in the text. Therefore, we cannot say that there is not enough information for the proposed conclusion, and the proposed conclusion must be recognized as false.