

Cross-cultural aspects of creativity:

A relation with self-actualization and schizotypy

Dissertation

zur Erlangung des akademischen Grades Doktor rerum naturalium (Dr. rer. nat.)

im Fach Psychologie

eingereicht

an der Mathematisch-Naturwissenschaftlichen Fakultät II

der Humboldt-Universität zu Berlin

von Dipl. Psych. Anastasiia Ilinykh

Präsident der Humboldt-Universität zu Berlin

Prof. Dr. Jan-Hendrik Olbertz

Dekan der Mathematisch-Naturwissenschaftlichen Fakultät II

Prof. Dr. Elmar Kulke

Gutachterinnen/Gutachter:

1. Prof. Dr. Elke van der Meer
2. PD Dr. Steffen Landgraf
3. Prof. Dr. Olga M. Razumnikova

Tag der Einreichung: 28.03.2014

Tag der Verteidigung: 15.08.2014

Table of Contents

SUMMARY IN ENGLISH (ABSTRACT)	5
SUMMARY IN GERMAN (ZUSAMMENFASSUNG)	7
1 INTRODUCTION.....	10
1.1 GENERAL OVERVIEW ON CREATIVITY RESEARCH	10
1.1.1 <i>Defining creativity</i>	10
1.1.2 <i>The ‘creative personality’</i>	12
1.2 CREATIVITY AND PSYCHOPATHOLOGY	14
1.2.1 <i>Defining schizotypy</i>	15
1.2.2 <i>Schizotypal personality traits in creative personality</i>	16
1.3 CREATIVITY AND SELF-ACTUALIZATION	17
1.3.1 <i>Defining self-actualization</i>	17
1.3.2 <i>Maslow’s theory of self-actualization</i>	17
1.3.3 <i>Self-actualization and creativity</i>	19
1.4 CREATIVITY FROM CROSS-CULTURAL PERSPECTIVE	20
1.4.1 <i>How culture influences creativity</i>	20
1.4.2 <i>Empirical cross-cultural studies of creativity</i>	22
2 GOALS OF THE DISSERTATION.....	23
3 EMPIRICAL STUDY OF THE RELATION BETWEEN CREATIVITY, SCHIZOTYPY, AND SELF-ACTUALIZATION FROM A CROSS-CULTURAL PERSPECTIVE.....	25
3.1 GENERAL SAMPLE CHARACTERISTICS.....	25
3.2 STUDY 1: “THE DIFFERENCE BETWEEN REAL-LIFE CREATIVE ACHIEVEMENT AND CREATIVITY: THE INFLUENCE OF SCHIZOTYPY AND SOCIAL INTELLIGENCE”	26
3.2.1 <i>Paradigm</i>	26
3.2.1.1. Creativity measures	26
Achievements selection.....	27
3.2.1.2. Individual characteristics measures.....	27
3.2.1.3. Data analysis	28
3.2.2 <i>Results and discussion</i>	28

3.3	STUDY 2: “PREDICTING CREATIVITY AND SELF-ACTUALIZATION IN THE SAMPLE OF RUSSIAN STUDENTS”	29
3.3.1	<i>Paradigm</i>	29
3.3.1.1.	Creativity measures	30
3.3.1.2.	Individual characteristics measures	30
3.3.1.3.	Data analysis	31
3.3.2	<i>Results and discussion</i>	31
3.4	STUDY 3: “CULTURE MAKES THE DIFFERENCES: CREATIVITY-SCHIZOTYPY ASSOCIATION VARIES BETWEEN RUSSIANS AND GERMANS.”	32
3.4.1	<i>Paradigm</i>	32
3.4.1.1.	Creativity measures	32
3.4.1.2.	Schizotypy measures	32
3.4.1.3.	Data analysis	33
3.4.2	<i>Results and discussion</i>	33
4	GENERAL DISCUSSION AND FUTURE DIRECTIONS	35
4.1	SCHIZOTYPAL TRAITS AND CREATIVITY	35
4.2	REAL-LIFE CREATIVE ACHIEVEMENTS	36
4.3	GENDER DIFFERENCES IN CREATIVITY	37
4.4	SELF-ACTUALIZATION AND CREATIVITY	38
4.5	CULTURAL ISSUES OF CREATIVITY AND SCHIZOTYPY	39
5	CONCLUSION	39
6	REFERENCES	40
	ORIGINAL PAPERS	51

Acknowledgements

This dissertation project was funded by the Erasmus Mundus Action 2, Strand 1, European Community Mobility Programme Triple I 'Integration. Interaction. Institution' launched by the Europe Aid Cooperation Office (ESCO), project no. TRIPLEI2010 C123. I would like to thank Matthias Parske for the coordination of this programme at Humboldt-Universität zu Berlin.

My first and foremost appreciation goes to my advisors, Prof. Elke van der Meer, Dr. Steffen Landgraf and Dr. Olga S. Shemelina, for their careful and inspiring supervision and ongoing support during the doctoral period.

I also would like to thank Prof. Olga M. Razumnikova whose support and research has inspired me to investigate the topic of this dissertation. I am very happy that Prof. Razumnikova agreed to review this dissertation.

I am very grateful to Tanja Kutscher who helped in the statistical analysis. I would like to thank Eugenia Bykova for the help in data collection, Dr. Manja Foth, Sebastian Schmidl, Anna Yashanina and Natalya Asanova for the help in test preparation and conduction. I am very grateful to Ludmila Aksenova and Elena Schmidt for their great willingness to help and support me.

My special appreciation goes to my parents. From the very first day, their confidence and emotional support kept my enthusiasm at a constant high.

And finally, I would like to thank my husband Anton Ilinykh who supported me everytime and in everywhere, and who spent lots of hours with our child increasing her creativity.

Summary in English (Abstract)

Creativity – the generation of novel and appropriate ideas – and psychopathology have been associated for a long time. However, the impact of cross-cultural influence has been somewhat neglected in the literature. The present dissertation consists of three separate studies that aimed to examine: (1) the association between creativity and schizotypal personality traits, (2) the association between creativity and self-actualization, and (3) the impact of cross-cultural differences in the creativity – schizotypy association. In parts one and two of this synopsis, an overview of creativity, schizotypy and self-actualization, as well as the research hypotheses and questions are outlined.

Part three consists of three manuscripts. Study 1 investigated the relationship between creativity and real-life creative achievements with positive, negative, and disorganized schizotypal personality traits, as well as with social intelligence. Forty-five German students participated in the study. Creativity was predicted by lower levels of odd speech and constricted affect, and higher levels of verbal expression, odd beliefs, and having no close friends. People with real-life creative achievements showed increased figural originality and decreased schizotypal personality traits (excessive social anxiety, odd speech, and constricted affect) compared to individuals without real-life achievements.

In study 2, 120 Russian students participated. The findings demonstrate that the correlation between creativity and self-actualization is significant in the subscale ‘spontaneity’ only. While creativity is not significantly predicted by self-actualization, purpose in life or self-esteem measures, self-actualization is positively and closely related with self-esteem, purpose in life measures, and empathy components. These results show little association between creativity performance and good mental health.

Study 3 explored the differences in creativity performance and schizotypy across 45 German and 46 Russian students. Structural equation modeling showed a strong negative association between ‘innovative capacities’ (a factor formed by figural originality and verbal originality) and ‘negative schizotypy’. In addition, this association was significantly mediated by culture and gender differences in creativity were found to be culturally specific, as well. Russian women were more creative than German women, whereas German men were more creative than Russian men.

In part four and the concluding part five of the dissertation, the results are comprehensively discussed and evaluated. In sum, the present dissertation demonstrates that (1) creativity is barely related with self-actualization and that, nevertheless, (2) creativity has a strong association with schizotypal personality disorder. However, people with real-life creative achievements showed decreased schizotypy and there are gender differences regarding creative capacities. (3) The creativity – schizotypy link is likely to be moderated by cultural differences between Russians and Germans. Results are discussed with regard to culture-independent validity of the constructs creativity, schizotypy, and self-actualization, with regard to the problem of psychometrical assessment of these constructs, and with regard to a role of creativity in good mental health. Future studies might account for how real-life creativity differs from cognitive creative abilities in other psychopathological and personality aspects, how culture influences the creativity – self-actualization association, and whether the association of creativity with schizotypy and self-actualization is consistent in other age groups. Conclusively, these results contribute to cultural psychology of creativity by extending how the creativity – schizotypy association varies between cultures, as well as by pointing out the differences between real-life creative achievements and cognitive creative abilities. Furthermore, the results extend the humanistic approach showing that self-actualization and creative abilities may not rely on similar personality characteristics.

Summary in German (Zusammenfassung)

Kreativität – die Generierung und Verwertung von Ideen – und Psychopathologie werden schon seit langem miteinander in Verbindung gebracht. Jedoch wurde der Einfluss interkultureller Faktoren bisher weitgehend in der Fachliteratur ignoriert. Die vorliegende Dissertation besteht aus drei separaten Studien, die folgende zusammenhängende Fragestellungen untersuchten: (1) die Assoziation zwischen Kreativität und schizotypen Persönlichkeitseigenschaften, (2) die Verbindung zwischen Kreativität und Selbstverwirklichung und (3) die Auswirkung der kulturübergreifenden Unterschiede hinsichtlich der Assoziation zwischen Kreativität und Schizotypie. Im ersten und zweiten Teil der vorliegenden Synopsis wird ein Überblick über die theoretischen Grundlagen und Forschungsfragen gegeben, sowie Kurzfassungen wesentlicher Ergebnisse in der Literatur diskutiert. Darüber hinaus werden Forschungsfragen herausgearbeitet und Hypothesen formuliert.

Der dritte Teil der Arbeit besteht aus drei zum Teil bereits veröffentlichten Manuskripten. Studie 1 („Unterschied zwischen den tatsächlichen schöpferischen Leistungen und Kreativität: Der Einfluss der Schizotypie und der sozialen Intelligenz“) untersucht den Zusammenhang zwischen Kreativität, tatsächlichen schöpferischen Leistungen (creative achievements) und positiven, negativen und desorganisierten schizotypen Persönlichkeitseigenschaften, sowie den Zusammenhang mit sozialer Intelligenz. Kreativität wurde durch ein niedrigeres Niveau sonderbarer Sprechweise und durch einen eingeschränkten Affekt, sowie durch eine höhere verbale Ausdrucksweise, sonderbaren Glauben und Mangel an engen Freundschaften prädiziert. Menschen mit schöpferischen Leistungen zeigten verstärkte figurale (personale) Originalität und verminderte schizotype Persönlichkeitseigenschaften (exzessive soziale Ängstlichkeit, merkwürdige Sprechweise und eingeschränkte Affekte) in Vergleich zu den Personen, die keine schöpferischen Leistungen im realen Leben nachzuweisen hatten.

Studie 2 („Voraussagende Kreativität und Selbstverwirklichung am Beispiel von Russischen Studierenden“) demonstriert, dass die Beziehung zwischen Kreativität und Selbstverwirklichung nur in der Unterskala Spontaneität signifikant ist. Außerdem zeigt Kreativität geringe Zusammenhänge mit Empathie, Lebenszielen, sowie mit Selbstwertgefühl. Für Kreativität ergab diese Studie nur zwei signifikante Prädiktoren, nämlich Durchdringlichkeit und Spontaneität. Diese Resultate verdeutlichen, dass mentale Gesundheit nicht direkt mit Kreativität assoziiert ist.

Studie 3 („Die Kultur macht den Unterschied: Kulturell bedingte Unterschiede der Assoziation zwischen Kreativität und Schizotypie bei Russen und Deutschen“) untersucht die Unterschiede in der Assoziation zwischen Kreativität und Schizotypie bei Russischen und Deutschen Probanden. Ein strukturelles Gleichungsmodell zeigt eine starke negative Beziehung zwischen „innovativen Kapazitäten“ (ein Faktor, der von der figuralen und verbalen Originalität abgeleitet wurde) und „negativer Schizotypie“. Zugleich wurde die Assoziation zwischen Kreativität und Schizotypie durch einen kulturellen Faktor beeinflusst. Geschlechtsspezifische Unterschiede in der Kreativität wurden ebenfalls auch als kulturspezifisch erfasst. Russische Frauen waren kreativer als Deutsche Frauen, während Deutsche Männer kreativer als Russische Männer waren.

In den abschließenden Teilen vier und fünf der Synopsis werden die Ergebnisse studienübergreifend erörtert und evaluiert. Zusammengefasst zeigt die vorliegende Dissertation, dass (1) Kreativität und Selbstverwirklichung kaum miteinander assoziiert sind, dass (2) Kreativität allerdings stark mit schizotyper Persönlichkeitsstörung verbunden ist, jedoch zeigen Menschen mit schöpferischen Leistungen verminderte Schizotypie-Symptome und es gibt einen Geschlechterunterschiede. Deshalb zeigt diese Dissertation (3), dass die Assoziation zwischen Kreativität und Schizotypie durch einen kulturellen Faktor (Deutsch, Russisch) moderiert wird. Die Ergebnisse werden diskutiert im Hinblick auf die kultur-unabhängige Validität der Konstrukte Kreativität, Schizotypie und Selbstverwirklichung, hinsichtlich psychometrischer

Probleme bei der Erfassung dieser Konstrukte und hinsichtlich der Rolle für die allgemeine und spezifische mentale Gesundheit. Zukünftige Studien sollten eine wie hier vorgeschlagene Unterscheidung zwischen schöpferischen Leistungen und Kreativität als kognitives Konstrukt bzw. als Teil psychopathologischer oder persönlichkeitsrelevanter Aspekte vornehmen. Darüber hinaus sind die Hinzunahme von Aspekten, die Kultur, Geschlecht und Alter unterscheiden, sinnvoll. Unsere Resultate leisten einen Beitrag zur kulturellen Psychologie, indem sie das Wissen erweitern, wie die Kreativität-Schizotypie Assoziation durch kulturelle Faktoren beeinflusst wird und inwieweit schöpferische Leistungen und kognitive kreative Fähigkeiten diesbezüglich divergieren. Dies bedeutet, dass der humanistische Ansatz unterstützt wird, welcher zeigt, dass Selbstverwirklichung und kreative Fähigkeiten nicht unmittelbar auf ähnliche Persönlichkeitseigenschaften zurückzuführen sind.

I INTRODUCTION

What is honored in a country will be cultivated there

- Plato (4th c. BC)

There is no great genius without a touch of madness

- Seneca (c. 4 BC – AD 65)

I.1 General overview on creativity research

I.1.1 Defining creativity

Creativity, as research area, has only a little over fifty years of history. Yet, the number of different theories on this concept is impressive. The most acceptable catalyst for creativity research was Guilford's presidential address to the American Psychological Association in 1950, in which he spelled out the importance of studying creativity (Guilford, 1950). Guilford (1950) specified a basic distinction between two types of cognitive operations: convergence and divergence. Guilford associated convergent thinking as the ability to derive the single best answer to a clearly defined question with the help of psychometric intelligence. Divergent thinking, according to Guilford, is defined as a type of thinking leading towards different directions and generating a set in an equal measure of true answers. As a result of a factorial analysis, factors, important for creative thinking, have been identified: sensitivity to problems, fluency, adaptive flexibility, spontaneous flexibility, lability of ideas, and originality. Further, this line of argumentation was extended by Torrance's studies (1988). Torrance defined creativity as an ability to keen perceptions of lacks, that is the gaps in one's knowledge and related disharmonies.

He considered that the creative act is divided into the following aspects: perception of the problem, search of a decision, formulation of a hypothesis, checking this hypothesis, if necessary the modification of the hypothesis and finding the result. While Guilford considered creativity as a structural component of intelligence, in Torrance's view creativity includes some set of cognitive and personal characteristics promoting and becoming creativity ability.

One of the psychological concepts of creativity, in which the key role in creativity processes belongs to remote associations, was developed by Mednick (1962). Mednick believes that the division of cognitive abilities on convergent and divergent components inadequately represents creative processes. In Mednick's opinion, the kernel of creativity is the ability to overcome stereotypes at the final stage of cognitive syntheses and to find new associations in the whole breadth of a specific field. Creative processes are considered as reformulating associative elements in new combinations adequately to the task at hand. However, the synthesis of elements cannot be creative. Instead, the major criterion of creative performances is the quantity of digression from a stereotype.

At present, a plethora of different theories and definitions of creativity have been developed. Researchers pay attention not only to characteristics of thinking, but also to other aspects of the phenomenon. It could be the creative *product*, the creative *process*, the creative *person*, or the creative *place* (environment) – 4 “P” (Rhodes, 1987).

Generally, creativity is defined as the production of an idea, act, or object that is both original and valued (Csikszentmihalyi, 1999). During the last half century, many investigators have studied psychological problems of creativity. Apparently, there are many different definitions, in which the experts emphasize different elements or factors of creativity. It is also clear that whatever aspect of creativity receives the main emphasis, this has profound implications for how one seeks to assess the conception of this phenomenon.

1.1.2 The 'creative personality'

Research on the creative personality has focused on individual differences of creative individuals and on the construct of creative personality itself. Further, longitudinal studies have focused on the creative personality. These studies suggest that there are no creative abilities. Instead, there is only a personality that has certain characteristics interpretable as creative. The corresponding research efforts investigated subjects' individual characteristics in several areas: cognition, personality traits, and motivational aspects. The relationship among these areas is complex, however, and often the specific characteristics do not fit neatly into just one. Characteristics vary within and among people and across disciplines (music, art, business, science etc.). No one person possesses all the characteristics nor does anyone display them all the time.

A considerable body of literature investigated individual differences regarding creative personality traits. Based on 15 years of research on personality characteristics with creative people, Barron and Harrington (1981) proposed a set of core creative personalities applicable to many domains, namely high evaluation of aesthetic qualities in experience, broad interests, attraction to complexity, high energy, independence of judgment, autonomy, intuition, and self-confidence. Csikszentmihalyi (1999) noted that the creative personality consists of alternative peculiarities at the same time: 1. Creative persons have too much physical energy, but at the same time they are often in the state of peace and rest. 2. They are stern and naïve at one time. 3. Their personality combines jocoseness and discipline, responsibility and irresponsibility. 4. Conceptions, imaginations and sense of reality of creative persons are alternated. 5. The creative person can be both extrovert and introvert. 6. The creative person is modest and proud simultaneously. 7. They can show rebellious spirit and conservatism at the same time. 9. Most of the creative persons reveal passion for what they do and can also evaluate their work objectively. 10. Their openness and sensitivity is a cause of pain and suffering, but they also love pleasure.

Amabile (1996) found a different list of creative person characteristics. These characteristics include self-discipline at work, the ability to postpone pleasure, independent opinions, tolerance to uncertainty, high level of self-containment, absence of gender stereotypes, internal locus of control, propensity to take risks, high level of self-initiation, and aspiration to complete tasks the best way possible.

MacKinnon (1978) studied individual peculiarities and achievements of more than 600 outstanding writers, architects, mathematicians, physicists, and representatives of technical science who were chosen by experts in each sphere. After their tests, examinees were divided in two groups. One of them consisted of more creative individuals, the other group contained less creative individuals. The author found that more creative persons showed greater intelligence, greater will to experiment and gain experience, study, freedom from inner self-restraint, flexibility and opinion independence, and also high level of creative energy. Observing personal and situational variables of creative functioning, Martindale (1995) concluded that real creative results are possible when there is unity of cognitive abilities and the matrix of motivational, attitudinal, and personal characteristics. Among the last ones, the author remarks that self-respect, persistence, high level of energy, wide range of interests, sensitivity to problems, androgyny, curiosity, enthusiasm and depth of feelings, preference for difficult goals, and high esthetic values are connected with creative behavior.

In sum, these research results on the correlation between creativity and personal peculiarities indicate that individual creativity factors cannot be exclusively held responsible for creative thinking. Different authors distinguish dissimilar psychological characteristics of creative persons, which include not only intellectual, but also emotional, motivational and behavioral aspects. Other researchers have extended this perspective of research and explored the construct of creative personality in relation to psychopathological traits, such as schizotypy.

1.2 Creativity and psychopathology

The idea that creativity and psychopathology are somehow linked goes way back to antiquity—to the time of Aristotle. Centuries later, this belief was developed and expanded by various psychiatrists, psychoanalysts, and psychologists. For instance, toward the end of the 19th century Lombroso (1891) argued that genius and madness were closely connected manifestations of an underlying degenerative neurological disorder. The prevailing view appears to be that psychopathology and creativity are positively associated (Durrenberger, 1999). Research into this relationship was spurred on by studies where a higher incidence of mental illness in highly creative people was observed (Andreasen, 1987; Nettle, 2001; Post, 1994).

Barron studied architects, scientists, mathematicians, entrepreneurs, writers, and found creators to score higher on the pathology-related scales of the MMPI (e.g., Barron, 1955, see also Richards, 2006). Andreasen (1987) used structural interviews to analyze 30 creative writers, 30 matched controls, and first-degree relatives of each group. The writers had a higher rate of mental illnesses, with a particular tendency toward bipolar disorders. The writer's first-degree relatives were more likely to both be creative and have affective disorders. Post (1994) found that visual artists and writers suffered from personality disorders.

Most other studies of living, eminent individuals have also been conducted with writers. Jamison (1989) interviewed 47 British writers and artists and found that a significantly higher percentage of them suffered from affective disorders (such as bipolar), than would be expected from population rates. Staltaro (2003) looked at 43 published poets and found that approximately one-third had a history of at least one psychiatric condition and more than half had been in therapy (this is notably higher than the population rates). Nettle (2006) examined poets, mathematicians, visual artists, and average people, finding higher levels of schizotypy in poets and visual artists and lower levels in mathematicians. Other studies have examined creative traits in control individuals finding “lower” subclinical symptomatology of psychopathological

disorders, such as hypomania (Furnham et al., 2008) and schizotypy (Abraham & Windmann, 2008; Nettle, 2006).

1.2.1 Defining schizotypy

The term ‘schizotype’ was originally coined by an American psychoanalyst, Rado (1953), and then elaborated – as ‘schizotypy’ – by Paul Meehl who used the construct to articulate a theory about the etiology of schizophrenia (Meehl, 1962, 1990). Schizotypal personality disorder can be found in the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV, 1994) and is defined as “a pervasive pattern of social and interpersonal deficits marked by acute discomfort with, and reduced capacity for, close relationships as well as by cognitive or perceptual distortions and eccentricities of behaviour, beginning by early adulthood and present in a variety of contexts, as indicated by five (or more) of the following: 1-Ideas of reference (excluding delusions of reference); 2-Odd beliefs or magical thinking that influences behaviors; 3-Unusual perceptual experiences; 4-Suspiciousness or paranoid ideation; 5-Inappropriate affect; 6-Odd thinking and speech; 7- Behaviour or appearance that is odd; 8- Lack of close friends or relationships.” (American Psychiatric Association, 1994, p. 209).

Rado (1956) formulated a construct of schizotypy and hypothesized that many cases of schizophrenia involve a genotype that interacts with environmental influences to produce a pattern of personality traits called schizotypy (Shean, 2004). Schizotypy refers to an individual’s proneness to psychosis (Claridge, 1997). Meehl (1962) stated a genetic disposition of schizotypy and argued that schizotypal traits should exist on a continuum or spectrum in the normal population, and these traits should also indicate a degree of proneness to psychosis. Subsequently, many scales or questionnaires have been designed to measure schizotypy among the general population (Chapman, Champan, & Kwapil, 1995; Raine, 1991). The schizotypal personality traits form a component structure (Mason et al., 1995), which comprises the following three factors: (1) the cognitive-perceptual factor, which is based on assessing ideas of

reference, odd beliefs, magical thinking, unusual perceptual experiences, and paranoid ideation; (2) the interpersonal factor, which is based on evaluating social anxiety, no close friends, constructed affects, and paranoid ideation; (3) the disorganized factor, assessing odd behavior and odd speech.

1.2.2 Schizotypal personality traits in creative personality

There is much evidence in the literature that schizotypy correlates with creativity. As the personality trait that underlies psychosis, schizotypy is suggested to share biological, emotional, and cognitive features with creativity (Barrantes-Vidal, 2004). Evolutionary connections have been found (O'Reilly et al., 2001) in the sense that a relation to creativity, as an advantageous, positive gene, can explain why schizophrenia, as negative, debilitating condition, has remained in the population.

In studies of creativity and schizotypy, positive correlations between creativity and positive schizotypy have been observed. Burch et al. (2006) found that students from the Department of Visual Arts scored higher on measures of positive-schizotypy, disorganized schizotypy, asocial-schizotypy, neuroticism, openness to experience, and divergent thinking (uniqueness) than did the students from a range of disciplines including education, psychology, sociology, politics, or mathematics. Similarly, Nelson et al. (2008) revealed that the sample of artists showed elevated “positive” schizotypy, unipolar affective disturbances, and the personality dimensions of openness to experience and neuroticism, compared with norm data.

It has been proposed that creativity and psychosis may have an inverted U-shaped relationship, with creativity first increasing with mild schizotypy, then decreasing as individuals approach the threshold of psychosis (Fisher et al., 2013, 2004; Brod, 1997). However, the role of creativity in mental health is not clear. As discussed above, empirical studies on psychopathological aspects have often been limited in terms of mental disorders and illnesses.

Creativity in the context of minimal presence of ill health (Maslow, 1971) is studied comparatively rarely. Therefore, in the following part, the contribution of self-actualization to good health and creativity is considered.

1.3 Creativity and self-actualization

1.3.1 Defining self-actualization

Many theorists and philosophers have taken on the challenge of developing a core theory of motivation (e.g., Alderfer, 1972; Goldstein, 1939/1995; Herzberg, 1959; Maslow, 1943). Goldstein (1939/1995) considered basic drives of human behavior as a tension-release mechanism. He posited that drives create tensions that subsequently need to be released. In “healthy” individuals, these tensions, when released, propel the individual toward a higher level of complexity and depth, thus bringing self-growth. While unhealthy individuals also seek to release the tension, they do not progress beyond this closed loop of tension-release cycles (Goldstein, 1939/1995). Goldstein coined the term self-actualizing to describe the basic tendency of individuals to grow deeper in complexity and to go beyond themselves. According to Goldstein, there is only one drive: that of self-actualization. “Normal behavior corresponds to a continual change of tension, of such a kind that over and again that state of tension is reached which enables and impels the organism to actualize itself in further activities, according to its nature” (p. 197). Thus, healthy people are able to use the natural buildup of tension to propel themselves forward on the path of actualizing their potentials.

1.3.2 Maslow’s theory of self-actualization

Inspired in part by Goldstein’s writings, Abraham Maslow presented the theory of motivation (1968). This theory organized human needs into a pyramid-like hierarchy that individuals were hypothesized to work through, with basic physiological needs at the bottom and

self-actualization at the top. The idea was that individuals would expend most of their efforts and energy toward meeting their current level of needs. Once met, higher needs would emerge and become the focus of the individual's attention (Maslow, 1968). At the base of Maslow's hierarchy are the basic physiological needs. This refers to the body's need to maintain homeostasis by getting the food, water, and so on that it needs to survive. If one is lacking parts in these areas, all activities will be organized with the priority being to meet these needs (Maslow, 1968). Once an individual is able to satisfy these physiological needs, he or she next focuses on maintaining safety. This might include obtaining stable shelter, developing methods of self-defense and learning to avoid danger. Thus, the individual focuses his or her activities to establish ways to secure the stability and safety of his or herself (Maslow, 1968). Once the individual develops enough trust in his or her safety, then he or she next focuses on relationship needs and love. Here the individual seeks to establish connections and a sense of belongingness and affection. This not only includes being loved, but being able to give love as well (Maslow, 1968). When an individual's love and relationship needs are mostly met, esteem comes into focus. This refers to the individual's need to have confidence in his or her self-worth. Maslow breaks down this stage into two needs: that of feeling one's own self-worth and that of achieving prestige and the respect of others (Maslow, 1971). With the distinction of these phases, it is easy to make the assumption that Maslow's hierarchy of needs rigidly requires an individual to progress through the stages successively, completing one before moving on to the next. Progression through these stages, however, is actually more of a fluid and flexible process. Maslow (1968, 1971) points out that needs from one level do not necessarily need to be completely satisfied before a person begins work on the next level. In fact, he envisioned the process as more of a gradual ebb and flow between the stages. People can be working on satisfying more than one level of needs simultaneously.

After an individual has mostly satisfied the basic needs, that person's attention shifts to the higher need for self-actualization. In the following statement, Maslow (1968) defines self-

actualization as the tendency for one to "...become actualized in what he is potentially. This tendency might be phrased as the desire to become more and more what one is, to become everything that one is capable of becoming" (p. 382). Self-actualizing individuals have been described as: psychologically well-adjusted and free from neurosis, psychosis, or crippling anxiety; more able to turn inward in a meditative way to solve personal problems; able to function well interpersonally with an increased capacity for intimate contact; more creative and spontaneous, and open to new experiences; less conformist and more inner-directed; having a greater sense of purpose and meaning in life; empathic and more accepting of others; more altruistic and loving; and able to focus their energies on the present moment, rather than dwelling on the past or the future (Farmer, 1984; Ford & Procidano, 1990; Maslow, 1971). Self-actualization is not an endpoint to be achieved, but is more of an ongoing process or a way of life. Self-actualizing people continually work to discern their unique core values and then to live congruently with them. It is an ongoing process of self-growth and integration.

1.3.3 Self-actualization and creativity

In Maslow's (1971) view, creativity and self-actualization are functionally interdependent, with creativity facilitating self-actualization and self-actualization facilitating creativity. Rogers (1969) viewed creativity as a core factor of mental health and growth. Rogers argued that there is a deep connection between self-actualization and creativity, hypothesizing that they both emerge from the same root. Rogers stated that "the concept of creativeness and the concept of the ... self-actualizing ... person seem to be closer and closer together" (1995, p.57). Empirical evidence, however, is ambiguous. For example, Mathes (1978) found only a low correlation between self-actualization and creativity, measured with creative product tests (Mednick, 1962). However, Murphy et al. (1976) used the Torrance Test of Creative Thinking (Torrance, 1966) and found that elaboration was significantly correlated with self-actualization, but no coefficient was reported. Runco et al. (1991) found that the relationship between creativity and self-

actualization conformed to the descriptions given by Maslow (1971) and Rogers (1961). To measure creativity the authors used the How Do You Think Test (HDYT, Davis & Subkoviak, 1975) that contains 100 statements describing preferences, interests, and attitudes that are indicative of creative personality and lifestyle. Pufal-Struzik' (1999) study revealed that gifted young people have a higher sense of realization of inherent potentials than less gifted peers.

Thus, empirical studies of the association between creativity and self-actualization show ambiguous results. Some researches confirm that creative and self-actualizing personality share some personality characteristics, however other findings do not support a significant association between creativity and self-actualization. Specifically, these findings raise the question about the validity of the creativity measures, such as creative products or creative personality.

1.4 Creativity from cross-cultural perspective

1.4.1 How culture influences creativity

Cross-cultural psychology provides the method and conceptual framework for the study. Cultural psychologists often describe culture as a shared system of learned meanings (Rohner, 1984), encompassing the “values, norms, beliefs and assumptions embraced by participants” (Nystrom, 1990, p. 147). One potential problem for creativity theory is whether both novelty and appropriateness are equally valid dimensions across cultures. Amabile (1996) emphasizes that creativity has been very often “read” at only one level, the individual one, and only recently social and cultural perspectives have been involved as valuable for its study.

Simonton (2003) has analyzed many geniuses in history across areas, time periods, and cultures, and has also concluded that the social environment can have nurturing (or inhibitory) effects on the development of creativity. Simonton (2003) thought that creativity can only be understood, if the social environment is concerned, because creativity is a special style of

interpersonal interaction. Simonton has focused on broad environmental contents, such as those created by economic, political, social, and cultural conditions. The effects of the environment on the creativity of eminent individuals could vary across different social situations. In other words, different environments can shape eminent people's creativity in different ways. Simonton thought that eminent people are closely integrated into a larger social world, stimulate each other, and become the bases for the *Zeitgeists* of that society.

Lubart (1999) identified four ways that cultural influence might affect creativity: a) people from different cultures may have different concepts of creativity; b) people from different cultures may use different psychological processes when they engage in creative behavior; c) language may influence the development of creativity; d) the environment can either promote or reduce people's creativity. Thus, understanding creativity means understanding the various systems: from individuality to culture, and their interaction.

Csikszentmihalyi (2005) emphasized that without a culturally defined domain of action, in which innovation is possible, a person cannot even initiate their creative processes. He pointed out that information and ideas that a creative person uses had existed before the creative person got started with his thoughts; it had been stored in the symbol system of the culture, in the customary practices, the language, and the specific notation of the "domain."

Garfield (2007) remarks that the creative press or environment is the context, in which creative ideas are produced and explored. The press may include such environmental and cultural factors as evaluation, surveillance, competition, and restricted choice. In any given organization, there can be a variety of cultures and subcultures that may be homogenous in some aspects, but can vary drastically in other aspects. These cultures can be associated with different levels of an organization, different functional areas, or different geographical locations. The different cultures can have differing impacts on the creative process. Identifying the cultural level to measure an environment's creative atmosphere can have an impact on observed outcomes. Glaveanu (2010)

tried to explain the shift in understanding creativity from the concept of the solitary genius (the ‘He-paradigm’) before the 20th century to that of the solitary normal and creative individual (the ‘I-paradigm’) and, further along, to the idea of ordinary individuals being creative only in their relation to one another (the ‘We-paradigm’). The ‘We-paradigm’ is the new level of explaining creativity, and this has cultural roots.

1.4.2 Empirical cross-cultural studies of creativity

Some researchers explore the concept of creativity in different countries (e.g., Niu & Sternberg, 2002), others compare creative performance between cultures (e.g., Torrance & Sato, 1979). For the concept of creativity, according to Niu and Sternberg (2002, 2003), Eastern and Western cultures share some universal core characteristics of creativity, such as originality, imagination, intelligence, and independence.

Cross-cultural research on creativity focuses on differences in creativity performance with contradicting results. Torrance and Sato (1979) found that American students scored higher on verbal fluency. Ogawa et al. (1991) compared verbal flexibility and verbal fluency of fifth-grade Japanese and American children. American children appeared to be superior to Japanese children in flexibility. Zha et al.’s (2006) study revealed that American doctoral students display significantly higher aptitude for creativity. Sacki et al. (2001) found that American college students are more creative than Japanese college students as measured by the Torrance Test of Creative Thinking (TTCT) figural form. Goncalo and Staw (2005) have studied creativity in relation to individualistic–collectivistic values in an attempt to see whether cooperation amplifies or diminishes group creativity. Evidence has shown that, when there are specific instructions to be creative, individualistic groups perform better than collectivistic ones. Individualistic groups reach conclusions differently, being more inclined than collectivistic groups to select multi-faceted ideas reflecting contributions from more members.

Kharkhurin and Motalleebi's (2008) study demonstrated that American and Russian participants show greater divergent thinking abilities than their Iranian counterparts. In particular, they scored higher on fluency and originality in divergent thinking. The authors suggested that the Western individualistic ideology considers nonstandard ways of thinking as a virtue of creative endeavor, whereas creativity in the Eastern, more collectivist cultures would be the adherence to the sociocultural norms and traditions. Aviram and Milgram (1977) reported that individuals in the Soviet Union tended to have lower scores on tests of divergent thinking than individuals in the United States and individuals in Israel. They suggested that there was more dogma in the Soviet Union, and this led to more conformity and less originality.

Overall these results imply that culture influences creativity. On the one hand, creative performances appear to be facilitated by individualism of Westerns cultures. The collectivism of East Asians cultures, on the other hand, rather impedes individual creative achievements (Heine, 2012). However, another open question concerns the variability of psychopathological symptoms with to creativity. Because the concept of creativity can vary depending on culture, it can be hypothesized that creativity and its relation to psychopathological aspects might be ambiguous, too.

2 GOALS OF THE DISSERTATION

As was discussed above, the examination of creativity as cognitive ability (Guilford, 1956) or rather as a personality (Feist, 2010) has been common in the literature on this topic. Research has begun to examine creativity from a health and clinical perspective such as self-actualization (Maslow, 1968) and schizotypy (Nettle, 2006), and from an environmental perspective such as culture (Lubart & Sternberg, 1998).

Self-actualization is the ability to transcend levels of physiological, psychological, and social needs in order to obtain fulfillment of personal needs in terms of life's meaning (Maslow, 1968). Self-actualization, underscores notions of mental health and normalcy rather than pathology with regard to creative conduct (Knapp, 1990; Tloczynski et al., 1997). However, empirical studies have collected more evidence for a relation of creativity with mental disorders such as schizotypy (Fink et al. 2013; Folley & Park, 2005; Schulberg, 2000), than with mental health and self-actualization (Mathes, 1978). Schizotypy is commonly conceptualized as increased vulnerability to develop psychotic or schizophrenia-like symptoms (Claridge, 1997; Fisher et al., 2004). Many studies have shown a positive relationship between schizotypy and creative thinking (Burch et al., 2006; Nelson & Rawlings, 2010). This raises a number of questions including: Which personality features do creativity and self-actualization share, how does schizotypy relate to real-life creative accomplishments, and whether and how do environmental, that is cultural aspects influence the creativity – schizotypy association?

As was discussed above, there is empirical evidence that creativity is related to psychopathology, specifically some forms of disorders from the schizophrenia spectrum. However, there are other theories and findings suggesting that creativity accentuates notions of mental health and normalcy rather than pathology with regard to self-actualization. In the present dissertation, we attempted to find out how creativity is related to self-actualization and schizotypal personality traits, taking into consideration personality features, such as social intelligence, empathy, self-esteem, and purpose in life. Moreover, the theoretical analysis showed that cultural differences may affect creativity and how it is defined and perform in different cultures. This leads to the hypothesis that a relation between creativity and some proneness to mental health or illnesses, such as schizotypy or self-actualization, may be culture-specific too. Much of the studies in the literature are focused on the Western-Eastern comparison, and only a few studies have been conducted, comparing the creative performance of Russian and other

nationals. In the present dissertation, we examined how culture (German or Russian) influences creativity performance, as well as the relation with schizotypy and self-actualization.

The present dissertation consists of three separate studies that were aimed to examine: (1) the association between creativity and schizotypal personality traits (Study 1), (2) the association between creativity and self-actualization (Study 2), and (3) the impact of cross-cultural differences in the creativity – schizotypy association (Study 3).

3 EMPIRICAL STUDY OF THE RELATION BETWEEN CREATIVITY, SCHIZOTYPY, AND SELF-ACTUALIZATION FROM A CROSS-CULTURAL PERSPECTIVE

3.1 General sample characteristics

A total of 211 students (45 Germans, 166 Russians; 149 females, 62 males, $M_{\text{age}} = 20.1$, age range: 16–27 years) from Humboldt University and Free University Berlin (Germany) and Novosibirsk State Technical University (Russia) participated in this study. Students were recruited in a range of disciplines, including psychology, biology, law, and mathematics. All Russian participants were citizens of Russia and Russian was their first language. All German participants were citizens of Germany and German was their first language. Participants provided written informed consent and obtained course credit as compensation.

3.2 Study I: “The difference between real-life creative achievement and creativity: The influence of schizotypy and social intelligence”

3.2.1 Paradigm

According to previous studies creativity can overlap with schizotypy (Nelson, 2008; Burch et al., 2006; Nettle, 2006). Nevertheless, other studies show that people with schizotypal personality disorder often suffer from impairments in social life (Abbott & Green, 2012; Li et al., 2012; Shi et al., 2012; Zong et al., 2010). In this regard, we investigated whether creative individuals may have more problems in social functioning compared to individuals with schizotypal personality disorder. The aim of this study was to determine the extent to which a measure of schizotypy and social intelligence predicted measures of creativity, as assessed either verbal and figural tests of creativity or as a dimension of real-life creative achievements.

3.2.1.1. Creativity measures

In this study, only German students participated. In order to assess figural creativity, the students from Humboldt and Free University Berlin (32 women, 13 men, $M_{\text{age}} = 21.7$, age range: 18–27 years) were asked to complete the Torrance Test of Creative Thinking (TTCT, Torrance; 1966). The responses were scored for fluency - total number of appropriate responses for the task, flexibility - total number of categories the appropriate responses can be sorted into, and originality - statistical rarity of a given response.

To assess verbal originality the Remote Association Test (RAT, Mednick, 1962) was administered. Twenty sets of three words were presented and participants were asked to generate an original word-association for each of these triads.

We analysed verbal originality, figural originality, fluency, flexibility and composite creativity as the mean sum of verbal originality, figural originality, fluency, and flexibility.

Achievements selection

Participants were asked to list their real-life achievements. For examining the achievements of the participants, we used the criteria of originality and functionality in everyday life (Barron, 1955), independence of the specific domains (Ward, Smith, and Finke, 1999), and importance for a person (Fleming and Hollinger, 1994). To rate achievements, two expert judges conducting research in psychology or pedagogy were recruited.

3.2.1.2. Individual characteristics measures

Social Intelligence was measured with the four-scales technique, based on the model of social intelligence by O'Sullivan, Guilford, and deMille (1976). The following four scales estimate social ability in the domain of intelligence: 1. Social Prediction is the ability to predict what will happen in an interpersonal situation; 2. Non-verbal Expression represents the ability to identify internal mental states and to understand feelings and intentions of others from their non-verbal expressions, facial expressions, postures, and gestures; 3. Verbal Expression is the ability to respond flexibly in interpreting changes in social behavior; 4. Social Relations is the ability to identify meaningful connections among behavioral acts and to interpret sequences of social behavior. Finally, a total score of social intelligence is computed as the sum of the four scales.

Schizotypy Personality Questionnaire (SPQ, Raine, 1991; German validation Klein, Andresen, Jahn, 2001). The SPQ is a 74-item yes/no self-report inventory designed to assess schizotypal personality disorder criteria using nine subscales (ideas of reference, social anxiety, odd beliefs/magical thinking, unusual perceptual experiences, eccentric/odd behavior and appearance, no close friends, odd speech, constricted affect, and suspiciousness/paranoid ideation).

3.2.1.3. Data analysis

Independent sample *t*-tests were used to investigate effects of gender. Pearson's correlations were used to assess how creativity measures correlated with social intelligence and schizotypy. Step-wise multiple regressions were performed to find out which of the social intelligence and schizotypy measures predict creativity. Potential differences between high achievement and low achievement groups were analyzed using *t*-tests. The alpha error level for all statistical analyses was .05. As dependent variables, we used the creativity, social intelligence, and schizotypy scales. Having a significant achievement and gender were the independent variables.

3.2.2 Results and discussion

In the result of study 1, we found a significant association between creativity and schizotypal personality traits and social intelligence. Correlational analyses revealed a negative association between composite creativity and odd speech. Regression analysis showed that composite creativity was predicted by lower levels of odd speech and constricted affect, and higher levels of verbal expression, odd beliefs, and having no close friends. The findings are partly consistent with previous research showing that positive schizotypal traits, such as magical thinking, are associated with higher creativity, and negative traits, such as odd speech and constricted affect, are negatively associated with creativity (Miller and Tal, 2007; Burch et al., 2006; Nettle and Clegg, 2006). However, in our study, the negative schizotypal trait "No close friends" was positively related to creativity. A person with high creativity tends to have no close friends. Thus, our findings support the assumption that individuals with high figural creativity can have interpersonal deficits (Völter et al.; 2012; Illykh, 2009, 2010).

Perhaps, the most important finding of this study is that creative abilities such as figural originality and flexibility were found to be essential for real-life creative achievements, whereas schizotypal personality traits become less important or are even hindering real-life creativity achievements. The findings from study 1 suggest that creativity, as cognitive ability measured by

psychometric tests, is partly predicted by schizotypy. However, ‘everyday creativity’ is not related to the schizotypal dimension.

Thus, schizotypy is not directly predictive of creativity and real-life creative achievements, which is consistent with some previous findings (Burch et al., 2006). Social intelligence was found to be significant to creativity only with regard to verbal expression ability. The findings of this study extend the understanding of how real-life creative achievements and creativity are associated with schizotypal personality traits and social intelligence.

3.3 Study 2: “Predicting creativity and self-actualization in the sample of Russian students”

3.3.1 Paradigm

According to study 1, creativity was found to be associated with psychopathological symptoms, such as those found in schizotypal personality disorder. However, in the literature there are contradictory empirical data concerning to how creativity is related to characteristics of good mental health, such as self-actualization. Creative and self-actualizing personality traits appear similar (openness to new experiences, self-acceptance, confidence in one’s abilities, emotional sensitivity). There are clear parallels between the traits that characterize creative people and the traits found in self-actualized individuals, but at the same time they do show some differences in emotional, existential spheres, as well as in self-esteem. In this regard, the aim of the present study was to examine the relationship between creativity and self-actualization, as well as to predict creativity and self-actualization by individual characteristics – specifically, empathy, meaning of life, and self-esteem.

3.3.1.1. Creativity measures

In this study, only Russian students participated. One hundred and twenty students (100 females, 20 males, mean age: 17.8 years \pm 1.5 years) participated in this study. Creativity was measured with the Torrance Test of Creative Thinking (TTCT; Torrance, 1966) and the Remote Associates Test (RAT; Mednick, 1962).

3.3.1.2. Individual characteristics measures

Self-actualization was measured using the modified from “Personal Orientation Inventory” questionnaire (POI, N. Kalina, 1998) examining the attitudes and values in term of the concept of “self-actualizing”. The questionnaire has eleven subscales: Time orientation, Self-actualizing values, Nature of man, Cognitive need, Creativity, Autonomy, Spontaneity, Self-understanding, Self-regard, Sociability, Interpersonal relationship flexibility. A total score of the level of self-actualization was computed as the sum of the eleven scales. A higher score indicated higher self-actualization.

The Purposes in life scale (modified “Purpose-in-Life Test, PIL”, D. Leontyev) was administered to evaluate five parameters of the purpose in life construct: Purpose, Process, Result, Locus of control ‘I’, Locus of control ‘Life’.

The empathy Inventory (Bojko, 1992) examines the level of empathy and its components: Rational Apperception, Emotional Apperception, Intuitive Apperception, Attitudes, Penetrability, and Identification. A total score of empathy was computed as the sum of the six parameters.

The level of self-esteem was measured with the Self-esteem Scale (Dembo-Rubinshtein, 1970). assessing such parameters as Health, Mind, Character, The authority among their peers, Appearance, and Self-confidence.

3.3.1.3. Data analysis

Independent sample *t*-tests were used to investigate effects of gender. Pearson's correlations were used to assess how creativity and self-actualization measures correlated with empathy, the purpose in life scores, and self-esteem. Step-wise multiple regressions were performed to find out whether or not empathy, the purpose in life construct, and the self-esteem measures predicted creativity or self-actualization.

3.3.2 Results and discussion

A correlation between creativity and self-actualization was found only for the subscale spontaneity. Furthermore, creativity showed very few correlations with empathy, purpose in life, or with self-esteem. Predicting creativity, there were only two significant predictors, namely penetrability and spontaneity. There were no significant predictors from the purpose in life and self-esteem measures. Our findings do not support Maslow's statement that a self-actualizing personality is creative. In the regression equation, creativity measures, neither verbal nor figural, were predicting self-actualization. However, a possible explanation for this result is that in order to access creativity, we used psychometric measures of creative processes that require to generate original ideas according to the task. Nevertheless the ability to generate ideas is only one aspect of the creative process (Runco, 2007; Runco & Okuda, 1988) and does not describe a creative personality or creative products in their entirety. In fact, these products require more time, planning, and resources (Davis, 1973; Sternberg & Davidson, 1992).

In contrast, in our study self-actualization was positively and closely related with self-esteem, purpose in life measures, and empathy components. Here, our findings are consistent with Maslow's theory (1968) and the previous studies that a person with a self-actualizing personality incorporates deep feelings of empathy, self-acceptance, positive self-esteem, and sufficient freedom of choice to build his/her own life in accordance with his/her own purposes.

The major theoretical implication of this study is that creativity measured by standard tests and self-actualization may not rely on similar personality characteristics. Possibly, if we would have used self-report measures focusing on characteristics representing achievements of the person, these creative personality characteristics may have overlapped with self-actualizing personality characteristics.

3.4 Study 3: “Culture makes the differences: Creativity-schizotypy association varies between Russians and Germans.”

3.4.1 Paradigm

The findings of study 1 and 2 show that creativity has more significant associations with schizotypy than with self-actualization. However, the impact of cross-cultural differences on the creativity – schizotypy association has been somewhat neglected in the literature. We explored the relationship of creativity with schizotypal personality traits according to the cultural contexts.

3.4.1.1. Creativity measures

In study 3, we investigated a sample of 45 German (32 females; $M_{\text{age}} = 21.7$ years, $SD = 3.6$) and 46 Russian students (17 females; $M_{\text{age}} = 20.7$ years, $SD = 2.5$) with respect to their verbal (RAT) and figural (TTCT) creativity.

3.4.1.2. Schizotypy measures

To measure schizotypy, we used Raine’s (1991) Schizotypal Personality Questionnaire (SPQ) scale, which is a 74-item questionnaire modeled on the Diagnostic and Statistical Manual of Mental Disorders criteria for schizotypal personality disorder (German version by Klein et al., 1997; Russian version by Efremov & Enikolopov, 2001). The positive schizotypy scale includes the SPQ-subscales magical thinking, unusual perceptual experiences, ideas of reference, odd

speech and odd behaviour. The negative schizotypy scale includes excessive social anxiety, having no close friends, and constricted affect (Klein et al., 1997).

3.4.1.3. Data analysis

Demographic data were analysed using the Chi-Square test (χ^2 -test) to find out gender differences in each sample (Germans and Russians); the Mann-Whitney U-test to compare the differences in age, year of study and distribution of disciplines. Further, we employed a two factorial ANOVA with culture (German and Russian) and gender (male, female) as the independent variables. The dependent variables were the scores on the TTCT, the RAT, and the SPQ. Exploratory factor analyses were used to investigate the underlying nature of the creativity and schizotypy measures. Structural equation modeling (SEM) was conducted to investigate the relationship between creativity and schizotypy and how culture (German, Russian) influenced this relationship.

3.4.2 Results and discussion

First, we found that German participants showed greater verbal and figural originality than Russians. This result is consistent with the previous research compared the creativity performance of participants from Western and Eastern culture (Kharkhitin & Motalleebi, 2008; Jellen & Urban, 1989; Rudowicz et al., 1995). In fact, previous studies and our results suggest that Russian creativity scores may be intermediate between East and Western culture performances. Moreover, the differences in creativity between the Eastern and the Western cultures may be explained by the differences in the creativity conceptions in terms of product- or process-oriented creative abilities. In the performed factor analysis with the TTCT and RAT results, we grouped creative fluency and flexibility as representative for generative capacities, and creative originality as representative for innovative capacities. Generative capacities, or process-oriented creativity (e.g., Mednick, 1962; Rothenberg, 1996), establish a beneficial framework for generating

original and novel ideas. Innovative capacities overlap with the definition of product-oriented creativity, which addresses the ability to produce an idea that satisfies the requirements of novelty, appropriateness, and usefulness (Martindale, 1989; Sternberg & Lubart, 1995). German compared to Russian students performed higher in innovative capacities. However, Russian compared to German students scored higher in generative capacities. This means that culture specificity was observed because Germans perform higher in product-oriented creativity and Russians perform higher in process-oriented creativity.

Gender differences in creativity were found to be culturally specific, as well. In fact, Russian women were more creative than German women, whereas German men were more creative than Russian men. This result may be addressed to the specific aspects of the cultural environment, influencing creativity performance and gender differences in German and Russian participants. Baer and Kaufman (2008) argued that any gender differences in creativity stems from environmental factors. Sociocultural values and norms determine and shape the concept of creativity, which in turn may influence the manner, in which a creative potential is apprehended and incarnated among women and men. For instance, higher scores on figural originality and flexibility of Russian females might be accounted for by the 'gender transition' (Kalabikhina & Tyndic, 2014) in the Russian society. Modern Russia represents a transition in gender-related roles of women and men from inequality to equality. However, creativity of German men may be explained by the socio-economic equality between genders in Western cultures (Larsen & Krumov, 2013), as well as by mating success strategies (Griskevicius et al., 2006; Nettle & Clegg, 2006; Beaussart et al., 2012).

Finally, structural equation modeling further revealed that creativity is negatively predicted by negative schizotypy, which is consistent with previous data (Batey & Furnham, 2009). However, our data also revealed that environmental factors, that is, culture, mediate this association. For instance, an indirect effect of negative schizotypy on innovative capacities

mediated by culture did not become significant. While schizophrenia and its spectrum emerges as one of the most universally similar psychopathologies across ethnicities, nations, and cultures (Gottesman, 1991), culture can influence the content of symptoms (Bhui & Tsangarides, 2008). Overall these results suggest that the association between creativity and schizotypy is culture specific and that cultural differences need to be taken into consideration when evaluating this association.

4 GENERAL DISCUSSION AND FUTURE DIRECTIONS

In this dissertation project, creativity was investigated by focusing on a good health and a psychopathological perspective. These perspectives were accorded to cultural influences, specifically the Russian and German culture. The goals of this dissertation were to examine how creativity is related to schizotypal personality disorder as well as to self-actualization. Furthermore, we analysed the creativity – schizotypy association with regard to cross-cultural effects. The results of our investigations yielded several insights regarding gender-related effects on creativity, cultural differences in creativity performance, the schizotypy – creativity association, and differences in creative and self-actualized personalities. The findings of the dissertation project suggest theoretical and practical implications, and open new directions for future research.

4.1 Schizotypal traits and creativity

Our research focused on specific individual traits that may be associated with both creativity and mental illness. Specifically, schizotypal personality as a candidate for vulnerability to schizophrenia has been identified as a potential contributor to creativity (Fisher, 2004). Schizotypal personality is characterized by a variety of traits, such as magical thinking, unusual perceptual experiences, constructed affect, and odd speech and behavior. Factor analytical studies

have shown that these characteristics tend to cluster into two (positive and negative schizotypy) or three (positive, negative, and disorganized traits) separate dimensions (Miller & Tal, 2007; Raine, 1994). In study 3, we obtained only two factors – positive schizotypy and negative schizotypy. Positive schizotypy refers to magical thinking, unusual perceptions, ideas of references, and suspiciousness. Negative schizotypy refers to social anxiety, having no close friends, constricted affect, and odd speech and behavior. Previous studies have shown that positive schizotypal traits are associated with higher creativity, whereas negative schizotypy is negatively related to creative thinking (Miller & Tal, 2007; Burch et al., 2006; Folley & Park, 2005; Nettle & Clegg, 2006; Schuldborg, 2000). Study 1 and 3 confirm the previous data, however, there was an important extension observed.

In fact, in study 1, the negative schizotypal trait “No close friends” was found to be positively related to creativity. This result points out that creativity may reduce an individual’s social sphere. Specifically, creative persons tend to have less close friends than non-creative individuals. Previous studies have shown that individuals with high figural originality were less accepted within their peer group (Ilinykh, 2009; 2010). Following this argumentation, one can assume that individuals with high figural creativity may have interpersonal or social deficits. Further research is needed to support this assumption.

4.2 Real-life creative achievements

In seeking empirical evidence for the psychological connection between creativity and mental illnesses, former studies primarily investigated creative professionals, visual artists, writers, scientists. (e.g. Nettle, 2006; Kaufman, 2005; Locarnini; 2008; Andreasen, 1987; Ludwig, 1994). However, the dimension of real-life or everyday creativity has been widely neglected in the literature. Study 1 aimed to define the difference between real-life creative achievements and creativity measured as cognitive ability. In contrast to the previous results, which show that

schizotypy might account for predicting creativity in eminent levels, we found that for everyday creative achievements to occur schizotypal personality traits are not necessary or even impedimental. In fact, in study 1 the comparison between individuals with high vs. low creative achievements revealed that creative abilities, such as figural originality and flexibility, are essential for real-life creative achievements. In contrast, schizotypal personality traits become less important or are even hindering real-life creativity achievements. This study's emphasis on 'everyday creativity' approach raises questions regarding the phenomenon of creativity and its empirical measurements. Of particular interest in the present context are the two components – creative abilities or creative thinking, on the one hand, and personality and personal characteristics, such as motivation to self-actualization, on the other hand. Do creative abilities refer to a creative personality? Is a creative personality possible without high creative thinking? And is schizotypy equally related to both cognitive aspects of creative abilities and a creative personality? Further research has to take into account dimensional approaches to measure creativity and to relate it to psychopathology.

4.3 Gender differences in creativity

Research on gender differences in creativity, including creativity test scores, creative achievements, and self-reported creativity, are underrepresented in the literature. In addition, previous studies showed contradictory results. Some studies revealed no gender differences between males and females (Baer & Kaufman, 2008; Charyton & Snelbecker, 2007), whereas other investigation revealed that gender differences in creative performance do exist, but the data does not consistently show a superiority for either men or women (Hoff, 2005; Matud, Rodríguez, & Grande, 2007; Razumnikova, 2004).

In all three of our studies, we analysed gender differences in creativity measures. For instance, in study 1 men were found to have higher scores on figural originality than women.

Study 2 did not reveal significant differences in creativity between women and men. Notably, study 2 was conducted with the sample of Russian students, whereas study 1 was performed with Germans. This fact pinpoints to the suggestion that gender differences may be culturally specific. Study 3 may have resolved this issue by showing that gender differences are, in fact, culturally specific. In study 3, Russian females had higher scores on figural originality and figural flexibility compared to German females. Further, German males were found to be more creative than Russian males. In fact, this result may be addressed to the specific aspects of the cultural environment, which may have an influence on ‘gender transitions’ in the Russian society (Kalabikhina & Tyndic, 2014) and on mating success strategies in Western cultures (Buss & Schmitt, 1993).

4.4 Self-actualization and creativity

According to Maslow’s (1968) motivation theory, creativity is a construct that is important for self-actualization – top of the pyramid needs. Self-actualization, underscores notions of mental health and normalcy rather than pathology with regard to creative conduct (Knapp, 1990). Study 2 aimed to examine whether self-actualization is closely related to creativity. The study found significant correlations between creativity and self-actualization. Moreover, self-actualization was positively and closely related with self-esteem, purpose in life measures, and empathy components, whereas creativity was not significant predicted by the purpose in life and self-esteem measures. Our data are consistent with Maslow’s theory of self-actualization and the previous studies that a person with a self-actualizing personality incorporates deep feelings of empathy, self-acceptance, positive self-esteem, and sufficient freedom of choice to build his/her own life in accordance with his/her own purposes. However, in comparison to a self-actualized personality, the listed characteristics were not essential for creative performance to occur. The results of study 2 raise the important question concerning the complexity of creativity and its

measurements as cognitive ability or personality facet. Future research might account for how different facets of creativity may be related to personal self-actualization.

4.5 Cultural issues of creativity and schizotypy

Despite of the existing point of view about environmental influence on creativity (Sternberg & Lubart, 2006), empirical studies addressing the potential difference in creativity from a cross-cultural perspective are comparatively rare. In study 3, we investigated the mediating influence of culture on the relation between creativity performance and schizotypal personality traits. To our knowledge, this was the first study to investigate the influence of culture onto the creativity – schizotypy association. While schizophrenia and its spectrum emerges as one of the most universally similar psychopathologies across cultures (Gottesman, 1991), culture can influence the content of symptoms (Bhui & Tsangarides, 2008), and therefore the relation with creative abilities. A plethora of studies have found that creative individuals have elevated levels of schizotypal traits (Batey & Furnham, 2008; Burch et al., 2006; Ilinykh et al., 2014; Nettle, 2006; Schuldberg, 2001), however most of them were conducted in Western cultures with Western standards for creative performance. Study 3 revealed a mediating role of culture for the creativity – schizotypy association. This raises a question about culture-independent validity of the two constructs. Future research is of utmost importance to either support or deny this assumption.

5 CONCLUSION

The empirical part of the present dissertation contributed to a better understanding of the cultural influence on creativity performance and its relation to psychopathology by showing that: (1) while creative cognitive abilities are predicted by schizotypal personality traits, people with real-life creative achievements demonstrate decreased schizotypal symptomatology; (2) while creativity is not significantly predicted by self-actualization, purpose in life and self-esteem

measures, self-actualization is positively and closely related with self-esteem, purpose in life measures, and empathy components; (3) the creativity – schizotypy association is mediated by culture and creative performance of Russians and Germans significantly differs in figural and verbal originality.

Taken together, the present dissertation project demonstrates how creativity contributes to characteristics of good mental health or mental illnesses, which in turn might be influenced by environmental factors such as culture. To the best of our knowledge, this is one of the rare examinations of culture, creativity, and schizotypy comparing samples in Russians and Germans. Our results will be fruitfully stimulating future research investigating how culturally dependent creativity and its assessment really function, how stable psychopathological constructs relate to creativity across cultures, and how strong the influence of environmental, social, and cultural factors is on creative performance. After all, Russian and German culture may have more in common than we think.

6 REFERENCES

1. Abbott, G. R. & Green, M. J. (2013). Facial affect recognition and schizotypal personality characteristics. *Early Intervention in Psychiatry*, 7(1), 58–63.
2. Abraham, A., & Windmann, S. (2008). Selective information processing advantages in creative cognition as a function of schizotypy. *Creativity Research Journal*, 20(1), 1-6.
3. Alderfer, C. P. (1972). Existence, relatedness, and growth: Human needs in organizational settings.
4. Amabile, T. M. (1996). *Creativity in context: Update to "the social psychology of creativity."*. Westview press.

5. American Psychiatric Association. (1994). *Diagnostic And Statistical Manual Of Mental Disorders DSM-IV* Author: American Psychiatric Association, Publisher: America.
6. Andreasen, N. C. (1987). Creativity and mental illness: Prevalence rates in writers and their first-degree relatives. *American Journal of Psychiatry*, 144(10), 1288–1292.
7. Aviram, A., & Milgram, R. M. (1977). Dogmatism, Locus of Control and Creativity in Children Educated in the Soviet Union the United States, and Israel. *Psychological Reports*, 40(1), 27-34.
8. Baer, J., & Kaufman, J. C. (2008). Gender differences in creativity. *The Journal of Creative Behavior*, 42(2), 75-105.
9. Barrantes-Vidal, N. (2004). Creativity & madness revisited from current psychological perspectives. *Journal of Consciousness Studies*, 11(3-4), 3-4.
10. Barron, F., & Harrington, D. M. (1981). Creativity, intelligence, and personality. *Annual review of psychology*, 32(1), 439-476.
11. Barron, F. (1955). The disposition towards originality. *Journal of Abnormal Psychology*, 51(3), 478–485. doi:10.1037/h0048073
12. Batey, M., & Furnham, A. (2008). The relationship between measures of creativity and schizotypy. *Personality and Individual Differences*, 45(8), 816-821. doi:10.1016/j.paid.2008.08.014
13. Beaussart, M. L., Kaufman, S. B., & Kaufman, J. C. (2012). Creative Activity, Personality, Mental Illness, and Short - Term Mating Success. *The Journal of Creative Behavior*, 46(3), 151-167.
14. Bhui, K., & Tsangarides, N. (2008). Culture and schizophrenia. *Psychiatry*, 7(11), 454-457.
15. Brod, J. H. 1997 Creativity and schizotypy. In *Schizotypy: implications for illness and health* (ed. G. Claridge), pp. 274–299. Oxford, UK: Oxford University Press.

-
16. Burch, G. S., Pavelis, C., Hemsley, D. R., & Corr, P. J. (2006). Schizotypy and creativity in visual artists. *British Journal of Psychology*, 37, 177–190.
 17. Chapman, J. P., Chapman, L. J., & Kwapil, T. R. (1995). Scales for the measurement of schizotypy. *Schizotypal personality*, 79-106.
 18. Charyton, C., & Snelbecker, G. E. (2007). Engineers' and musicians' choices of self-descriptive adjectives as potential indicators of creativity by gender and domain. *Psychology of Aesthetics, creativity, and the arts*, 1(2), 91.
 19. Claridge, G. E. (1997). *Schizotypy: Implications for illness and health*. Oxford University Press.
 20. Csikszentmihalyi, M. (1999). *Creativity: Flow and the psychology of discovery and invention*. New York: HarperCollins.
 21. Davis, G. A. (1975). In *Frumious Pursuit of the Creative Person*. *The journal of creative behavior*, 9(2), 75-87.
 22. Durrenberger, S. D. (1999). Mad genius controversy. *Encyclopedia of creativity*, 2, 169-177.
 23. Farmer, R. (1984). Humanistic education and self-actualization theory. *Education*, 105(2).
 24. Efremov, A. G., Enikolopov, S. N. (2002). Aprobaziya biosozial'noy metodiki Klonindzhera – struktura kharaktera I temperamenta (TCI-125) I metodiki vyrazhennosti shizotipicheskikh chert (SPQ-74) [Approbation of Cloninger' method to assess psychobiological model of temperament (TCI-125) and the schizotypal personality questionnaire (SPQ-74)] *Vestnik MGU*, 92-93.
 25. Feist, G.J. (2010). The Function of Personality in Creativity: The Nature and Nurture of the Creative Personality. In J. Kaufman and R. Sternberg (Ed.) *Cambridge Handbook of Creativity*, p. 113-131.

-
26. Fisher, J.E., Mohanty, A., Herrington, J.D., Koven, N.S., Miller, G.A., & Heller, W. (2004). Neuropsychological evidence for dimensional schizotypy: Implications for creativity and psychopathology. *Journal of Research in Personality*(38), 24-31.
 27. Fisher, J. E., Heller, W., & Miller, G. A. (2013). Neuropsychological differentiation of adaptive creativity and schizotypal cognition. *Personality and individual differences*, 54(1), 70-75
 28. Fleming, E., & Hollinger, C. (1994). Project choice: A longitudinal study of the career development of gifted and talented young women. In R. Subotnik & K. Arnold (Eds.), *Beyond Terman: Contemporary longitudinal studies of giftedness and talent* (pp. 316-348). NJ: Ablex.
 29. Folley, B. S., & Park, S. (2005). Verbal creativity and schizotypal personality in relation to prefrontal hemispheric laterality: A behavioral and near-infrared optical imaging study. *Schizophrenia Research*, 80(2), 271-282.
 30. Ford, G. G., & Procidano, M. E. (1990). The relationship of self-actualization to social support, life stress, and adjustment. *Social Behavior & Personality: An International Journal*, 18(1).
 31. Furnham, A., & Bachtiar, V. (2008). Personality and intelligence as predictors of creativity. *Personality and Individual Differences*, 45(7), 613-617.
 32. Garfield, M., Chidambaram, L., Carte, T., & Lim, Y. K. (2007). Group Diversity and Creativity: Does Anonymity Matter?. *ICIS 2007 Proceedings*, 118.
 33. Glăveanu, V. P. (2010). Principles for a cultural psychology of creativity. *Culture & Psychology*, 16(2), 147-163.
 34. Goldstein, K. (1939/1995). *The Organism: A Holistic Approach to Biology Derived from Pathological Data in Man*. Zone Books.

-
35. Goncalo, J. A., & Staw, B. M. (2005). Individualism-Collectivism and group creativity. *Faculty Publications-Organizational Behavior*, 1.
 36. Gottesman, I. I. (1991). *Schizophrenia genesis: The origins of madness*. WH Freeman/Times Books/Henry Holt & Co.
 37. Griskevicius, V., Cialdini, R. B., & Kenrick, D. T. (2006). Peacocks, Picasso, and parental investment: The effects of romantic motives on creativity. *Journal of personality and social psychology*, 91(1), 63.
 38. Guilford, J. P. (1956). The structure of intellect. *Psychological bulletin*, 53(4), 267.
 39. Heine, S. J. (2012). *Cultural Psychology* (2nd edition) New York: Norton.
 40. Hoff, E. V. (2005). Imaginary companions, creativity, and self-image in middle childhood. *Creativity Research Journal*, 17(2-3), 167-180.
 41. Ilinykh, A. E., & Shemelina, O. S. (2010). Lichnostnye aspekty kreativnosti [Personal aspects of creativity]. *Jaroslavskij pedagogicheskij vestnik*, 2 (4), 205-211.
 42. Ilinykh, A. E. (2011). Social'naja kreativnost' lichnosti: Psihologicheskaja struktura [Social creativity of a person: psychological structure]. *Izvestija Saratovskogo universiteta. Serija: Filosofija. Psihologija. Pedagogika*, 11(3), 74-77.
 43. Jamison, K. R. (1989). Mood disorders and patterns of creativity in British writers and artists. *Psychiatry*, 52(1), 125–134
 44. Jellen, H. G., & Urban, K. K. (1989). Assessing creative potential world-wide: The first cross-cultural application of the test for creative thinking—drawing production (TCT-DP). *Gifted Education International*, 6(2), 78-86.
 45. Kalabikhina, I., & Tyndik, A. (2014). Does Current Demographic Policy in Russia Impact on Fertility of Different Educational Groups? Results from Quantitative and Qualitative Studies. Results from Quantitative and Qualitative Studies (February 10, 2014).

-
46. Kaufman, J. C. (2005). The door that leads into madness: Eastern European poets and mental illness. *Creativity Research Journal*, 17, 99-103.
 47. Kharkhurin, A. V., & Samadpour Motalleebi, S. N. (2008). The impact of culture on the creative potential of American, Russian, and Iranian college students. *Creativity Research Journal*, 20(4), 404-411.
 48. Klein, C., Andresen, B., & Jahn, T. (1997). Erfassung der schizotypen Persönlichkeit nach DSM-II-R: Psychometrische Eigenschaften einer autorisierten deutschsprachigen Übersetzung des "Schizotypal Personality Questionnaire" (SPQ) von Raine [Assessment of schizotypal personality according to DSM-III-R: Psychometric properties of an authorized German translation of the "Schizotypal Personality Questionnaire" by Raine]. *Diagnostica*, 43, 347-369.
 49. Knapp, R. R. (1990). *Handbook for the personal orientation inventory*. Edits Publishers.
 50. Larsen, K. S., & Krumov, K. (2013). The relationship between men and women: Culture, sex, gender. *Advances in International Psychology. Research Approaches and Personal Dispositions, Socialization Processes and Organizational Behavior*, 267.
 51. Leontiev D.A. Test smyslozhiznennykh orientatsiy [Test life meaning orientations]. M.: Meaning, 1992. 16 p
 52. Li, H. J., Chan, R. C. K., Gong, Q. Y., Liu, Y., Liu, S. M., Shum, D., & Ma, Z. L. (2012). Facial emotion processing in patients with schizophrenia and their non-psychotic siblings: a functional magnetic resonance imaging study. *Schizophrenia Research*, 134, 143-150.
 53. Lombroso, C. (1891). *The man of genius* (Vol. 16). Scott.
 54. Lubart, T. I. (1999). Componential models of creativity. In M. A. Runco & S. Pritzner (Eds.) *Encyclopedia of creativity* (pp. 295-300). New York : Academic Press.

-
55. Lubart, T. I., & Sternberg, R. J. (1998). Creativity across Time and Place: life span and cross - cultural perspectives. *High Ability Studies*, 9(1), 59-74.
56. MacKinnon, D. W. (1978). *In search of human effectiveness*. Buffalo, NY: Creative Education Foundation.
57. Martindale, C. (1995). Creativity and connectionism. *The creative cognition approach*, 249-268.
58. Maslow, A.H. (1971). *The Father Reaches of Human Nature*. New York: Viking.
59. Maslow, A.H. (1968). *Towards a Psychology of Being* (2nd ed.). New York: Van Nosrtand Reinhold.
60. Maslow, A. H. (1943). A theory of human motivation. *Psychological review*, 50(4), 370.
61. Mason, O., Claridge, G., & Jackson, M. (1995). New scales for the assessment of schizotypy. *Personality and Individual differences*, 18(1), 7-13.
62. Mathes, E.W. (1978). Self-actualization, Metavalues, and Creativity. *Psychological Reports*, 43: 215-222.
63. Meehl, P. E. (1962). Schizotaxia, schizotypy, schizophrenia. *American psychologist*, 17(12), 827.
64. Meehl, P. H. (1990). Toward an integrated theory of schizotaxia, schizotypy, and schizophrenia. *Journal of Personality Disorders*, 4, 199
65. Mednick, S. A. (1962). The associative basis of the creative process. *Psychological Review*, 69(3), 220–232.
66. Miller, G. F., & Tal, I. R. (2007). Schizotypy versus openness and intelligence as predictors of creativity. *Schizophrenia Research*, 93, 317–324.

-
67. Murphy, J. P., Dauw, D. C., Horton, R. E., & Fredian, A. J. (1976). Self - Actualization and Creativity. *The Journal of Creative Behavior*, 10(1), 39-44.
68. Nelson, B., & Rawlings, D. (2010). Relating schizotypy and personality to the phenomenology of creativity. *Schizophrenia Bulletin*, 36, 388–399. doi:10.1093/schbul/sbn098
69. Nettle, D. (2006). Schizotypy and mental health amongst poets, visual artists and mathematicians. *Journal of Research in Personality*, 40, 876–890.
70. Nettle, D. (2001). *Strong imagination: Madness, creativity and human nature*. Oxford University Press.
71. Niu, W., & Sternberg, R. J. (2003). Societal and school influences on student creativity: The case of China. *Psychology in the Schools*, 40(1), 103-114.
72. Niu, W., & Sternberg, R. (2002). Contemporary studies on the concept of creativity: The East and the West. *The Journal of Creative Behavior*, 36(4), 269-288.
73. Nystrom, H. (1990). Organizational innovation. In M. A. West & J. L. Farr (Eds.), *Innovation and creativity at work: Psychological and organizational strategies*(pp. 143-161). New York: John Wiley.
74. Ogawa, M. (1991). Differences in Creative Thinking between Japanese and American Fifth Grade Children. *Ibaraki University Faculty of Education Bulletin*, 40, 53-59.
75. O'Reilly, T., Dunbar, R., & Bentall, R. (2001). Schizotypy and creativity: an evolutionary connection? *Personality and Individual Differences*, 31, 1067–1068.
76. O'Sullivan, M., & Guilford, J. P. (1976). *Four Factor Tests of Social Intelligence: Manual of instructions and interpretations*. Orange, CA: Sheridan Psychological Services.
77. Post, F. (1994). Creativity and psychopathology. *British Journal of Psychiatry*, 165(22â), 34.

-
78. Pufal - Struzik, I. (1999). Self - actualization and other personality dimensions as predictors of mental health of intellectually gifted students. *Roeper Review*, 22(1), 44-47.
79. Rado, S. (1953). Dynamics and classification of disordered behavior. *American Journal of Psychiatry*, 110(6), 406-416.
80. Raine, A. (1991). The SPQ: A scale for the assessment of schizotypal personality based on DSM-III-R criteria. *Schizophrenia Bulletin*, 17(4), 555–564. doi:10.1093/schbul/17.4.555
81. Razumnikova, O. M. (2004). Gender differences in hemispheric organization during divergent thinking: an EEG investigation in human subjects. *Neuroscience Letters*, 362(3), 193-195.
82. Rhodes, M. (1987). An analysis of creativity. *Frontiers of creativity research: Beyond the basics*, 216-222.
83. Richards, R. (2006). Frank Barron and the study of creativity: A voice that lives on. *Journal of Humanistic Psychology*, 46(3), 352-370.
84. Rohner, R. P. (1984). Toward a conception of culture for cross-cultural psychology. *Journal of Cross-Cultural Psychology*, 15, 111-138.
85. Rogers, C. (1995). *On Becoming a Person: A Therapist's View of Psychotherapy*. Boston: Houghton Mifflin. (Original work published in 1961).
86. Rogers, C. R., & Freiberg, H. J. (1969). *Freedom to learn*, Charles E. Merrill, Columbus, OH.
87. Rothenberg, A. (1996). The Janusian process in scientific creativity. *Creativity research journal*, 9(2-3), 207-231.
88. Runco, M. A. (2007). *Creativity: Theories and Themes: Research, Development, and Practice*. San Diego, CA: Academic Press.

-
89. Runco, M. A., Okuda, S. M., & Thurston, B. J. (1987). The Psychometric Properties of Four Systems for Scoring Divergent Thinking Tests. *Journal of Psychoeducational Assessment*, 2, 149–156.
90. Rudowicz, E., Lok, D., & Kitto, J. (1995). Use of the Torrance Tests of Creative Thinking in an exploratory study of creativity in Hong Kong primary school children: A cross-cultural comparison. *International Journal of Psychology*, 30(4), 417-430.
91. Runco, M. A., Ebersole, P., & Mraz, W. (1991). Creativity and self-actualization. *Journal of Social Behavior & Personality*.
92. Saeki, N., Fan, X., & DUSEN, L. (2001). A comparative study of creative thinking of American and Japanese college students. *The Journal of Creative Behavior*, 35(1), 24-36.
93. Schuldborg, D. (2000–2001). Six subclinical spectrum traits in normal creativity. *Creativity Research Journal*, 13, 5–16.
94. Simonton, D. K. (2004). *Creativity in science: Chance, logic, genius, and zeitgeist*. Cambridge University Press.
95. Simonton, D. K. (2003). Scientific creativity as constrained stochastic behavior: the integration of product, person, and process perspectives. *Psychological bulletin*, 129(4), 475.
96. Staltaro, S. O. (2003). *Contemporary American poets, poetry writing, and depression* (Doctoral dissertation, ProQuest Information & Learning).
97. Sternberg, R. J., & Lubart, T. I. (1995). *Defying the crowd: Cultivating creativity in a culture of conformity*. New York: Free Press.
98. Tloczynski, J., Knoll, C., & Fitch, A. (1997). The relationship among spirituality, religious ideology, and personality. *Journal of Psychology and Theology*, 25(2), 208-213.
99. Torrance, E. P., & Sato, S. (1979). Differences in Japanese and United States styles of thinking. *Creative Child & Adult Quarterly*.

-
100. Torrance, E. P. (1966). *The Torrance Tests of Creative Thinking-Norms-Technical Manual Research Edition-Verbal Tests, Forms A and B-Figural Tests, Forms A and B*. Princeton, NJ: Personnel Press.
101. Torrance, E. P. (1988). The nature of creativity as manifest in its testing. *The nature of creativity*, 43-75.
102. Shean, G. (2004). *Understanding and treating schizophrenia: Contemporary research, theory, and practice*. Haworth Clinical Practice Press.
103. Shi, Y.F., Wang, Y., Cao, X.Y., Wang, Y., Wang, Y.N., Zong, J.G., Xu, T. ... Chan, R. (2012). Experience of pleasure and emotional expression in individuals with schizotypal personality features. *PLoS ONE* 7(5): e34147.
104. Völter, C., Strobach, T., Aichert, D. S., Wöstmann, N., Costa, A., Möller, H. J., Schubert, T. ... Ettinger, U. (2012). Schizotypy and behavioural adjustment and the role of neuroticism. *PLoS ONE* 7(2): e30078.
105. Ward, T. B., Smith, S. M., & Finke, R. A. (1999). Creative Cognition. In R. J. Sternberg (Ed.), *Handbook of Creativity* (pp. 189–212). Cambridge: Cambridge University Press.
106. Zha, P., Walczyk, J. J., Griffith-Ross, D. A., Tobacyk, J. J., & Walczyk, D. F. (2006). The impact of culture and individualism–collectivism on the creative potential and achievement of American and Chinese adults. *Creativity Research Journal*, 18(3), 355-366.
107. Zong, J. G., Chan, R. C. K., Stone, W. S., His, X. L., Cao, X. Y., Zhao, Q., Shi, Y. F. ... Wang, Y. (2010). Coping flexibility in young adults: comparison between subjects with and without schizotypal personality features. *Schizophrenia Research*, 122(1), 185–192.

ORIGINAL PAPERS

Ilinykh, A., van der Meer, E., Shemelina, O., Osterheider, M., Landgraf, S. (2014). The difference between real-life creative accomplishments and creativity: The influence of social intelligence and schizotypy. *Journal of Personality* (under revision).

Ilinykh, A., van der Meer, E., Shemelina, O., Landgraf, S. (2013). Predicting self-actualization and creativity in the sample of Russian students. *Creative Personality*. Collection of Internationally Reviewed Scientific Papers. - Riga: RTTEMA, 2013, Vol. XI, 52-61.

Landgraf, S.*, **Ilinykh, A.***, Haller, C., Cropley, D., Shemelina, O., Osterheider, M., van der Meer, E. (2014). *Culture makes the difference: Creativity-schizotypy association varies between Russians and Germans*. *Frontiers in Human Neuroscience* (submitted)

*these authors contributed equally to this work

Study I

The difference between real-life creative achievements and creativity: The influence of social intelligence and schizotypy

Ilinykh, A., van der Meer, E., Shemelina, O., Osterheider, M., Landgraf, S.

Abstract

Objective: The aim of this study was to determine the extent to which a measure of schizotypy and social intelligence predicted measures of creativity, as assessed by verbal and figural tests of creativity, or as a dimension of real-life creative achievements. **Method:** Forty-five students (32 females) from Humboldt and Free University Berlin completed creativity measures (TTCT: Torrance, 1966; RAT: Mednick, 1962), a social intelligence test (O'Sullivan, Guilford, and deMille, 1976), and a schizotypy personality questionnaire (SPQ: Raine, 1991). Furthermore, participants listed their real-life creative achievements, which were rated by two expert judges for creative significance. **Results:** First, creativity was significantly associated with schizotypal personality traits and social intelligence. A negative association was found between composite creativity and odd speech. Second, composite creativity was predicted by lower levels of odd speech and constricted affect, and higher levels of verbal expression, odd beliefs, having no close friends. Third, people with real-life creative achievements showed increased figural originality and decreased schizotypal personality traits (excessive social anxiety, odd speech, and constricted affect) compared to individuals without real-life achievements. **Conclusions:** The findings have

implications for understanding how real-life creative achievements and creativity are associated with schizotypal personality traits.

Key words: verbal creativity, figural creativity, schizotypy, social intelligence, real-life

The difference between real-life creative achievements and creativity: The influence of social intelligence and schizotypy

Ilinykh, A., van der Meer, E., Shemelina, O., Osterheider, M., Landgraf, S.

I. Introduction

There is neither a single, authoritative definition of creativity (Runco, 2004), nor a consensus about whether eminent creativity strongly differs from everyday creativity (Simonton, 2010). Further, it is unclear which place in the creativity-street smart continuum is taken up by mental health (Ilinykh, 2013). Are creative people more likely to suffer from mental, specifically, psychotic disorders? Are people with psychological disorders more likely to be eminent or everyday creative? The purpose of the present study is to examine creativity in relation to schizotypy. We will, further, account for the contribution of social intelligence to creativity, including a dimension of real-life creative achievements.

Creativity has been associated with mental illness for centuries. Biographical accounts of famous musicians, philosophers, scientists, writers, artists, and poets describe psychotic episodes and suicides. One of the first empirical studies on this topic was conducted by Andreasen (1987). She used structured interviews to compare 30 creative writers with 30 matched controls of equivalent age, gender, and educational achievements. The writers had a higher rate of mental illness, such as bipolar (43% in comparison with 10% of control subjects) and any other mood disorder (80% versus 30%). Jamison (1989) interviewed 47 British artists and writers. It was found that a significantly higher percentage of them suffered from some form of mental illness, particularly affective disorders, compared to healthy controls. Similarly, Ludwig (1994) studied 59 female writers and 59 matched controls of equivalent age, gender, and educational achievements, and found that the writers suffered from mood disorders, panic attacks, general anxiety, and

eating disorders. In more recent studies, there is a tendency to distinguish domain specific associations between creativity and mental disorders. Kaufman (2005) studied 826 writers from Eastern Europe from the fourth century to the present day and found that poets are more likely to suffer from mental illness than other types of writers (fiction writer, playwright, nonfiction writer). Following Guilford's idea (1967) that creative thinking is perceived as an ability to initiate multiple cycles of divergent and convergent thinking, Nettle (2006) suggested that different domains of creativity require different personality profiles: poetry and art are associated with divergent thinking, schizophrenia and affective disorders; mathematics is associated with convergent thinking and autism. Following this idea, Rawlings and Locarnini (2008) studied measures of subclinical psychosis and autism in professional "artists" (visual artists and musicians) and scientists. The findings indicated higher scores on measures of positive schizotypy in artists than scientists. Burch et. al (2006) found that students from the Department of Visual Arts scored higher on measures of positive-schizotypy, disorganized schizotypy, asocial-schizotypy, neuroticism, openness to experience, and divergent thinking (uniqueness) than did the students from a range of disciplines including education, psychology, sociology, politics, mathematics. Similarly, Nelson et al. (2008) revealed that the sample of artists was found to be elevated on "positive" schizotypy, unipolar affective disturbance, and the personality dimensions of openness to experience and neuroticism, compared with norm data. Earlier studies have shown that schizotypy is related to creative activity in artists. In this study, we investigate the association between creativity, measured by standard tests, and schizotypy in a non-artist group. We hypothesize that this association is positive for positive schizotypal traits (magical thinking, unusual perceptions, ideas of reference, suspiciousness) and negative for negative schizotypal traits (social anxiety, having no close friends, constricted affect) and disorganized (eccentric behavior, odd speech) schizotypal traits

These assumptions reflect the tendency that eminent creative people often suffer from some mental illnesses (Simonton, 2010). From another side, the question whether everyday

creative achievements may be associated with psychotic disorders has been discussed. For example, Cropley (1990) focused on creativity as (a) an everyday phenomenon found in all people and (b) as a facet of personality capable of contributing to the maintenance of mental health. Richards et al. (1990) reported on an investigation of creative activities carried out in everyday life, at work or leisure-time, and argued that creativity may serve as a healthy, compensatory advantage to the risk for bipolar disorder and perhaps schizophrenia. Richards concluded that the study of creativity in the natural environment allows us to better appreciate the behavior of noneminent individuals.

Therefore, in our study, we focus on creative achievements of noneminent individuals. Creative achievements may be defined as the sum of creative products generated by an individual in the course of his or her lifetime (Carson et al., 2005). We use the following criteria for examining the achievements of the participants: 1. The creative product must be original and functional in everyday life. A creative product – be it a poem or culinary recipe – is both novel and useful (Barron, 1955). 2. The achievements must be examined within the personal context, suggesting a recognition of the interaction between self, work environment, and relational context (Fleming and Hollinger, 1994). 3. Achievements are identified within different domains (Ward, Smith, and Finke, 1999). A person can be successful either in one area of creative endeavor (painting, architecture, music, or scientific discovery), or simultaneously in several areas.

Of particular interest in this context is social intelligence. The concept of "social intelligence" was first introduced by Thorndike (1920), who defined social intelligence as "the ability to understand and manage men and women, boys and girls, to act wisely in human relations" (Thorndike, 1920, p.227). Social functioning is an important criterion for the diagnosis of schizotypal personality disorder (SPD). Previous research indicates that patients with schizophrenia (Addington & Addington, 2008; Landgraf et al., 2010; Landgraf et al., 2012), SPD (Dickey et al., 2005), and individuals scoring high on schizotypy (Jahshan, Sergi, 2007) show

some social impairment. Recent studies (Platek & Gallup, 2002; Abbott and Green, 2012; Li et al., 2012; Shi et al., 2012; Zong et al., 2010) revealed that individuals with SPD display impairments in understanding and responding to social stimuli. Further, they also show deficits in processing dynamic happy facial expressions under different social interaction cues (Huang et al., 2013). Aguirre et al. (2008) found that individuals scoring high in psychometric schizotypy were impaired in three aspects of social functioning: peer relationships, family relationships, and academic functioning. Fonseca-Pedrero et al. (2010) concluded that social functioning is negatively related to schizotypal personality disorder. Taken together, these studies strongly support an important link between cognitive abilities and social functioning in schizotypal personality. In contrast, social functioning is very essential for creative endeavors. Montuori and Purser (1995) showed that the most creative researches view themselves as collaborative team players, who are most concerned with improving the quality of their contacts and relationships with colleagues. Montuori and Purser (1996) also emphasized a myth of a lone genius, that true creativity does not need anything or anybody and a creative person is profoundly at odds with society. This myth distorts the understanding of creativity and leads to considering creativity on the individual level, only. However, creativity requires a social context to occur. Some recent studies (Watson, 2007; Han, 2010) consider “creativity as a social as well as an individual and intrapsychic phenomenon” and emphasize interaction and the ability to collaborate with other people. In this regard, there is no clarity about the association between creativity, schizotypy, and social functioning. Creativity is related to schizotypy that is, in turn, negatively related to social functioning. Unlike in schizotypy, however, creative persons do not necessarily need to be at odds with society. In the present study, we hypothesize that schizotypy is associated with creativity when measured by creativity tests but not when measured as a real-life dimension. Further, real-life creative achievements should be positively associated with social intelligence.

Purpose of the study

According to previous studies creativity can overlap with schizotypy. Nevertheless, other studies show that people with SPD often suffer from impairments in social life. In this regard, we ask whether creative people may have more problems in social functioning compared to people with SPD. In other words, are there associations between creativity, schizotypal personality traits, and social intelligence. To investigate the possible role of such confounds, we administered the schizotypal personality questionnaire (SPQ) (Raine, 1991), verbal and figural creativity tasks, as well as a self-rating creative achievements questionnaire, and social intelligence measures to a sample of healthy young adults.

2. Method

2.1. Participants

Forty-five students (32 women, 13 men, $M_{\text{age}} = 21.7$, age range: 18–27 years) from Humboldt and Free University Berlin participated in this study. The students were recruited from a range of disciplines, including psychology, biology, mathematics. Participants gave their written informed consent and obtained course credit as compensation. The study was carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for experiments involving humans. Participation was anonymous and we used pseudonyms to code performance.

2.2. Materials and procedure

Participants were tested in groups of 10–15 individuals. Completion of all tasks took about 2.5 hours. First, a demographic questionnaire was applied to assess age, gender, and years of study. Then, the participants were asked to list their achievements, honors, and awards (Holland & Nichols, 1964; Torrance, 1969). Subsequently, a test battery was administered, including two creativity tasks and two individual characteristics measures (social intelligence, schizotypy questionnaire). After the testing, participants were debriefed.

Creativity measures

Torrance Test of Creative Thinking (TTCT), Torrance; 1966). The non-verbal task “Circles” was used in the study. The participants were given a printed form of 20 circles and asked to sketch objects or pictures which have circle or several circles as a major part. Their responses were scored for fluency, flexibility, and originality. *Fluency* refers to the total number of appropriate responses for the task. *Flexibility* refers to the total number of categories the appropriate responses can be sorted into. *Figural originality* refers to the statistical rarity of a given response.

Remote Association Test (RAT), Mednick, 1962). *Verbal originality* was measured by the RAT. During the RAT, 20 verbal triads (for example, *Suddenly – Man – Street*) were presented. Participants were asked to generate an original word-association for each of these triads. There was no time limit. Total score of verbal originality was calculated in the following way: $\text{Originality} = \sum (1/(n_i + 1))$, where n is the quantities of generated word-association for each triad of words ($i=1, \dots, 20$) in the database that was created during the testing in a particular sample. To each response can be attributed a score $1/(n + 1)$ where n is the occurrences of the idea in the sample. Therefore, high scores correspond to rare ideas (the highest score 1 corresponds to a unique idea and, thus, the highest total score is 20, the lowest 20/21).

We analysed verbal originality, figural originality, fluency, flexibility and composite creativity as the mean sum of verbal originality, figural originality, fluency and flexibility.

Individual characteristics measures

Social Intelligence was measured with the four-scales technique, based on the model of social intelligence by O’Sullivan, Guilford, and deMille (1976). This model includes six social cognitions: Behavioral Units, Classes, Relations, Systems, Transformations, and Implications. The test items are based on such materials as drawings of faces, hands, or bodies; cartoon panels and strips; stick figures and silhouettes. Responses to the situations depicted are indicated by

choosing an appropriate picture or verbal statement. The following four scales estimate social ability in the domain of intelligence: 1. *Social Prediction* is the ability to predict what will happen in an interpersonal situation; 2. *Non-verbal Expression* represents the ability to identify internal mental states and to understand feelings and intentions of others from their non-verbal expressions, facial expressions, postures, and gestures; 3. *Verbal Expression* is the ability to respond flexibly in interpreting changes in social behavior; 4. *Social Relations* is the ability to identify meaningful connections among behavioral acts and to interpret sequences of social behavior. Finally, a total score of social intelligence is computed as the sum of the four scales.

Schizotypy Personality Questionnaire (SPQ, Raine, 1991; German validation Klein, Andresen, Jahn, 2001). The SPQ is a 74-item yes/no self-report inventory designed to assess *schizotypal personality disorder* criteria using nine subscales (ideas of reference, social anxiety, odd beliefs/magical thinking, unusual perceptual experiences, eccentric/odd behavior and appearance, no close friends, odd speech, constricted affect, and suspiciousness/paranoid ideation).

Achievements selection

For examining the achievements of the participants we used the criteria of originality and functionality in everyday life (Barron, 1955), independence of the specific domains (Ward, Smith, and Finke, 1999), and importance for a person (Fleming and Hollinger, 1994).

To rate achievements, we recruited two expert judges conducting research in psychology or pedagogy. Each judge assessed independently the achievements lists of the participants according to the mentioned criteria and decided if their honors and/or awards were significant or not. Rating yielded a satisfactory inter-judge homogeneity index (Cronbach's $\alpha = .85$). In this way, we divided our sample into two groups: a high achievement group ($n=19$), whose members have had at least one significant award, honor, price and a low achievement group ($n=26$), whose members have not had any significant creative achievements.

2.3. Data Analysis

Data were analysed using SPSS version 20 for “Windows”. Independent sample t-tests were used to investigate effects of gender. Pearson’s correlations were used to assess how creativity measures correlated with social intelligence and schizotypy. Step-wise multiple regressions were performed to find out which of the social intelligence and schizotypy measures predict creativity. Potential differences between high achievement and low achievement groups were analyzed using *T*-tests. The alpha error level for all statistical analyses was .05. As dependent variables, we used the creativity, social intelligence, and schizotypy scales. Having a significant achievement and gender were the independent variables.

3. Results

Means and standard deviations are presented in Table 1.

Table 1

Participants Characteristics

Creativity and social intelligence measures	Mean	SD	Schizotypal traits	Mean	SD
Verbal Originality	12.9	2.5	Ideas of Reference	3.1	1.9
Figural Originality	1.7	0.9	Social Anxiety	2.3	1.9
Figural Fluency	11.7	5.8	Odd Beliefs	1.1	1.6
Figural Flexibility	7.1	3.8	Unusual Perceptions	2.4	1.9
Composite Creativity	8.4	2.4	Odd Behavior	1.4	1.7
			No close Friends	1.1	1.2
Social Prediction	11.7	1.6	Odd Speech	3.5	2.6
Non-verbal Expression	8.4	2.1	Constricted Affect	1.6	1.3
Verbal Expression	10.9	0.9	Suspiciousness	1.8	1.7
Social Relations	7.6	2.5	Composite Schizotypy	18.4	9.5
Social Intelligence	38.7	3.9			

Note: SD – Standard deviation

Gender effects

An effect of gender was found on figural originality of the TTCT, $t(45) = 2.42, p = .020$, 95% CI [-2.67, -.12], where males ($M = 2.21$) scored higher than females ($M = 1.51$) and on excessive social anxiety of the SPQ, $t(45) = 2.13, p = .039$, 95% CI [.07, 2.57], where females ($M = 2.72$) scored higher than males ($M = 1.38$).

Correlations between creativity, social intelligence, and schizotypal personality

Composite creativity was significantly negatively correlated only with odd speech, $r = -.31, p = .039$ (see table 2), and positively correlated with social intelligence scale ‘verbal expression’, $r = .29, p = .050$. Figural originality was significantly negatively correlated with excessive social anxiety, $r = -.31, p = .041$, and positively correlated with odd beliefs or magical thinking, $r = .28$, as a tendency ($p = .063$). Figural fluency was significantly positively correlated with social intelligence scale ‘verbal expression’, $r = .32, p = .030$. Figural flexibility was significantly negatively correlated with odd speech, $r = -.39, p = .007$, suspiciousness, $r = -.31, p = .037$, and with composite schizotypy, $r = .29$, as a tendency ($p = .056$). In addition, correlations between social intelligence and schizotypy measures were observed: Significant negative correlations between having no close friends and social relations, $r = -.36, p = .016$, as well as social intelligence, $r = -.43, p = .003$, were found. Constricted affect was negatively correlated with social prediction, $r = -.36, p = .015$.

Table 2

Correlations Between Creativity, Social Intelligence, and Schizotypy Measures

	Verbal originality	Figural originality	Figural Fluency	Figural Flexibility	Composite Creativity
Social Prediction	-.36*	-.26	.13	.09	.00
Non-verbal Expression	.16	.11	.22	-.05	.17
Verbal expression	.03	.18	.32*	.19	.29
Social Relations	.23	-.17	-.08	-.01	.01
Social Intelligence	.09	-.01	.20	.05	.16

	Verbal originality	Figural originality	Figural Fluency	Figural Flexibility	Composite Creativity
Ideas of Reference	-.10	.02	-.04	-.11	-.09
Social Anxiety	-.23	-.31*	-.13	-.10	-.21
Odd Beliefs	.12	.28	.20	.18	.25
Unusual Perceptions	-.10	.05	-.12	-.27	-.20
Odd Behavior	.05	.08	-.11	-.19	-.12
No Friends	-.03	-.13	.11	.11	.09
Odd Speech	.03	-.08	-.26	-.39**	-.31*
Constricted Affect	-.02	.03	-.24	-.22	-.24
Suspiciousness	-.07	-.05	-.19	-.31*	-.26
Schizotypy	-.07	-.03	-.17	-.29	-.24

Note. N=45. * $p < .05$ ** $p < .01$

Predicting creativity from social intelligence and schizotypy

Stepwise multiple regression analyses were performed on the data to test the extent, to which the subscales of social intelligence and schizotypy could predict the following creativity measures: verbal originality, figural originality, fluency, flexibility, and composite creativity (see table 3, 4).

The prediction model of verbal originality contained two of the thirteen predictors and was reached in two steps with no variables removed. The model was statistically significant, $F(2, 42) = 5.52, p < .01$, and accounted for approximately 21% of the variance of verbal originality ($R^2 = .21, \Delta R^2 = .08$). Significant predictors were negatively social prediction, and positively social relations.

In a regression to predict figural originality, only excessive social anxiety significantly negatively predicted figural originality, $F(1, 43) = 4.46, p < .05$. The multiple correlation squared coefficient was $R^2 = .09, \Delta R^2 = .09$.

Predicting figural fluency, the model contained five of the thirteen predictors and was reached in four steps with no variables removed. The prediction model was statistically significant, $F(5, 39) = 7.22, p < .001$, and accounted for approximately 48% of the variance of figural fluency ($R^2 = .48, \Delta R^2 = .07$). Significant predictors of figural fluency were lower levels of

odd speech, constricted affect, higher levels of verbal expression, having no close friends and odd beliefs or magical thinking. Verbal expression received the strongest weight in the model followed by odd speech and having no close friends. Odd beliefs received the lowest of the five weights.

The prediction model of figural flexibility contained six predictors. The model was reached in six steps, and was statistically significant, $F(6, 38) = 8.64, p < .001$, accounting for approximately 58% of the variance ($R^2 = .58, \Delta R^2 = .05$). Significant predictors of figural flexibility were lower levels of unusual perceptual experience, odd speech, constricted affect, and higher levels of verbal expression, having no close friends, odd beliefs or magical thinking. The strongest weights in the model were reached by odd speech and having no close friends. The lowest weight was reached by verbal expression.

Table 3

Stepwise Multiple Regression Analyses Predicting Verbal Originality, Figural Originality, Figural Fluency, Figural Flexibility From Social Intelligence and Schizotypy

Variables	Verbal originality		Figural originality		Figural Fluency		Figural Flexibility	
	St. β	95% CI	St. β	95% CI	St. β	95% CI	St. β	95% CI
Constant		[12.79,23.35]		[1.64, 2.46]		[-29.12, 3.93]		[-11.65, 8.30]
Social Prediction	-.39**	[-1.05, -.19]						
Non-verbal Expression								
Verbal expression					.40**	[.96, 3.99]	.27*	[.16, 1.98]
Social Relations	.28*	[.01, .56]						
Ideas of Reference								
Social Anxiety			-.31*	[-.28, -.01]				
Odd Beliefs					.27*	[.12, 1.88]	.31*	[.22, 1.27]
Unusual Perceptions							-.28*	[-1.01, -.04]
Odd Behavior								
No Friends					.58**	[1.37, 4.21]	.71**	[1.32, 3.08]
Odd Speech					-.53**	[-1.76, -.58]	-.55**	[-1.18, -.41]
Constricted Affect					-.41**	[-2.97, -.58]	-.45**	[-2.02, -.56]
Suspiciousness								

Note. N=45.

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

Finally, the prediction model of composite creativity contained five of the thirteen predictors and was reached in five steps with no variables removed. The model was statistically significant, $F(5, 39) = 8.28, p < .001$, and accounted for approximately 51% of the variance of verbal originality ($R^2 = .515, \Delta R^2 = .10$). Composite creativity was primarily predicted by lower levels of odd speech and constricted affect, and higher levels of verbal expression, odd beliefs, having no close friends.

Table 4

Stepwise Multiple Regression Analyses Predicting Composite Creativity From Social Intelligence and Schizotypy

Variables	Composite Creativity	
	St. β	95% CI
Constant		[-7.50, 5.75]
Social Prediction		
Non-verbal		
Expression		
Verbal expression	.37**	[.35, 1.56]
Social Relations		
Ideas of Reference		
Social Anxiety		
Odd Beliefs	.33**	[.15, .86]
Unusual Perceptions		
Odd Behavior		
No Friends	.58**	[.58, 1.72]
Odd Speech	-.58**	[-.77, -.30]
Constricted Affect	-.39**	[-1.20, -.24]
Suspiciousness		

Note. N=45.* $p < .05$ ** $p < .01$

Comparing creative achievement groups

Dealing with creativity measures, the T -test revealed significant group differences with respect to figural originality, $t(45) = 2.57, p = .014$, and as a tendency with respect to composite creativity, $t(45) = 1.87, p = .069$, indicating higher scores in the high achievement group ($M_{\text{fig. originality}} = 2.11; M_{\text{com. creativity}} = 9.14$, respectively) compared to the low achievement group ($M_{\text{fig. originality}} = 1.14; M_{\text{com. creativity}} = 7.14$, respectively).

originality = 1.43; $M_{\text{com. creativity}} = 7.82$, respectively) (see table 5.1). There were no significant group differences regarding social intelligence.

Table 5

Means and Standard Deviations of Creativity Measures and Schizotypal Personality Traits Scores, and Tests of Between-subjects Effects: (1) By Creativity and (2) Schizotypy

	High achievement group (N=19)		Low achievement group (N=26)		t	p	95% CI	
	mean	SD	mean	SD			LL	UL
(1) By creativity								
Verbal originality	13.5	2.3	12.5	2.6	1.28	.21	-.54	2.42
Figural originality	2.1	0.9	1.4	0.8	2.57	.01	.15	1.19
Fluency	12.8	5.6	10.9	5.9	1.07	.29	-1.67	5.39
Flexibility	8.2	3.6	6.4	3.8	1.62	.11	-.44	4.06
Composite creativity	9.1	2.1	7.8	2.5	1.87	.07	-.11	2.74
(2) By schizotypy								
Ideas of Reference	1.62	.11	3.3	1.6	-0.71	.48	-1.59	.77
Social Anxiety	1.7	1.42	2.8	2.2	-1.94	.05	-2.29	.04
Odd Beliefs	1.3	1.7	0.9	1.5	0.74	.47	-.62	1.32
Unusual Perceptions	2.2	2.2	2.6	1.8	-0.69	.49	-1.64	.80
Odd Behavior	1.0	1.3	1.8	1.9	-1.54	.13	-1.78	.24
No Friends	0.7	0.9	1.3	1.4	-1.48	.14	-1.26	.19
Odd Speech	2.7	2.0	4.2	2.9	-1.98	.05	-3.02	.08
Constricted Affect	1.1	1.2	1.9	1.3	-2.28	.03	-1.64	-.10
Suspiciousness	1.7	1.7	1.9	1.8	-0.38	.71	-1.27	.87
Composite schizotypy	15.2	9.7	20.7	8.8	-1.92	.07	-11.03	.14

Note. Significant associations highlighted in bold. SD – Standard deviation

a (by creativity) Positive t values indicate that the high achievement group scores higher, negative t values indicate that the low achievement group scores higher.

b (by schizotypy) Positive t values indicate that the high achievement group scores higher, negative t values indicate that the low achievement group scores higher.

With respect to schizotypy, the T -test revealed significant group differences with respect to excessive social anxiety, $t(45) = 1.94$, $p = .050$, odd speech, $t(45) = 1.98$, $p = .049$, and constricted affect, $t(45) = 2.28$, $p = .028$, indicating lower scores in the high achievement group

compared to the low achievement group (see table 5.2). As a tendency, group differences were apparent with respect to the total score of schizotypy, $t(45) = 1.92$, $p = .066$, revealing lower scores in the high achievement group compared to the low achievement group.

4. Discussion

Our goal was to investigate whether verbal and figural creativity, as well as composite creativity overlap with schizotypal traits, taking into account social intelligence. A second aim was to examine whether individuals with low and high real-life creativity achievements differ in figural/verbal creativity, schizotypy, or social intelligence. The main results show, first, that creativity is significantly associated with schizotypal personality traits and social intelligence. These associations are positive with magical thinking, having no close friends, verbal expression, and negative with odd speech and constricted affect. Second, people with real-life creative achievements show increased figural originality and decreased schizotypal personality traits compared to individuals without real-life achievements. Third, males tended to be more original than females, and scored lower in excessive social anxiety.

At first glance, our findings seem consistent with previous research showing that positive schizotypal traits are associated with higher creativity (Miller and Tal, 2007; Burch et al., 2006; Folley and Park, 2005; Nettle and Clegg, 2006; Schuldborg, 2000). Odd beliefs or magical thinking were found to be positively predictive of creativity measures. Negative schizotypal traits, such as constricted affect and odd speech, were found to be negatively predictive of creativity. These findings support our first hypothesis. The association between creativity and schizotypy is positive for positive schizotypal traits and negative for negative schizotypal traits. However, in our study, the negative schizotypal trait “No close friends” was positively related to creativity. A person with high creativity tends to have no close friends. Across different studies, it has been shown that the subscale “No close friends” exhibited the highest loadings on negative schizotypy

ranging from .73 to .89 (Raine et al., 1994; Gruzelier et al., 1996). High scores on “No close friends” items (e.g., I find it hard to be emotionally close to other people) are indicative of interpersonal deficits (Völter et al.; 2012). In previous studies, we have examined whether highly creative individuals are liked or disliked by their peers in a group (Ilinykh, 2009, 2010). Using a sociometric technique, we found that students with high figural creativity were less preferred within a group. Students with high figural creativity had poor social relationships in a group. Nettle and Clegg (2006) found that mating success is increased by schizotypy, but it is not mediated by creativity. Thus, our findings support the assumption that individuals with high figural creativity can have interpersonal deficits.

These results pinpoint that schizotypal traits and creativity overlap and contrast at the same time. On the one hand, creativity appears to reduce the social sphere, creative persons tend to have no close friends. But on the other hand, a negative association between figural originality and excessive social anxiety was found. When figural originality increases, social anxiety decreases. Probably, creative persons have low fear of social interaction, which allows them being original. At the same time they experience loneliness or disconnection. Thus, schizotypy is not directly predictive of creativity, which is consistent with some previous findings (Burch et al., 2006; O'Reilly et al., 2001; Stavridou and Furnham, 1996).

Based on the ‘everyday creativity’ approach the present study examined the association between creative abilities, schizotypy, social intelligence, and real-life creative achievements. Corresponding to the everyday creativity approach every person is seen to possess creativity to a certain degree. This creativity is manifested through a wide variety of outcomes that need not to be constrained to specific fields of endeavors (Richards et al., 1988). We asked the participants to list all their achievements independent of the fields (e.g. musical, sporting, poetic, scientific achievements etc). Comparison between the high achievement and the low achievement groups revealed that creative abilities such as figural originality and flexibility are essential for real-life

creative achievements, whereas schizotypal personality traits become less important or are even hindering real-life creativity achievements.

Thus, the assumption that there is a creative cognitive advantage in schizotypy has received mixed support. Previous research suggests that people with sub-clinical levels of schizophrenic symptoms achieve a greater number of creative achievements (Schuldborg, 2000-2001; Kaufman, 2005; Locarnini and Rawlings, 2008). But at the same time, Kinney and colleagues (2000-2001) found no difference between healthy controls and those with diagnoses of schizophrenia or schizotypal personality disorder using researcher-rated 'everyday' creative achievements. In our study, we used another criterion for the division into low and high achievements groups: having any significant achievements. Thus, it appears that people with schizotypal personality disorder or diagnoses of schizophrenia have significantly more creative achievements (Brod, 1997; Burch et al., 2006; Nettle & Clegg, 2006). In contrast, however, the prevalence of schizotypal personality traits in people with everyday creative achievements is lower compared to 'non-creative' peers. This finding is consistent with results of other authors demonstrating an inverted U relationship between creativity and mental health (Jamison, 1993; Prentky, 2000-2001; Richards et al., 1988).

In fact, schizotypy is essential for psychometric creativity, but not for real-life creative achievements. A possible explanation for this may be the genetic basis of psychosis and creativity in the general population. With regard to Kéri et al.'s study (2009), the T/T genotype is related to psychosis risk and altered brain structure and function (Kéri, Kiss, & Kelemen, 2009). It is also associated with the highest creativity scores when lifetime achievements and schizotypy measures are taken into consideration. The Kéri et al.'s study showed that a genetic polymorphism related to severe mental disorders may have a positive impact on creative achievements, above and beyond the influence of schizotypal personality disorder. This is consistent with our results. Our analyses of the role of schizotypal personality traits in creativity measured by tests as well as in

‘everyday creativity’ have proved useful with regard to the association between mental illness and creativity. The findings from the present study suggest that creativity as cognitive ability measured by psychometric tests is partly predicted by schizotypy. However, ‘everyday creativity’ is not related to the schizotypal dimension, confirming our second hypothesis.

The third aim of our study was to examine whether social intelligence is positively related with real-life creative achievements. There is a disagreement among researches about whether IQ or creativity is the better predictor of creative achievement (Crano, Kenny, & Campbell, 1972; Hakstian & Cattell, 1978; Harris, 2003; Watkins et al., 2007; Razumnikova & Shemelina, 1999; Ilinykh, 2011). Kim (2008) conducted a meta-analysis about the relationship between creative achievements and both IQ and divergent thinking test scores. The author found that creative achievements were best predicted by divergent thinking and not by IQ. These findings suggest a lower impact of IQ on creativity compared to divergent thinking due to the social determination of creative achievements. Rather, the level of creative achievements is the result of successfully and productively applying one’s creative abilities. For example, in Lee et al.’s study (2008) it was demonstrated that behavioral capacities like ‘communicational skills’ and ‘social network skills’ are the prepositions of creative behavior. In our study, we did not find an association between social intelligence and creative achievements. The high achievement group did not differ from the low achievement group in social intelligence. This does not support our third hypothesis. Possible explanations could be found in the definition of social intelligence. Recent data suggest that social intelligence is part of cognitive abilities. Süß et al. (2005b) showed the necessity to differentiate between the fundamental cognitive ability structure (the potential) as precondition that allows or influences behavior and the behavior itself (result). Behavior is influenced directly by social situations and is directed towards a social goal (Weis, 2008). Our findings are consistent with these studies. Social intelligence is probably related to creative achievements, but this link is indirect. Further research has to take into account behavioral skills in order to clarify this indirect mediation.

A gender effect was also found in our study. Males scored higher than females on the figural originality dimension of the TTCT. This result partly confirms former results. On the one hand, figural originality may be explainable by men's superiority in visuo-spatial (Landgraf & Osterheider, 2013; Landgraf et al. 2012) and mental rotation tasks (Halari et al., 2006; Landgraf et al., 2011a,b), which is independent of disorder status. On the other hand, only figural originality, but not verbal originality, fluency, and flexibility differed between females and males. A studies review (Pagnani, 2011) on gender differences in creativity has shown no significant differences in gender superiority. Instead, we assume that creativity in females and males result from different underlying processes. In fact, in Razumnikova's study (2004) it was shown that the same creative productivity scores in men and women were mediated by different strategies in both figural and verbal tasks. Abraham et al.'s study (2013) revealed a dissociation in the neural network engaged by men versus women. To generalize, in Furnham and Nederstrom's study (2010) it was indicated that only 1-2% of creativity variance was accounted for by demographic factors, such as gender. This shows that it is hardly gender, which is determining creativity.

In summary, we replicated prior studies that creativity could be predicted from schizotypal personality traits. We demonstrated that negative and disorganized traits are negatively related to creativity, and positive traits are positively related to creative abilities. Further, we found a reduced social sphere in people with high creativity. We also extended previous findings by considering real-life dimensions with regard to creativity, schizotypy, and social intelligence. Creative abilities such as figural originality and figural flexibility are found to be essential for real-life creative achievements, whereas schizotypal personality traits become less important. Social intelligence is not directly related with creative achievements. These results show that the process of developing creative real-world achievements rather than the result of these processes should be taken into consideration when disentangling the mechanisms, which drive human innovation and creative potential.

Aknowlegments

The authors would like to acknowledge the subjects participating in the study and the staff who helped recruit the subjects. Further, we would like to thank Anna Yashanina, Dr. Manja Foth, and Sebastian Schmidl for test preparation and conduction. Finally, this work profited from conversations with Prof. Olga Razumnikova.

References

1. Abraham, A., Thybusch, K., Pieritz, K., & Hermann, C. (2013). Gender differences in creative thinking: Behavioral and fMRI findings. *Brain Imaging & Behavior*, 6. doi:10.1007/s11682-013-9241-4
2. Addington, J., Addington, D. (2008). Social and cognitive functioning in psychosis. *Schizophrenia Research*, 99(1), 176–181. doi:10.1016/j.schres.2007.07.004
3. Abbott, G. R. & Green, M. J. (2013). Facial affect recognition and schizotypal personality characteristics. *Early Intervention in Psychiatry*, 7(1), 58–63. doi:10.1111/j.1751-893.2012.00346.x
4. Aguirre, F., Sergi, M., & Levy, C. (2008). Emotional intelligence and social functioning in persons with schizotypy. *Schizophrenia Research*, 104(1), 255–264. doi:10.1016/j.schres.2008.05.007
5. Andreasen, N. C. (1987). Creativity and mental illness: Prevalence rates in writers and their first-degree relatives. *American Journal of Psychiatry*, 144(10), 1288–1292.
6. Barron, F. (1955). The disposition towards originality. *Journal of Abnormal Psychology*, 51(3), 478–485. doi:10.1037/h0048073
7. Burch, G. S., Pavelis, C., Hemsley, D. R., & Corr, P. J. (2006). Schizotypy and creativity in visual artists. *British Journal of Psychology*, 37, 177–190. doi:10.1348/000712605X60030

8. Carson, S. H., Peterson, J. B., & Higgins, D. M. (2005). Reliability, validity, and factor structure of the creative achievement questionnaire. *Creativity Research Journal*, 17(1), 37–50. doi:10.1207/s15326934crj1701_4
9. Crano, W. D., Kenny, D. A., & Campbell, D. T. (1972). Does intelligence cause achievement?: A cross-lagged panel analysis. *Journal of Educational Psychology*, 63(3), 258–275. doi:10.1037/h0032639
10. Cropley, A. J. (1990). Creativity and mental health in everyday life. *Creativity Research Journal*, 3, 167–178. doi:10.1080/10400419009534351
11. Dickey, C. C., McCarley, R. W., Niznikiewicz, M. A., Voglmaier, M. M., Seidman, L. L., Kim, S., & Shenton, M. E. (2005). Clinical, cognitive, and social characteristics of a sample of neuroleptic-naïve persons with schizotypal personality disorder. *Schizophrenia Research*, 78, 297–308. doi:10.1016/j.schres.2005.05.016
12. Fleming, E., & Hollinger, C. (1994). Project choice: A longitudinal study of the career development of gifted and talented young women. In R. Subotnik & K. Arnold (Eds.), *Beyond Terman: Contemporary longitudinal studies of giftedness and talent* (pp. 316-348). NJ: Ablex.
13. Folley, B. S., & Park, S. (2005). Verbal creativity and schizotypal personality in relation to prefrontal hemispheric laterality: a behavioral and near-infrared optical imaging study. *Schizophrenia Research*, 80(2), 271–282. doi:10.1016/j.schres.2005.06.016
14. Fonseca-Pedrero, E., Lemos-Giráldez, S., Paíno-Piñeiro, M., Villazón-García, U., & Muñiz, J. (2010). Schizotypal traits, obsessive-compulsive symptoms, and social functioning in adolescents. *Comprehensive Psychiatry*, 51, 71–77. doi:10.1016/j.comppsy.2009.02.003

15. Furnham, A., & Nederstrom, M. (2010). Ability, demographic and personality predictors of creativity. *Personality and Individual Differences*, 48, 957–961. doi:10.1016/j.paid.2010.02.030
16. Gruzelier, J. H., & Doig, A. (1996). The factorial structure of schizotypy. *Schizophrenia Bulletin*, 22(4), 621–634. doi:10.1093/schbul/22.4.621
17. Hakstian, R. A., Rogers, W. T., & Cattell, R. B. (1982). The behavior of numbers-of-factors rules with simulated data. *Multivariate Behavioral Research*, 17, 193–219. doi:10.1207/s15327906mbr1702_3
18. Halari R., Mehrotra R., Sharma T., Ng V., & Kumari V. (2006). Cognitive impairment but preservation of sexual dimorphism in cognitive abilities in chronic schizophrenia. *Psychiatry Research*, 141, 129–139. doi:10.1016/j.psychres.2005.07.021
19. Han, M. (2010). Commentary: How can creativity in a social context be possible. *Culture & Psychology*, 16(2), 165–173. doi:10.1177/1354067X10361401
20. Harris, J. A. (2004). Measured intelligence, achievement, openness to experience, and creativity. *Personality and Individual Differences*, 36(4), 913–929. doi:10.1016/S0191-8869(03)00161-2
21. Holland, J. L., & Nichols, R. C. (1964). Explorations of a theory of vocational choice: III. A longitudinal study of change in a major field of study. *The Personnel and Guidance Journal*, 43(3), 235–242. doi:10.1002/j.2164-4918.1964.tb02667.x
22. Huang, J., Wang, Y., Jin, Z., Di, X., Yang, T., Gur, R. C., ... Chan, R. C. K. (2013). Happy facial expression processing with different social interaction cues: An fMRI study of individuals with schizotypal personality traits. *Progress in Neuro-Psychopharmacology and Biological Psychiatry*, 44, 108–117. doi:10.1016/j.pnpbp.2013.02.004

-
23. Ilinykh, A., van der Meer, E., Shemelina, O., Landgraf, S. (2013). Predicting self-actualization and creativity in the sample of Russian students. *Creative Personality. Collection of Internationally Reviewed Scientific Papers*. - Riga: RTTEMA, 2013, Vol. XI, 52-61.
24. Ilinykh, A. E. (2009). Social'noe povedenie tvorcheskoj lichnosti [Social behavior of a creative person]. *Vestnik Sankt-Peterburgskogo universiteta*. Chast' 12, Psihologija. Sociologija. Pedagogika, 2(1), 271–276.
25. Ilinykh, A. E., & Shemelina, O. S. (2010). Lichnostnye aspekty kreativnosti [Personal aspects of creativity]. *Jaroslavskij pedagogicheskij vestnik*, 2 (4), 205-211.
26. Ilinykh, A. E. (2011). Social'naja kreativnost' lichnosti: Psihologicheskaja struktura [Social creativity of a person: psychological structure]. *Izvestija Saratovskogo universiteta. Serija: Filosofija. Psihologija. Pedagogika*, 11(3), 74-77.
27. Jahshan, C. S., & Sergi, M. J. (2007). Theory of mind, neurocognition, and functional type in schizotypy. *Schizophrenia Research*, 89(1), 278–286. doi:10.1016/j.schres.2006.09.004
28. Jamison, K. R. (1989). Mood disorders and patterns of creativity in British writers and artists. *Psychiatry*, 52(1), 125–134.
29. Jamison, K. R. (1993). *Touched with fire: Manic-depressive illness and the artistic temperament*. New York, NY: Free Press.
30. Kaufman, J. C. (2005). The door that leads into madness: Eastern European poets and mental illness. *Creativity Research Journal*, 17, 99-103. doi:10.1207/s15326934crj1701_8
31. Kéri, S., Kiss, I., & Kelemen, O. (2009). Effects of a neuregulin 1 variant on conversion to schizophrenia and schizophreniform disorder in people at high risk for psychosis. *Molecular Psychiatry*, 14, 118–119. doi:10.1038/mp.2008.1.

-
32. Kéri, S. (2009). Genes for psychosis and creativity: A promoter polymorphism of the neuregulin 1 gene is related to creativity in people with high intellectual achievement. *Psychological Science*, 20(9), 1070-1073. doi:10.1111/j.1467-9280.2009.02398.x
33. Kim, K. H. (2008). Meta-analyses of the relationship of creative achievement to both IQ and divergent thinking test scores. *Journal of Creative Behavior*, 42, 106–130. doi:10.1002/j.2162-6057.2008.tb01290.x
34. Kinney, D. K., Richards, R., Lowing, P. A., LeBlanc, D., Zimbalist, M. E., & Harlan, P. (2000). Creativity in offspring of schizophrenic and control parents: an adoption study. *Creativity Research Journal*, 13(1), 17–25. doi:10.1207/S15326934CRJ1301_3
35. Klein, C., Andresen, B., & Jahn, T. (1997). Erfassung der schizotypen Persönlichkeit nach DSM-II-R: Psychometrische Eigenschaften einer autorisierten deutschsprachigen Übersetzung des “Schizotypal Personality Questionnaire“ (SPQ) von Raine [Assessment of schizotypal personality according to DSM-III-R: Psychometric properties of an authorized German translation of the “Schizotypal Personality Questionnaire“ by Raine]. *Diagnostica*, 43, 347–369.
36. Landgraf, S., Krebs, M. O., Olié, J. P., van der Meer, E., Berthoz, A., & Amado, I. (2010). Real world referencing and schizophrenia: are we experiencing the same reality? *Neuropsychologia*, 48(10), 2922-2930. doi:10.1016/j.neuropsychologia.2010.05.034
37. Landgraf, S., Amado, I., Berthoz, A., Krebs, M. O., & van der Meer, E. (2012). Cognitive Identity in Schizophrenia. Vision, Space, and Body Perception from prodrome to syndrome. *Current Psychiatry Reviews*, 8, 119-139. doi:10.2174/1573400511208020119
38. Landgraf, S., & Osterheider, M. (2013). “To see or not to see: that is the question.” The “Protection-Against-Schizophrenia” model: evidence from congenital blindness and

- visuo-cognitive aberrations. *Frontiers in Psychopathology*, 4, 352.
doi:10.3389/fpsyg.2013.00352
39. Landgraf, S., Amado, I., Brucks, M., Krueger, F., Krebs, M. O., & van der Meer, E. (2011a). Inflexible information acquisition strategies mediate visuo-spatial reasoning in stabilized schizophrenia patients. *The World Journal of Biological Psychiatry*, 12(8), 608-619.
doi:10.3109/15622975.2010.544329
40. Landgraf, S., Amado, I., Ries, J., Purkhardt, R., Olié, J. P., & van der Meer, E. (2011b). Visuo-spatial cognition in schizophrenia: Confirmation of a preference for local information processing. *Schizophrenia Research*, 127(1-3), 163-170.
doi:10.1016/j.schres.2010.11.027
41. Lee, K., Joshi, K., & Kim, Y. (2008, April). *Person-Job Fit as a Moderator of the Relationship between Emotional Intelligence and Job Performance*, Paper presented at the SIGMIS Computer personnel doctoral consortium and research conference "Refilling the pipeline: meeting the renewed demand for information technology workers", Charlottesville, Virginia.
42. Li, H. J., Chan, R. C. K., Gong, Q. Y., Liu, Y., Liu, S. M., Shum, D., & Ma, Z. L. (2012). Facial emotion processing in patients with schizophrenia and their non-psychotic siblings: a functional magnetic resonance imaging study. *Schizophrenia Research*, 134, 143-150.
doi:10.1016/j.schres.2011.10.019
43. Ludwig, A. M. (1995). *The price of greatness: Resolving the creativity and madness controversy*. New York: Guilford Press.
44. Mednick, S. A. (1962). The associative basis of the creative process. *Psychological Review*, 69(3), 220-232. doi:10.1037/h0048850

-
45. Miller, G. F., & Tal, I. R. (2007). Schizotypy versus openness and intelligence as predictors of creativity. *Schizophrenia Research*, 93, 317–324. doi:10.1016/j.schres.2007.02.007
46. Montuori, A. & Purser, R. (1996). Context and creativity: Beyond social determinism and the isolated genius. A rejoinder to Hale. *Journal of Humanistic Psychology*. 36(2), 34–43. doi:10.1177/00221678960362006
47. Montuori, A. & Purser, R. (1995). Deconstructing the lone genius myth: Towards a contextual view of creativity. *Journal of Humanistic Psychology*. 35(3), 69–112. doi:10.1177/00221678950353005
48. Nelson, B., & Rawlings, D. (2010). Relating schizotypy and personality to the phenomenology of creativity. *Schizophrenia Bulletin*, 36, 388–399. doi:10.1093/schbul/sbn098
49. Nettle, D. (2006). Schizotypy and mental health amongst poets, visual artists and mathematicians. *Journal of Research in Personality*, 40, 876–890. doi:10.1016/j.jrp.2005.09.004
50. Nicholls, J. G. (1972). Creativity in the person who will never produce anything original and useful: The concept of creativity as a normally distributed trait. *American Psychologist*, 27, 717–727. doi:10.1037/h0033180
51. O'Reilly, T., Dunbar, R., & Bentall, R. (2001). Schizotypy and creativity: an evolutionary connection? *Personality and Individual Differences*, 31, 1067–1068. doi:10.1016/S0191-8869(00)00204-X
52. O'Sullivan, M., & Guilford, J. P. (1976). *Four Factor Tests of Social Intelligence: Manual of instructions and interpretations*. Orange, CA: Sheridan Psychological Services.

-
53. Pagnani, A. R. (2011). Gender differences. In Editors-in-Chief: M. A. Runco & S. R. Pritzker (Eds.), *Encyclopedia of creativity (second edition)* (pp. 551–557). Retrieved from <http://www.sciencedirect.com/science/article/pii/B9780123750389001060>
54. Prentky, R. (2000—2001). Mental illness and roots of genius. *Creativity Research Journal*, 13(1), 95–104. doi:10.1207/S15326934CRJ1301_11
55. Raine, A. (1991). The SPQ: A scale for the assessment of schizotypal personality based on DSM-III-R criteria. *Schizophrenia Bulletin*, 17(4), 555–564. doi:10.1093/schbul/17.4.555
56. Raine, A., Reynolds, C., Lencz, T., Scerbo, A., Triphon, N., & Kim, D. (1994). Cognitive-perceptual, interpersonal, and disorganized features of schizotypal personality. *Schizophrenia Bulletin*, 20, 191–201. doi:10.1093/schbul/20.1.191
57. Rawlings, D., & Locarnini, A. (2008). Dimensional schizotypy, autism, and unusual word associations in artists and scientists. *Journal of Research in Personality*, 42(2), 465–471. doi:10.1016/j.jrp.2007.06.005
58. Razumnikova, O. M. (2002). *Sposoby opredelenija kreativnosti* [Methods of Creativity Assessment], Izdatel'stvo Novosibirskogo gosudarstvennogo tekhnicheskogo universiteta, Novosibirsk.
59. Razumnikova, O. M. (2004). Gender differences in hemispheric organization during divergent thinking: an EEG investigation in human subjects. *Neuroscience Letters*, 362(3), 193–195. doi:10.1016/j.neulet.2004.02.066
60. Razumnikova, O. M. (2005). Gender-dependent frequency–spatial organization of the brain cortex activity during convergent and divergent thinking: II. analysis of the eeg coherence, human physiology, *Human Physiology*, 31(3), 275–284. doi:10.1007/s10747-005-0045-9

-
61. Razumnikova, O. M., & Shemelina, O. S. (1999). Lichnostye i kognitivnye svoystva pri jeksperimental'nom opredelenii urovnja kreativnosti [Personality and cognitive features interaction in experimental evaluation of creativity]. *Voprosy Psihologii*, 5, 130–139.
62. Richards, R. & Kinney, D. (1990). Mood swings and creativity. *Creativity Research Journal*, 3, 203–218. doi:10.1080/10400419009534353
63. Richards, R., Kinney, D. K., Benet, M., & Merzel, A. P. C. (1988). Assessing everyday creativity: Characteristics of the lifetime creativity scales and validation with three large samples. *Journal of Personality and Social Psychology*, 54, 467–485. doi:10.1037/0022-3514.54.3.476
64. Richards, R., Kinney, D., Lunde, I., Benet, M., & Merzel, A.P.C. (1988). Creativity in manic-depressives, cyclothymes, their normal relatives, and control subjects. *Journal of Abnormal Psychology*, 97(3), 281–288. doi:10.1037/0021-843X.97.3.281
65. Richards, R. (2000–2001). Creativity and the schizophrenia spectrum: More and more interesting. *Creativity Research journal*, 13, 111–132. doi:10.1207/S15326934CRJ1301_13
66. Runco, M. A. (2004). Creativity. *Annual Review of Psychology*, 55, 657–687. doi:10.1146/annurev.psych.55.090902.141502
67. Schuldberg, D. (2000–2001). Six subclinical spectrum traits in normal creativity. *Creativity Research Journal*, 13, 5–16. doi:10.1207/S15326934CRJ1301_2
68. Shi, Y.F., Wang ,Y., Cao, X.Y., Wang, Y., Wang, Y.N., Zong, J.G., Xu, T. ... Chan, R. (2012). Experience of pleasure and emotional expression in individuals with schizotypal personality features. *PLoS ONE* 7(5): e34147. doi:10.1371/journal.pone.0034147
69. Simonton, D. K. (2010). Creativity in highly eminent individuals. In J. C. Kaufman & R. J. Sternberg (Eds), *The Cambridge handbook of creativity* (pp. 174–188). New York: Cambridge University Press.

-
70. Stavridou, A., & Furnham, A. (1996). The relationship between psychoticism, trait-creativity and the attentional mechanism of cognitive inhibition. *Personality and Individual Differences*, 21(1), 143–153. doi:10.1016/0191-8869(96)00030-X
71. Süß, H. M., Weis, S., & Seidel, K. (2005b). Soziale Kompetenzen [Social Competences]. In H. Weber & T. Rammsayer (Hrsg.), *Handbuch der Persönlichkeitspsychologie und Differentiellen Psychologie, (Reihe Handbuch der Psychologie) [Handbook of Personality Psychology and Differential Psychology]* (pp. 350-362). Göttingen: Hogrefe.
72. Thorndike, E. L. (1920). Intelligence and its uses. *Harper's Magazine*, 140, 227–235.
73. Torrance, E. P. (1966). *The Torrance Tests of Creative Thinking-Norms-Technical Manual Research Edition-Verbal Tests, Forms A and B-Figural Tests, Forms A and B*. Princeton, NJ: Personnel Press.
74. Torrance, E. P. (1969). Prediction of adult creative achievement among high school seniors. *Gifted Child Quarterly*, 13, 223–229. doi:10.1177/001698626901300401
75. Völter, C., Strobach, T., Aichert, D. S., Wöstmann, N., Costa, A., Möller, H. J., Schubert, T. ... Ettinger, U. (2012). Schizotypy and behavioural adjustment and the role of neuroticism. *PLoS ONE* 7(2): e30078. doi:10.1371/journal.pone.0030078
76. Ward, T. B., Smith, S. M., & Finke, R. A. (1999). Creative Cognition. In R. J. Sternberg (Ed.), *Handbook of Creativity* (pp. 189–212). Cambridge: Cambridge University Press.
77. Watson, E (2007). Who or what creates: A conceptual framework for social creativity. *Human Resource Development Review*, 6(4), 419–441. doi:10.1177/1534484307308255
78. Zong, J. G., Chan, R. C. K., Stone, W. S., His, X. L., Cao, X. Y., Zhao, Q., Shi, Y. F. ... Wang, Y. (2010). Coping flexibility in young adults: comparison between subjects with and without schizotypal personality features. *Schizophrenia Research*, 122(1), 185–192. doi:10.1016/j.schres.2010.04.013.

Study 2

Predicting creativity and self-actualization in the sample of Russian students

Ilinykh, A., van der Meer, E., Shemelina, O., Landgraf, S.

Abstract

Creativity and self-actualization appear similar but differ in emotional, existential spheres, as well as in self-esteem. **Aim of the study.** We examined the relationship between creativity and self-actualization. Further, we predicted creativity and self-actualization assessing individual's scores on empathy, meaning of life, and self-esteem. **Materials and Methods.** 120 students participated in this study. Creativity was measured with the TTCT (Torrance), RAT (Mednick). A self-actualization questionnaire (Kalina), Empathy Inventory (Bojko), Purpose-in-Life Scale (Leontjev), Self-esteem Scale (Dembo-Rubinshtein) were administered. **Results.** Creativity was predicted by penetrability and spontaneity. Self-actualization was predicted by locus of control "Life", intuitive apperception, identification, and self-esteem. **Conclusions.** Creativity measured by standard tests is not related to self-actualization.

Key words: creativity, self-actualization, empathy, self-esteem, purpose in life.

Predicting creativity and self-actualization in the sample of Russian students

Ilinykh, A., van der Meer, E., Shemelina, O., Landgraf, S.

I. Introduction

The phenomenon of creativity has always been a great interest for psychological science. A plethora of studies (Barron, 1963; Amabile, 1996; Csikszentmihalyi, 1996; Feist, 1998; Wolfradt & Pretz, 2001; Silvia et al., 2008) focuses on identifying individual traits and characteristics that distinguish creative people from their less creative peers. In particular, there are three areas for this line of research: cognitive, social traits, and motivational-affective aspects (Feist, 2010). Besides, creativity is associated with psychopathology and mental illness (Andreasson, 1987; Ludwig, 1994; Kaufman, 2005; Nettle, 2006). Another construct important for the consideration of creativity is self-actualization. Self-actualization, underscores notions of mental health and normalcy rather than pathology with regard to creative conduct (Knapp, 1990; Tloczynski et al., 1997). Self-actualization is the ability to transcend levels of physiological, psychological, and social needs in order to obtain fulfillment of personal needs in terms of life's meaning (Maslow, 1968). In Maslow's (1971) view, creativity and self-actualization are functionally interdependent, with creativity facilitating self-actualization and self-actualization facilitating creativity. If this was correct, then creative individuals should show personality traits similar to self-actualizing individuals. Foresightedly, Rogers stated that "*the concept of creativeness and the concept of the ... self-actualizing ... person seem to be closer and closer together*" (1995, p.57). Empirical evidence, however, is ambiguous. For example, Mathes (1978) found only a low correlation between self-actualization and creativity, measured with creative product tests. Thus, the present study constitutes an

attempt to compare two phenomena in relation to individual characteristics, and to examine whether the same personality facets predict creativity and self-actualization.

Characterizing self-actualization, Maslow (1968) identified acceptance of self, others and nature, detachment, a desire for privacy, autonomy, and resistance to enculturation, problem-centering, and democratic character structure. Rogers (1969) noted that self-actualization leads to or is manifested by growth and motivation, differentiation, independence and autonomy, and self-responsibility. Noteworthy, Rogers describes major characteristics of self-actualizing persons: (1) they are open to experience, to all external and internal stimuli. They experience both positive and negative feelings without repressing the latter. (2) Fully functioning persons live existentially. They are constantly in the process of change. They are flexible and adaptive. (3) Fully functioning people have an internal locus of control and (4) they are creative and self-actualized. Two decades later, Runco and Bahleda (1986) identified confidence, intrinsic motivation, preference to aesthetic experience, independence, energy, a wide range of interests, and tolerance to ambiguity as characteristics of self-actualization.

Similarly to self-actualization, a creative person can be described with reference to cognitive, social, motivational-affective, and clinical characteristics. Martindale (1989) hypothesized that real creative results are possible when there is unity of cognitive abilities and the matrix of motivational, attitudinal, and personal characteristics. Regarding the latter, self-respect, persistence, high level of energy, wide range of interests, sensitivity to problems, androgyny, curiosity, enthusiasm and depth of feelings, preference of difficult aims and high esthetic values are connected with creative behavior. A more profound analysis revealed that openness to experiences constitutes functional aspects of creative behavior. Feist (1998) found that creative people are also more open to new experiences, less conscientious, more self-accepting, hostile, and impulsive. Russian creativity researcher Druzhinin (2001) lists independence, open-mindedness, a high level of tolerance to ambiguity, a developed sense for

esthetic, and the confidence in one's abilities as significant characteristics of creativity. Ljvova's (2005) experimental research revealed that creativity includes activity, adequate self-esteem, sensitivity, positive life attitude, courage, and flexibility.

In this way, different authors distinguish different psychological characteristics of a creative personality. Generalizing, a creative person is open to new experiences, self-accepting, confident in one's abilities, emotionally sensitive, and s/he prefers difficult creative aims. There are clear parallels between the traits that characterize creative people and the traits found in self-actualized individuals. Hence, we want to test this empirically with the present study

Despite overlapping creative and self-actualizing personality traits, there are some differences. Considering emotional sphere, many studies have shown that a creative person is characterized by emotional sensitivity (Barron, 1972; Götz & Götz, 1979; Jamison, 1993; Ludwig, 1995; Richards & Kinney, 1990), anxiety (Andreasen & Glick, 1988), and also by a higher prevalence of affective disorders (Bakker, 1991). This is not the case for healthy, fully self-actualizing individuals (Maslow, 1968; Rogers, 1969). Self-actualizing persons have a deep feeling of *empathy* (Maslow, 1956). Empathy is regarded as the ability to share, perceive, or imagine the experiences of others (Batson, 2009; Hoffman, 2007) and is associated with compassion, sympathy, and prosocial behaviour (Preston & de Waal, 2002).

Considering existential aspect studies, self-actualization is closely related to the meaning in life construct (Frankl, 1984; Maslow, 1968; Rogers, 1969; more recent Rhoades & McFarland, 2000). A search of meaning or purpose in life is humanly inherent and integral for psychological functioning (O'Connor & Chamberlain, 1996; Frankl, 1987). On the contrary, the results of creativity research show that creativity is often associated with disorders, alcoholism, and even suicide (Kuaqa et al., 2012). These syndromes may indicate meaninglessness of life rather than search for a life purpose.

There are contradictory data concerning self-esteem. Self-esteem is the fourth level of Maslow's needs and these needs provide an individual with confidence and independence. Maki and Smith (2002) believed that self-esteem is one of the determining factors of human behavior. Research has shown that when individuals have more self-esteem they also show more efficiency and higher status and will be protected from mental–social disorders. Self-esteem is related to positive attitude to life, successful identity and positive personal growth and self-actualization (Abdi & Bagheri, 2012). However, considering creativity, Jaquish and Richard (1980) revealed that self-esteem significantly correlated with divergent thinking only in preadolescents.

Moreover, the present study is conducted in the Russian sample. Dealing with Maslow's theory self-actualization is the basic concept of applies to any human being in any culture. But there are contradictory data about cultural affects on self-actualization. Findings of Ivtsan's study (2008) suggest that the characteristics of self-actualization, as defined by American psychologist Maslow, cannot be effectively applied to collectivistic cultures, in the same way they can in individualistic cultures. Russians are more collectivistic then Americans (Realo & Allik, 1999; Matsumoto et al., 1998). In this way the characteristics of self-actualizing persons in Russia can differ from the American population.

Aim of study

Creative and self-actualizing personality traits appear similar, but at the same time do show some differences in emotional, existential spheres, as well as in self-esteem. In this relation the aim of the present study is to examine the relationship between creativity and self-actualization, as well as to predict creativity and self-actualization by individual characteristics – empathy, meaning of life, self-esteem. The empirical study was used for the verification of the following hypotheses. H1: Creativity measured by tests has low correlation with self-actualization. H2: Self-actualization is predicted by empathy, meaning in life and self-esteem measures. H3:

Creativity isn't predicted by empathy, meaning in life and self-esteem. The results are discussed with regard to theoretical implications for self-actualization and creativity.

2. Materials and Method

2.1. Participants

One hundred twenty students (100 females, mean age: 17.8 years \pm 1.5 years) from Novosibirsk State Technical University participated in this study. Students were recruited from the Faculty of Humanities. Participants gave their written informed consent and obtained course credit as compensation. The work was carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for experiments involving humans.

2.2. Materials and Procedure

Participants were tested in groups of 15-20 individuals. Completion of all tasks took about 3.5-4 hours. In this regard, the testing took place in three meetings. On the first meeting, a demographic questionnaire and creativity measures were administrated. On the second meeting, the participants were asked to fill in the self-actualization questionnaire and purpose-in-life measure. Subsequently on the third meeting, an empathy questionnaire and a self-esteem test were administered. There was always exactly one week between the meetings. After each testing, participants were debriefed.

Creativity measures

Torrance Test of Creative Thinking (TTCT, Torrance; 1966). The non-verbal task "Circles" was used in the study. The participants were given a printed form of 20 circles and asked to sketch objects or pictures which have circle or several circles as a major part. There was no time limit. Their responses were scored for fluency, flexibility, and originality. *Fluency* refers to the total number of appropriate responses for the task. Here, a higher score indicates higher creativity.

Flexibility refers to the total number of categories that the appropriate responses can be sorted into. Again, a higher score indicates higher creativity. *Figural originality* refers to the statistical rarity of a given response in a particular sample of subjects in the validation sample published by our workgroup (Razumnikova, 2002). Each picture was compared to the total amount of pictures from all of subjects. Originality was scored for each picture or idea, and then summarized to the index of originality. A higher index of originality means that all pictures are highly originally and unusual. We analyzed figural originality, fluency, and flexibility.

Remote Association Test (RAT, Mednick & Mednick, 1962, 1967). *Verbal originality* was measured by the RAT. During the RAT, 20 verbal triads (for example, Suddenly – Man – Street) were presented. Participants were asked to articulate an original word-association for each of these triads. There was no time limit. Total score of verbal originality was computed with: $\text{Originality} = \sum (1/(n_i + 1))$, where n is the quantities of presented word-association for each triad of words ($i=1, \dots, 20$) in the validation sample published by our workgroup (Razumnikova, 2002). Each response can be attributed a score $1/(n + 1)$ where n is the occurrences of the idea in the sample. Therefore, high scores correspond to rare ideas (the highest score 1 corresponds to a unique idea and, thus, the highest total score is 20, the lowest 20/21).

Individual characteristics measures

Self-actualization questionnaire. We measured self-actualization using the 100-item *yes/no* questionnaire (modified “Personal Orientation Inventory”, POI, N. Kalina, 1998) examining the attitudes and values in term of the concept of “self-actualizing”. The questionnaire has eleven subscales: *Time orientation, Self-actualizing values, Nature of man, Cognitive need, Creativity, Autonomy, Spontaneity, Self-understanding, Self-regard, Sociability, Interpersonal relationship flexibility*. A total score of the level of self-actualization is computed as the sum of the eleven scales. A higher score indicates higher self-actualization.

Purposes in life scale (modified "Purpose-in-Life Test, PIL", D. Leontyev). A sense of purpose in life was measured with Purposes-in-life scale, modified by Russian psychologist D. Leontjev (1986-1988) from "Personal Orientation Inventory" Crumbaugh and Maholick (1969). The test is based on Frankl's (1955) conception of purpose in life. The Purpose-in-Life Scale is a 20-item instrument. Low PIL scores indicate an "existential vacuum" in the individual's life. Subscales: *Purpose* is characterized by the presence or the absence of future purposes in life that give direction and time perspective. *Process* is characterized as having an interest in and an emotional richness of life. *Result* is characterized as a satisfaction of self-realization. *Locus of control* *T'* is characterized as representation of a person with a strong personality that has sufficient freedom of choice to build his/her own life in accordance with his/her own objectives. *Locus of control* *'Life'* is characterized as control of one's own life.

Empathy Inventory (Bojko, 1992) examines the level of empathy and its components. The inventory includes 36 dichotomous items and estimates six components of empathy: *Rational Apperception*, *Emotional Apperception*, *Intuitive Apperception*, *Attitudes*, *Penetrability*, and *Identification*. A total score of empathy is computed as the sum of the six scales.

Self-esteem Scale (Dembo-Rubinshtein, 1970). The level of self-esteem was measured with the Self-esteem Scale. The students were administered six scales of about 100 mm in length. The scales were *Health*, *Mind*, *Character*, *The authority among their peers*, *Appearance*, and *Self-confidence*. The first scale, *Health* is for practice trials use only. For all six scales, participants were instructed to indicate they self-esteem by indicating a point on the scale. One millimeter on the scale is one point. Level of self-esteem is calculated in each parameter, and in the overall level of self-esteem (Self-esteem = 5 scales points / 5).

2.3. Data Analysis

Data were analysed using SPSS version 21 for “Windows”. Independent sample t-tests were used to investigate effects of gender. Pearson’s correlations were used to assess how creativity and self-actualization measures correlated with empathy, purpose in life scores and self-esteem. Step-wise multiple regressions were performed to find out if empathy, purpose in life construct and self-esteem measures predict creativity and self-actualization.

3. Results

Means and standard deviations of all creativity and personality measures are presented in Table 1.

Table 1

Descriptive statistics

Creativity measures	Mean	SD	Personality traits	Mean	SD
Verbal Originality	11.1	3.2	Self-actualization	90.4	14.4
Figural Originality	1.2	0.7	Purpose in life	104.1	15.5
Fluency	14.8	3.8	Empathy	20.3	4.2
Flexibility	8.9	2.6	Self-esteem	70.6	21.3
Composite Creativity	9.0	1.8			

Note: SD – Standard deviation

Gender effects

A trend was found on verbal originality of the RAT, $t(120) = 1.92$, $p < .057$, where females ($M = 11.39$) scored higher than males ($M = 9.95$). Therefore, we included gender as a covariate in all subsequent analyses.

Correlations between creativity and self-actualization

Figural creativity was significantly positively correlated with spontaneity, $r = .18$, $p < .05$. Composite creativity was significantly positively correlated only with spontaneity, $r = .19$, $p < .05$.

Correlations between creativity and personality characteristics

Figural originality was negatively correlated with Purpose-in-life as a process, $r = -.21$, $p < .03$, and as a result, $r = -.22$, $p < .02$. Concerning empathy, only penetrability showed a positive correlation with verbal originality, $r = .34$, $p < .001$, and with composite creativity, $r = .21$, $p < .02$. There were no correlations between creativity and self-esteem.

Correlations between self-actualization and personality characteristics

We consider here only the significant correlation with composite self-actualization level. Self-actualization had positive significant correlations with such components of empathy as intuitive apperception, $r = .27$, $p < .001$, identification, $r = .29$, $p < .001$, and composite empathy, $r = .20$, $p < .03$. All subscales of the 'Purpose-in-life' test were positively correlated with self-actualization: purpose, $r = .34$, $p < .001$, process, $r = .44$, $p < .001$, result, $r = .39$, $p < .001$, locus of control 'I', $r = .41$, $p < .001$, locus of control 'Life', $r = .51$, $p < .001$, composite score, $r = .45$, $p < .001$. As well, almost all subscales of self-esteem were significantly positively correlated with self-actualization: character, $r = .31$, $p < .001$, authority among peers, $r = .18$, $p < .05$, appearance, $r = .36$, $p < .001$, self-confidence, $r = .41$, $p < .001$, and composite self-esteem, $r = .38$, $p < .001$. There were no significant correlations with social intelligence.

The number of positive, negative, and possible correlations between creativity, self-actualization and individual characteristics are presented in Table 2.

Table 2

Number of positive/negative correlations between creativity, self-actualization and personality characteristics

	Purpose in life	Empathy	Self-esteem
Creativity	0 / 2 / 30	2 / 0 / 35	0 / 0 / 30
Self-actualization	47 / 0 / 76	15 / 2 / 84	31 / 1 / 72

Note: positive correlations / negative correlation / possible number of correlations

A series of hierarchical regressions were performed on the data to test the extent, to which the subscales of personal characteristics could predict self-actualization and the following creativity measures: verbal originality, figural originality, fluency, flexibility, and total creativity. Creativity was included in a regression to predict self-actualization. And self-actualization subscales were included in a regression to predict creativity. The significant predictors of self-actualization and composite creativity are presented in Table 3.

Predicting creativity

Predicting verbal originality, the regression coefficient was $R = .34$ (adjusted $R^2 = .12$, $p < .01$). Significant predictor was penetrability, $\beta = .34$, $t = 3.97$, $p < .001$. In a regression to predict figural originality, the multiple correlation coefficient was $R = .23$ (adjusted $R^2 = .06$, $p < .04$). Only orientation in time (self-actualization subscale) was significantly negatively predicted by figural originality, $\beta = -.23$, $t = -2.61$, $p < .01$. Predicting verbal originality, the regression coefficient was $R = .34$ (adjusted $R^2 = .12$, $p < .01$). Significant predictor was penetrability, $\beta = .34$, $t = 3.97$, $p < .001$. For fluency and flexibility there were no significant predictors. Finally, predicting *composite creativity*, the regression coefficient was $R = .28$ (adjusted $R^2 = .08$, $p < .01$). Significant predictors were penetrability, $\beta = .21$, $t = 2.31$, $p < .05$, and spontaneity, $\beta = .18$, $t = 1.99$, $p < .05$.

Predicting self-actualization

The regression analysis for self-actualization revealed a multiple correlation coefficient of $R = .63$ (adjusted $R^2 = .39$, $p < .000$). Significant predictors of self-actualization were locus of control 'Life', $\beta = .41$, $t = 4.96$, $p < .001$, intuitive apperception, $\beta = .20$, $t = 2.63$, $p < .01$, identification, $\beta = .20$, $t = 2.58$, $p < .01$, and self-esteem, $\beta = .19$, $t = 2.24$, $p < .03$.

Table 3

Hierarchical regression: empathy, purpose in life and self-esteem as predictors of self-actualization and creativity

	Self-actualization		Composite Creativity	
	St. β	t	St. β	t
Rational apperception	-	-	-	-
Emotional apperception	-	-	-	-
Intuitive apperception	.20	2.63**	-	-
Attitudes	-	-	-	-
Penetrability			.21	2.31*
Identification	.20	2.58**	-	-
	-	-	-	-
Purpose	-	-	-	-
Process	-	-	-	-
Results	-	-	-	-
Locus of control 'I'	-	-	-	-
Locus of control Life'	.41	4.96**	-	-
	-	-	-	-
Self-esteem	.19	2.24*	-	-
<i>Spontaneity (subscale of self-actualization)</i>			.18	1.99*
	Adj. $R^2 = .39$		Adj. $R^2 = .08$	
	F (4.115) = 18.46**		F (2.117) = 4.97**	

Note. N=120

* $p < .05$.

** $p < .01$

4. Discussion

The major aim of our study was to investigate whether creativity and self-actualization are correlated and predicted by the same personality characteristics. The results partly supported the experimental hypotheses. The correlation between creativity and self-actualization was found in the subscale *spontaneity*. Predicting creativity, there were only two significant predictors, namely *penetrability* and *spontaneity*. There were no significant predictors from the purpose in life and self-esteem measures. Furthermore, creativity showed very few correlations with empathy, purpose in life, as well as with self-esteem. In contrast, The regression analysis revealed that *locus of control 'Life'*, *intuitive apperception*, *identification* and *self-esteem* were the significant predictors for self-

actualization. Self-actualization is positively and closely related with self-esteem, purpose in life measures and empathy components. Our observations have a number of interesting theoretical implications.

Our findings are consistent with Maslow's theory and the previous studies that a person with a self-actualizing personality incorporates deep feelings of empathy, self-acceptance, positive self-esteem, and sufficient freedom of choice to build his/her own life in accordance with his/her own purposes. The regression model for self-actualization explains 39 % of its variance. Korostyleva (2005) believes that a fulfillment of potential is achieved through an individual's own efforts and joint activities with other people (close and remote relations), the society, and the world as a whole. Positive relations with other persons becomes a basis for self-acceptance and positive self-esteem (Sergienko, 2008; Selezneva, 2007).

However, Maslow stated that self-actualizing personality is creative and original. Our findings do not support this statement. In the regression equation, creativity measures, neither verbal nor figural, were not predicting self-actualization. In order to access creativity, we used psychometric measures of creative process that require to generate original ideas according to the task. Nevertheless the ability to generate ideas is only one aspect of the creative process (Runco, 2007; Runco & Okuda, 1988) and does not describe a creative personality or creative products, which require more time, planning, and resources (Davis, 1973; Dombrovski, 1979; Sternberg & Davidson, 1992). Possibly, if we would have used self-report measures focusing on characteristics, that is achievements of the person, the creative personality characteristics may have overlapped with self-actualizing personality characteristics. Maslow emphasized creativity as a lifestyle – a way of living and perceiving. He distinguished between a general, self-actualized creativity and a special talent creativity. Davis (2004) noted that creativity is more than producing ideas in art, science, business, and on divergent thinking tests. In this way, psychometrically measured creativity is not a sense for self-actualization (Damm, 1970; Yonge, 1975). In

Csikszentmihalyi's view (1990) creativity is regarded in the term of *flow*. Flow is the mental state of operation, in which a person performing an activity is fully immersed in a feeling of energized focus, full involvement, and enjoyment in the process of the activity. This concept describes creativity as something more than generating ideas, it is more closely related to self-actualization. Thus, probably it may be worthwhile to relate self-actualization with creativity measured by the self-reported personality tests, not by product-orientated measures.

Considering creativity, the significant predictors for composite creativity were penetrability and spontaneity. Penetrability is regarded as the ability to take into consideration the feelings and emotions of another person, thereby creating an atmosphere of soulfulness in the communications with other people (Bojko, 1992). Emotions are essential for a creative personality. The findings received by Oshmarina (2000) demonstrated that actors compared with people of other professions have emotional hypersensitivity and a wide range of feelings. They have a distinct tendency to control their emotions and feelings but nevertheless their behavior is very expressive. Flanders (2004) also marks creativity as the personal exploration and authentic expression of the emotional sphere. Until the artist has expressed the emotion, s/he does not have a definitive idea of the end product. Thus, the act of emotion, the act of creation, is fundamentally exploratory (Flanders, 2004). Penetrability in a creative process allows to feel a creative product before it will be expressed in the outside world (Druzhinin, 2005). In this way, our findings support and extend previous data about the role of the emotional sphere in creativity.

A limitation of this study is that the sample contains more female than male students. A number of studies have reported sex differences for measures of self-actualization (Bledsoe, 1973; Foulds & Warehime, 1971; Schroeder, 1973; Shostrom, 1966). Differences were mostly showing higher self-actualization in females. In a recent study by Okech and Chambers (2012) it was found that a medium amount of the variance of self-actualization was accounted for by

gender. Our findings do not support this statement. Gender was included as co-variant in the analysis. It is consistent to the idea of androgyny regarding self-actualizing persons. A more flexible perception of the concept of gender is related with greater self-actualization (Ivtzan and Conney, 2009). Another limitation of the study is that it was conducted in a student sample. Probably, with age the relationship between self-actualization and creativity becomes closer. This assumption could initiate further investigations on the topic of creativity and self-actualization.

In sum, we have shown that creativity and self-actualization were predicted by different personality characteristics, namely penetrability and spontaneity for the former, and locus of control in life, intuitive apperception, identification, and self-esteem for the latter. These results implicate that creativity measured by standard tests and self-actualization may not rely on similar personality characteristics.

References

1. Amabile, T. M. (1996). *Creativity in context: Update to "the social psychology of creativity."* Westview press.
2. Andreasen, N. C., & Glick, I. D. (1988). Bipolar affective disorder and creativity: implications and clinical management. *Comprehensive Psychiatry*, 29(3), 207-217.
3. Andreasen, N. C. (1987). Creativity and mental illness: Prevalence rates in writers and their first-degree relatives. *American Journal of Psychiatry*, 144(10), 1288–1292.
4. Bagheri, F., & Abdi, F. (2012). A comparison of identity and life regard performing arts students with other field's art students. *Annals of Biological Research*, 3(3).
5. Bakker, F. C. (1991). Development of personality in dancers: A longitudinal study. *Personality and individual differences*, 12(7), 671-681.

6. Barron, F., & Harrington, D. M. (1981). Creativity, intelligence, and personality. *Annual review of psychology*, 32(1), 439-476.
7. Barron, F. (1963). *Creativity and psychological health: Origins of personal vitality and creative freedom*. Princeton, NJ: Van Nostrand.
8. Batson, C. D. (2009). These things called empathy: eight related but distinct phenomena.
9. Bledsoe, J. C. (1973). Sex differences in self-concept: fact or artifact? *Psychological reports*, 32(3c), 1253-1254.
10. Csikszentmihalyi, M. (1999). Implications of a Systems Perspective for the Study of Creativity. *Handbook of creativity*, 313.
11. Crumbaugh, J., & Maholick, L. (1964). Purpose in life test.
12. Damm, V. J. (1970). Creativity and intelligence: Research implications for equal emphasis in high school. *Exceptional children*.
13. Davis, G. A. (2004). Objectives and activities for teaching creative thinking. *Creativity and giftedness*, 10(2), 97.
14. Davis, G. A. (1975). In Frumious Pursuit of the Creative Person*. *The journal of creative behavior*, 9(2), 75-87.
15. Druzhinin, V.N. (2005). Psychology of Creativity. *Psychological journal*, 5, 101-110 (in Russian)
16. Feist, G.J. (2010). The Function of Personality in Creativity: The Nature and Nurture of the Creative Personality. In J. Kaufman and R. Sternberg (Ed.) *Cambridge Handbook of Creativity*, p. 113-131.
17. Foulds, M. L., & Warehime, R. G. (1971). Effects of a "fake good" response set on a measure of self-actualization. *Journal of Counseling Psychology*, 18(3), 279.

18. Frankl, V. E. (1985). *Man's search for meaning*. Simon and Schuster.
19. Hoffman, M. L. (2008). Empathy and prosocial behavior. *Handbook of emotions*, 3, 440-455.
20. Gotz, K. O., & Gotz, K. (1979). Personality characteristics of successful artists. *Perceptual and Motor Skills*, 49(3), 919-924.
21. Ivtzan, I. (2008). Self-actualisation: For Individualistic Cultures Only? *International Journal on Humanistic Ideology*, 1(2): 111-138.
22. Ivtzan, I., & Conneely, R. (2009). Androgyny in the Mirror of Self-actualisation and Spiritual Health. *The Open Psychology Journal*, 2: 58-70.
23. Jaquish, G. A., & Ripple, R. E. (1980). Divergent thinking and self-esteem in preadolescents and adolescents. *Journal of Youth and Adolescence*, 9(2), 143-152.
24. Kaufman, J. C. (2005). The door that leads into madness: Eastern European poets and mental illness. *Creativity Research Journal*, 17, 99-103. doi:10.1207/s15326934crj1701_8
25. Knapp, R. R. (1990). *Handbook for the personal orientation inventory*. Edits Publishers.
26. Korostyleva, L.A. (2005). *Psychology of Personal Fulfillment*. Rech', St. Petersburg, (in Russian)
27. L'vova, I.V. (2005). *Psychological Factors of Creativity Development*. Dissertation thesis. Novosibirsk.(in Russian)
28. Leontiev D.A. Test smyslozhiznennykh orientatsiy [Test life meaning orientations]. M.: Meaning, 1992. 16 p
29. Ludwig, A. M. (1995). *The price of greatness: Resolving the creativity and madness controversy*. New York: Guilford Press.

-
30. Martindale, C. (1989). Personality, situation, and creativity. In *Handbook of creativity* (pp. 211-232). Springer US.
 31. Mathes, E.W. (1978). Self-actualization, Metavalues, and Creativity. *Psychological Reports*, 43: 215-222.
 32. Maslow, A.H. (1968). *Towards a Psychology of Being* (2nd ed.). New York: Van Nostrand Reinhold.
 33. Maslow, A.H. (1971). *The Father Reaches of Human Nature*. New York: Viking.
 34. Matsumoto, D., Takeuchi, S., Andayani, S., Kouznetsova, N., & Krupp, D. (1998). The Contribution of Individualism vs. Collectivism to Cross - national Differences in Display Rules. *Asian Journal of Social Psychology*, 1(2), 147-165.
 35. Mednick, S. A. (1962). The associative basis of the creative process. *Psychological Review*, 69(3), 220–232. doi:10.1037/h0048850
 36. Nettle, D. (2006). Schizotypy and mental health amongst poets, visual artists and mathematicians. *Journal of Research in Personality*, 40, 876–890. doi:10.1016/j.jrp.2005.09.004
 37. O'Connor, K., & Chamberlain, K. (1996). Dimensions of life meaning: A qualitative investigation at mid - life. *British Journal of Psychology*, 87(3), 461-477.
 38. Okech, A., & Chambers, C. R. (2012). Gender Differences in Self-Actualization.Diversity in Higher Education, 12, 59-74.
 39. Preston, S. D., & De Waal, F. (2002). Empathy: Its ultimate and proximate bases. *Behavioral and brain sciences*, 25(01), 1-20.
 40. Razumnikova, O. M. (2002). *Methods of Creativity Assessment* Novosibirsk State Technical University Press, Novosibirsk (in Russian).

-
41. Realo, A., & Allik, J. (1999). A cross-cultural study of collectivism: A comparison of American, Estonian, and Russian students. *The Journal of Social Psychology*, 139(2), 133-142.
 42. Rhoades, D. R., & McFarland, K. F. (2000). Purpose in life and self-actualization in agency-supported caregivers. *Community mental health journal*, 36(5), 513-521.
 43. Richards, R., & Kinney, D. K. (1990). Mood swings and creativity. *Creativity Research Journal*, 3(3), 202-217.
 44. Rogers, C. (1995). *On Becoming a Person: A Therapist's View of Psychotherapy*. Boston: Houghton Mifflin. (Original work published in 1961).
 45. Rogers, C. R., & Freiberg, H. J. (1969). *Freedom to learn*, Charles E. Merrill, Columbus, OH.
 46. Runco, M. A. (2007). *Creativity: Theories and Themes: Research, Development, and Practice*. San Diego, CA: Academic Press.
 47. Runco, M. A., Okuda, S. M., & Thurston, B. J. (1987). The Psychometric Properties of Four Systems for Scoring Divergent Thinking Tests. *Journal of Psychoeducational Assessment*, 2: 149–156.
 48. Runco, M. A., & Bahleda, M. D. (1986). Implicit Theories of Artistic, Scientific, and Everyday Creativity*. *The Journal of Creative Behavior*, 20(2), 93-98.
 49. Silvia, P. J., Winterstein, B. P., Willse, J. T., Barona, C. M., Cram, J. T., Hess, K. I., ... & Richard, C. A. (2008). Assessing creativity with divergent thinking tasks: Exploring the reliability and validity of new subjective scoring methods. *Psychology of Aesthetics, Creativity, and the Arts*, 2(2), 68.
 50. Tloczynski, J., Knoll, C., & Fitch, A. (1997). The relationship among spirituality, religious ideology, and personality. *Journal of Psychology and Theology*, 25(2), 208-213.

-
51. Torrance, E. P. (1966). The Torrance Tests of Creative Thinking-Norms-Technical Manual Research Edition-Verbal Tests, Forms A and B-Figural Tests, Forms A and B. Princeton, NJ: Personnel Press
 52. Wolfradt, U., & Pretz, J. E. (2001). Individual differences in creativity: Personality, story writing, and hobbies. *European Journal of Personality*, 15(4), 297-310

Study 3

Culture makes the difference: Creativity-schizotypy association varies between Russians and Germans

Landgraf, S.*, Ilinykh, A.*, Haller, C., Cropley, D., Shemelina, O., Osterheider, M., van der Meer, E.

*these authors contributed equally to this work

Abstract

Creativity – the generation and exploitation of ideas – and schizotypy share a strong association. However, the impact of cross-cultural differences on these traits has been somewhat neglected in the literature. With the present study, we investigated a sample of 45 German and 46 Russian students with respect to their verbal (Remote Association Test) and figural (Torrance Test of Creative Thinking) creativity, as well as their schizotypal personality traits. First, we found that German participants showed greater verbal and figural originality than Russians. In fact, this result was mediated by a culture by gender interaction, indicating that Russian women were more creative than German women, whereas German men were more creative than Russian men. Further, a data-driven factor analysis of the creativity scores identified two factors: – “generative capacities” addressing a subject’s ability to generate a variety of often unrelated ideas in different categories; and “innovative creative capacities” addressing the ability to generate novel, original, unique ideas. While Russians performed higher in the former, that is, process-oriented creativity, Germans perform higher in the latter, that is, product-oriented creativity. Finally, structural

equation modeling showed that ‘negative’ schizotypy predicted innovative creative capacities, and this effect was mediated by culture. Overall these results suggest that the association between creativity and schizotypy is culture specific. We discuss the implications regarding (1) culture-independent validity of the two constructs and (2) the usefulness of distinguishing psychopathological and socially acceptable personality characteristics.

Keywords: Creativity, schizotypy, gender, culture, innovative capacities, generative capacities

Culture makes the difference: Creativity-schizotypy association varies between Russians and Germans

Landgraf, S.*, Ilinykh, A.*, Haller, C., Cropley, D., Shemelina, O., Osterheider, M., van der Meer, E.

*these authors contributed equally to this work

I. Introduction

Creativity is a topic of wide scope that is important at both the individual and societal level. According to Sternberg and Lubart (2006), creativity can be understood as a confluence of personal (intellectual abilities, personality, motivation) and environmental (society, culture) variables. Csikszentmihalyi (1999) proposed that creativity is a cultural phenomenon, not simply a mental process. In fact, culture does not only influence how creativity is defined and assessed (Kaufman, 2009), culture may also mediate how creativity is associated with personality (Ilinykh et al., 2013), e.g., psychopathological traits. However, little effort has been made to investigate environmental factors, such as culture, with respect to creativity performance. The present study closes this gap by investigating how culture, specifically German and Russian backgrounds, influences the association between creativity and personality characteristics, that is, schizotypal personality traits.

A plethora of studies have found that creative individuals have elevated levels of schizotypal traits (Batey & Furnham, 2008; Burch et al., 2006; Ilinykh et al., 2014; Nettle, 2006; Schuldberg, 2001). According to the Diagnostic and Statistical Manual of Mental Disorders (5th ed; DSM-5; American Psychiatric Association, 2013), schizotypal personality disorder is considered within the schizophrenia spectrum. Schizophrenia is a chronic and highly impairing condition that affects around 1% of the human population (Jablensky, 1995). In fact,

schizophrenia emerges as one of the most universally similar psychopathologies across ethnicities, nations, and cultures, which fits with the biological bases of the disease (Gottesman, 1991; Jablensky et al., 1992) and warrants validity to intercultural studies.

The schizophrenic spectrum is a dimensional model of psychopathology that includes schizophrenia and schizotypal personality disorder. Patients with schizophrenia experience several problems with cognition related to attention, memory, sensory processing, executive functioning, decision making, and difficulty changing response sets (Walker & Tessner, 2008; Carter & Neufeld, 1998; Landgraf et al. 2010). These difficulties may actually increase with increasing genetic risk for the disorder (Calkins et al., 2004, 2008; Landgraf et al., 2008), with increasing psychosis imminence (Yung & Nelson, 2011) and with the progression of the disorder (Landgraf et al., 2012). Individuals suffering from schizotypal personality disorder also experience cognitive perceptual distortions, but they do not reach the same proportions as those in schizophrenia (Chapman et al., 1994; Fernandes & Miller, 1995). These distortions include magical thinking, abstract or digressive language, bizarre thoughts, and derealisation (Raine, 1991). Importantly, cross-culturally studying schizotypal personality traits in non-clinical populations may be informative about whether or not intensity and variability of these traits and their association to creativity traits are stable across cultures.

Relevant studies in this field revealed that creativity seems to be associated only with “mild forms” or less severe manifestations of the schizophrenia spectrum (Fisher et al., 2013, 2004; Fink et al., 2013; Nelson & Rawlings, 2010), such as schizotypy. Schizotypy has been associated with a greater number of unique responses on divergent thinking measures (Green & Williams, 1999), which is considered an important component of creative thinking (Guilford, 1956). Studying different psychometric measures of creativity, Batey and Furnham (2008) found that creativity was positively associated with unusual experiences and impulsive nonconformity, but negatively with cognitive disorganization. Similarly, Claridge and Blakey (2009) observed

significant correlations between positive schizotypy (unusual experience) and self-assessed creativity. It therefore seems useful to examine whether creativity is associated with certain personality traits from the cross-cultural perspective.

Studies addressing the potential link between creativity and the schizophrenia spectrum from the cultural perspective are comparatively rare. However, some studies have contrasted Westerners and East Asians (Heine, 2012) with regard to the influence of individualism and collectivism. Markus and Kitayama (1991, 1994) argued that people who lived in individualistic and collectivistic cultures construe themselves differently, as a result of their socialization. Individualistic members think of themselves in an independent manner: They perceive themselves as separate entities and express their personal feelings and opinions in direct manners. In contrast, collectivistic members construe themselves in an interdependent way: They view themselves as part of the social group and comply with the in-group norms. Creativity can be understood as a form of individuated behavior (Lau et al., 2004). Thus, it may be feasible to assume that creativity is accepted more in individualistic cultures than in collectivistic ones.

Ng (2003) investigated individuals from China and the United States and found that a society of liberal individualism is more conducive to people engaging in creative behavior than a society of Confucianism. Ng (2001) argues that creative individuals of collectivistic societies were dogmatic people because of their stubborn adherence to their unpopular ideas. This, in turn, directly relates to their psychological health and manifestation of mental illnesses. While famous examples of mad geniuses in Western cultures are readily available (e.g., Vincent van Gogh, Ernest Hemingway etc.), Eastern creative geniuses do not show strong links between creativity and mental illness (Simonton & Ting, 2010). Kaufman (2005) studied 826 writers from Eastern Europe and found that 10.7% of them suffered from mental illnesses. Following this line of research, Niu and Kaufman (2005) investigated Chinese writers and found that only 16 out of 722 writers (2.2%) suffered from mental illnesses. The authors explained this difference by

traditional Chinese philosophy, e.g., Confucianism or Taoism. Furthermore, the authors explained their results with the use of biographical methods for collecting their data. The biographies of famous Chinese writers may tend to avoid mentioning mental illnesses and instead chose to focus on more academic and professional achievements (Niu & Kaufman, 2005).

Cross-cultural research on creativity focuses on differences in creativity performance with contradicting results. Torrance and Sato (1979) found that American students scored higher on verbal fluency. Ogawa et al. (1991) compared verbal flexibility and verbal fluency of fifth-grade Japanese and American children. American children appeared to be superior to Japanese children in flexibility. Zha et al.'s (2006) study revealed that American doctoral students display significantly higher aptitude for creativity, including "openness to experience, self-acceptance, achievement motivation, dominance, hostility and impulsiveness" (Zha et al.'s, 2006, p.356), compared to their Chinese counterparts. Saeki et al. (2001) found that American college students are more creative than Japanese college students as measured by the Torrance Test of Creative Thinking (TTCT) figural form. Overall these results imply that on the one hand, creative performances appear to be facilitated by individualism of Westerns cultures. The collectivism of East Asians cultures, on the other hand, rather impedes individual creative achievements (Heine, 2012; Markus & Kitayama, 1991, 1994; Ng, 2003).

Russia represents an intermediate position between Western and Eastern cultures (Shlapentokh, 2007). On the one hand and similar to many East European countries, Russia is considered a collectivistic country (Realo & Allik, 1999). The cultural and educational environments in Russia differ as compared with European countries (Frolov, 2001; Martynenko, 2001). However, on the other hand Gulyanskaya's study (2008) found that the percentage of preference of either individualistic or collectivistic values is not evenly distributed among different Russian age groups. Young individuals perceive themselves as more individualistic (54% of the 21-28 year olds) than older individuals (only 8% of the 50-59 year olds). Thus, mixed

cultural values and political, social, and cultural changes may influence the creative potential and manner, in which a creative potential is implemented by Russian individuals.

Only a few studies have been conducted, comparing the creative performance of Russian and other nationals. One study (Kharkhitin & Motalleebi, 2008) revealed that, compared to Iranian citizens, Russians scored higher on verbal and figural creative fluency and originality. Considering an international sample, Jellen and Klaus (1989), employing the Test for Creative Thinking – Drawing Production, showed that students in the Philippines performed better than students in England, Germany, and the United States. Still, students in the United States scored higher than those in China and India. Zhou et al. (1995, 1998) reported that Chinese children performed better than their German peers on divergent thinking tests by using the Finding Geometric Analogies (in Wang et al., 2011). In addition, Rudowicz et al. (1995) showed that Hong Kong children scored lower than American and German children on fluency, flexibility, and originality on the TTCT verbal form. More recently, Yi et al. (2013) found that German participants produced more creative and aesthetically pleasant works than their Chinese counterparts.

Together, these results suggest that culture mediates creative performance and its relation to psychopathology. Hence, this study hypothesizes specifically that creativity and its link to psychopathology may be influenced by cultural factors that differ between Germany and Russia. To this end, we explored the relationship of creativity with schizotypal personality traits according to the cultural contexts. Motivated by the presumption that creativity has been related to different schizotypy–schizophrenia continuum symptoms, we hypothesized that environmental factors, such as culture, can mediate the creativity – schizotypy link. Specifically, we hypothesized that (1) the performance in creativity would be higher in German students, (2), the mean level of schizotypy would be stable across cultures, and (3) that there would be no

gender differences in both cultures. Finally, we generated a creativity-schizotypy association model, employing structural equation modeling. We hypothesized that a structural equation model including culture as mediating factor between schizotypy and creative performance would best account for our data.

2. Material and Methods

2.1. Participants

2.1.1. German sample

A total of 45 German participants (32 females; $M_{\text{age}} = 21.7$ years, $SD = 3.6$) were recruited from Humboldt University in a range of disciplines, including psychology, biology, and mathematics. All participants were citizens of Germany and German was their first language. The students gave their written informed consent and obtained course credit as compensation.

2.1.2. Russian sample

A total of 46 Russian participants (17 females; $M_{\text{age}} = 20.7$ years, $SD = 2.5$) were recruited from Novosibirsk State Technical University in a range of disciplines, including psychology, law, and mathematics. All Russian participants were citizens of Russia and Russian was their first language. The study was conducted during regular class time. Students provided written informed consent and obtained course credit as compensation.

2.2. Schizotypal personality traits measure

To measure schizotypy, we used Raine's (1991) Schizotypal Personality Questionnaire (SPQ) scale, which is a 74-item questionnaire modeled on the Diagnostic and Statistical Manual of Mental Disorders criteria for schizotypal personality disorder (German version by Klein et al., 1997; Russian version by Efremov & Enikolopov, 2001). The positive schizotypy scale includes the SPQ-subscales magical thinking, unusual perceptual experiences, ideas of reference, odd

speech and odd behaviour. The negative schizotypy scale includes excessive social anxiety, having no close friends, and constricted affect (Klein et al., 1997).

2.3. Creativity measures

The participants completed figural and verbal creativity tasks. The figural task “Circles” of the Torrance Test of Creative Thinking (TTCT; Torrance, 1966) was used to assess figural creativity. Participants were given a printed form of 20 circles. They were asked to sketch objects or pictures in an original way, which have one or several circles as a major part. There was no time limit (Runco & Cayirdag, 2012). Their responses were scored for figural fluency, flexibility, and originality. Figural fluency represents the ability to produce a number of appropriate figural images. Figural flexibility represents the ability to generate ideas in different categories. Figural originality represents the ability to generate statistically infrequent ideas.

Verbal originality was measured by the Remote Association Test (RAT, Mednick, 1962). Twenty sets of three words were presented and participants were asked to generate an original word-association for each of these triads. There was no time limit. During testing, the database of all given word-associations for each triad was created separately for the Russian and German sample. Originality of each response was based on the relative frequency of a particular response in each sample. Total score of verbal originality was calculated as the sum of originality values for all triads.

2.4. Procedure

A test booklet and pencils were provided to each participant. In Germany and in Russia, participants were tested in groups of 10–20 individuals. Completion of all tasks took about 1.5 hours. A demographic questionnaire was administered to determine participants’ age, gender, years of study, disciplines, country of origin, and nationality. After filling out the demographic questionnaire, participants were given the two creativity tasks, namely the TTCT and the RAT. Subsequently, the SPQ was administered. After the testing, participants were debriefed.

2.5. Statistical analyses

Demographic data were analysed using the Chi-Square test (χ^2 -test) to find out gender differences in each sample (Germans and Russians); the Mann-Whitney U-test to compare the differences in age, year of study and distribution of disciplines. Further, we employed a two factorial ANOVA with culture (German and Russian) and gender (male, female) as the independent variables. The dependent variables were the scores on the TTCT, the RAT, and the SPQ. Exploratory factor analyses were used to investigate the underlying nature of the creativity and schizotypy measures. Structural equation modeling (SEM) was conducted to investigate the relationship between creativity and schizotypy and how culture (German, Russian) influenced this relationship. The comparative study was conducted using IBM SPSS Statistics version 20 for “Windows” (IBM Corp., 2011). The statistical models were estimated using Mplus Version 7 (Muthén & Muthén, 2012) with maximum likelihood estimations (ML). Baseline and restricted models were estimated in order to better specify the model with mediator. For these models, approximate model fit was assessed using the comparative fit index (CFI), the Tucker-Lewis index (TLI), the root-mean-square error of approximation (RMSEA), and the standardized root-mean square residuals (SRMR). An appropriate model fit was determined by CFI and TLI values approaching .95, an RMSEA value below .06, and an SRMR below .08 (Hu & Bentler, 1998). Data distributions fulfilled, if not specified otherwise, the criteria for the statistical procedures. The significance level for all tests was .05.

3. Results

3.1. Demographic data

The Mann-Whitney U-test did not reveal significant differences between the Russian and German samples in age, $U = 922, p = .361, r = .10$, years of study, $U = 907, p = .258, r = .12$, and study disciplines, $U = 820, p = .061, r = .19$. However, a difference was found for gender, for the

German sample $\chi^2(1, N = 45) = 8.02, p = .005$, but not for the Russian sample $\chi^2(1, N = 46) = 3.13, p = .077$. There are significantly more females in the German sample (Table 1). To control for the effect of gender in further comparisons between the two samples, we conducted a series of hierarchic regressions. Dependent variables in the hierarchic regressions were the creativity and schizotypy subscales as well as the creativity index and the composite schizotypy score. The independent variable was gender. As a result of the regression analyses, we obtained the residual values, that is, the difference between the observed value of the dependent variables and the predicted value of gender. All further group comparisons were conducted using these variables.

Table 1.

Summary of participants

Culture	Male	Female	Total	Age	Study disciplines
Germany	13	32	45	$M_{age} = 21.7$	Humanities – 26 Social sciences – 12 Natural sciences – 4 Art - 3
Russia	29	17	46	$M_{age} = 20.7$	Humanities – 15 Social sciences – 24 Natural sciences – 4 Art – 3

3.2. Comparative approach

Table 2 provides the means and standard deviations for scores on the RAT and the TTCT of the German and Russian students. A two-way ANOVA was conducted on the measures of creativity to examine the effects of culture (German, Russian) and gender (male, female). There was a significant gender x culture interaction effect on figural originality, $F(1, 87) = 3.95, p = .050, \eta_p^2 = .043$, and on figural flexibility, $F(1, 87) = 6.09, p = .016, \eta_p^2 = .065$. The differences in creativity varied in Germans and Russians across the two gender groups. Specifically, the Russian females had higher scores of creative abilities than the German females, and the German males had higher scores than the Russian males. Furthermore, there was a statistically significant main effect for culture on verbal, $F(1, 87) = 10.39, p = .002, \eta_p^2 = .107$,

and figural originality, $F(1, 87) = 13.70, p < .001, \eta_p^2 = .136$. German students showed higher scores than the Russian students.

Table 2.

Mean and Standard Deviations of the Creativity Measures (Culture and Gender Differences)

Components	(a)	Germans		Russians		(b)	Germans	Russians
		Male	Female	Male	Female		Total	Total
		M (SD)	M (SD)	M (SD)	M (SD)		M (SD)	M (SD)
Verbal originality		13.7 (1.8)	12.7 (2.6)	11.4 (3.4)	10.9 (2.9)		12.9 (2.4)	10.9 (3.2)
Figural originality		2.2 (.7)	1.5 (.9)	1.2 (.8)	1.2 (.6)		1.7 (.9)	1.2 (.7)
Figural fluency		12.7 (3.7)	11.4 (4.2)	12.1 (4.3)	13.7 (3.2)		11.8 (4.1)	13.7 (3.9)
Figural flexibility		9.4 (3.4)	7.9 (3.1)	8.9 (3.3)	10.8 (2.7)		8.3 (3.1)	10.8 (3.2)

Note: M – Sample mean, SD – Standard deviation; Significant differences highlighted in bold.

Table 3 provides the means and standard deviations for scores on schizotypy measures of the German and Russian students. Comparing the two samples in schizotypy measures, a two-way ANOVA revealed a statistically significant main effect for culture on having no close friends, $F(1, 87) = 10.46, p = .002, \eta_p^2 = .107$ and suspiciousness $F(1, 87) = 4.21, p = .043, \eta_p^2 = .046$. The Russian students showed higher scores than the German students.

Table 3.

Mean and Standard Deviation of the Schizotypy Measures (Culture and Gender Differences)

Components	(a)	Germans		Russians		(b)	Germans	Russians
		Male	Female	Male	Female		Total	Total
		M (SD)	M (SD)	M (SD)	M (SD)		M (SD)	M (SD)
Ideas of Reference		2.4 (1.1)	3.4 (2.1)	1.8 (1.2)	2.9 (2.1)		3.1 (1.9)	2.2 (1.6)
Social Anxiety		1.3 (1.2)	2.7 (2.1)	2.1 (2.2)	3.2 (2.4)		2.3 (1.9)	2.5 (2.3)
Odd Beliefs		1.1 (1.7)	1.1 (1.6)	1.6 (1.9)	1.9 (2.4)		1.1 (1.6)	1.7 (2.1)
Unusual Perceptions		2.4 (2.1)	2.4 (1.9)	2.3 (2.1)	3.4 (2.0)		2.4 (2.0)	2.7 (2.0)

Components	(a)	Germans		Russians		(b)	Germans	Russians
		Male	Female	Male	Female		Total	Total
		M	M	M	M		M (SD)	M (SD)
		(SD)	(SD)	(SD)	(SD)			
Odd Behavior		1.8	1.3	1.9	2.4		1.4	2.1
		(2.1)	(1.5)	(2.1)	(1.9)		(1.7)	(2.1)
No Friends		1.1	1.1	2.2	2.3		1.1	2.2
		(1.3)	(1.2)	(1.9)	(1.9)		(1.2)	(1.9)
Odd Speech		4.5	3.2	3.8	4.5		3.5	4.1
		(3.1)	(2.4)	(2.6)	(2.7)		(2.6)	(2.6)
Constricted Affect		1.5	1.6	2.1	1.6		1.6	1.9
		(1.1)	(1.4)	(1.9)	(1.1)		(1.3)	(1.6)
Suspiciousness		1.3	2.0	2.3	2.7		1.8	2.4
		(1.3)	(1.9)	(1.8)	(1.9)		(1.7)	(1.8)
Overall Schizotypy		17.5	18.7	20.1	24.9		18.4	21.9
		(9.2)	(9.7)	(12.2)	(11.5)		(9.5)	(11.9)

Note: M – Sample mean, SD – Standard deviation; Significant differences highlighted in bold and italics.

3.3. Factor analytical approach

3.3.1. Creativity factors

To explore the nature of creativity traits measured by the RAT and the TTCT, the scores from both cultures were factor analysed using the principle component method with varimax rotation (Kaiser, 1958). The analysis extracted two factors (with Eigenvalues > 1), which accounted for 78% of the variance (Table 4). The first factor was primarily determined by the TTCT measures of fluency and flexibility. The second factor showed the highest loading on originality for both the RAT and the TTCT score. In this way, verbal originality and figural originality were combined by creating a new variable “innovative capacities” or process-oriented capacities (Kharkhurin & Motallaebe, 2008) using the Anderson-Rubin’s method (Anderson & Rubin, 1949). Respectively, figural fluency and figural flexibility formed the new variable “generative capacities” or product-oriented capacities (Kharkhurin & Motallaebe, 2008). Further analyses were conducted using the variables “innovative capacities” and “generative capacities”.

Table 4.

Factor loadings for creative abilities (gender controlled residuals) of the RAT and the TTCT

	Factor loadings	
	I	II
1. Verbal originality	-.31	.81
2. Figural originality	.39	.76
3. Fluency	.87	-.12
4. Flexibility	.91	.13

Note: N=91 * $p < .05$ ** $p < .01$; I – Generative capacities loading, II – Innovative capacities loading.

3.3.2. Schizotypy factors

Schizotypy responses on the nine SPQ subscales controlled for gender were factor-analyzed in SPSS using maximum likelihood extraction with varimax rotation (Kaiser, 1958). In contrast to Raine's (1991) three factors, we obtained just two factors with Eigenvalues > 1 (Table 5), accounting for 58% of the variance: a 'positive schizotypy' factor with strong positive loadings on the six subscales concerning unusual experiences, magical thinking, ideas of reference, suspiciousness, odd speech, and odd behavior; and a 'negative schizotypy' factor with strong positive loadings on the three subscales concerning constricted affect, having no close friends, and social anxiety (Miller & Tal, 2007). From the first factor, we formed as a new variable 'positive schizotypy' using the Anderson-Rubin's method (Anderson & Rubin, 1949). Respectively, the second factor formed a new variable 'negative schizotypy'. Further analyses were conducted using the variables "positive schizotypy" and "negative schizotypy".

Table 5.

Factor loadings for schizotypy measures of the SPQ

	Factor loadings	
	I	II
1.Ideas of Reference	.70	.03
2.Social Anxiety	.08	.79
3.Odd Beliefs	.66	-.32
4.Unusual Perceptions	.70	.35
5.Odd Behavior	.58	.43
6.No Friends	.15	.82
7.Odd Speech	.71	.35
8.Constricted Affect	.19	.76
9.Suspiciousness	.64	.27

Note: N=91; I – Positive schizotypy loading, II – Negative schizotypy loading.

3.3.3. Performance differences on creativity and schizotypy factors

The next step of the analyses was to compare Russian and German performances on the obtained factors for creativity and schizotypy. The independent sample T-tests on innovative and generative capacities, as well as positive and negative schizotypy showed a significant effect for culture (Germans, Russians) on innovative capacities, $t(89) = 3.92, p < .001$, (Table 6). Specifically, German students had significantly higher scores on innovative capacities than Russian students, $t(89) = 3.92, p < .001$. A tendency for a significant result was found for negative schizotypy, $t(89) = -1.81, p = .074$. Here, Russian students tended to be higher in negative schizotypy than German students. At the same time, correlational analyses revealed that innovative capacities were significantly negatively related with negative schizotypy independent of culture, $r(91) = -.30, p = .004$.

Table 6.

Correlations and Differences of Creativity and Schizotypy Factors between the Russian and the German sample.

	Correlations		T-test		Germans	Russians	CI 95%	
	3	4	t	p	M (SD)	M (SD)	Lower	Upper
1. Innovative capacities	-.01	-.30*	3.92	.001	.38 (.91)	-.37 (.95)	.38	1.15
2. Generative capacities	.09	-.01	-1.37	.174	-.14 (.95)	.14 (1.04)	-.70	.13
3. Positive schizotypy			-.77	.446	-.08 (.91)	.08 (1.09)	-.58	.26
4. Negative schizotypy			-1.81	.074	-.19 (.79)	.18 (1.14)	-.78	.04

Note: N=91 * $p < .05$; Significant differences between Germans and Russians highlighted in bold; M – Sample mean, SD – Standard deviation

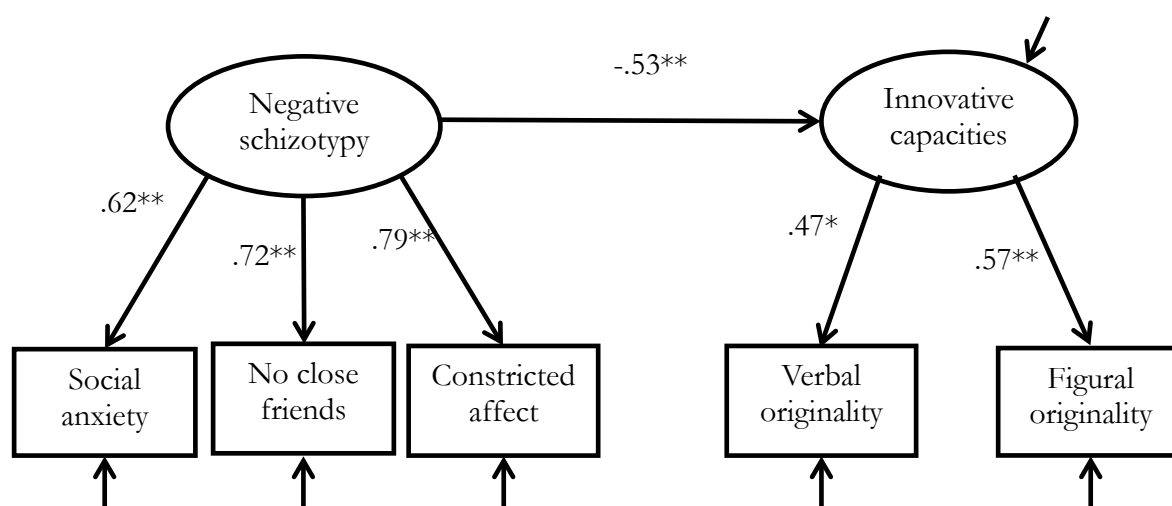
3.4. Statistical equation modeling approach

3.4.1. The baseline model without culture as mediator

Statistical modeling was based on the preliminary results after comparative and correlational studies. We found that only innovative capacities significantly differed in Germany and Russia, and they correlated with negative schizotypy. Thus, the structural equation modeling (SEM) approach tested whether the association between latent innovative capacities and latent negative schizotypy was mediated by culture. In our baseline model, we performed a regression analysis of innovative capacities from negative schizotypy (see figure 1). Innovative capacities were modeled by the two manifest variables verbal originality and figural originality, as were found in the factor analysis above. The factor loadings of the first indicator variables were fixed to 1 (per default). Negative schizotypy was reflected by the three indicator variables social anxiety, having no close friends, and constricted affect, as were found in the factor analysis above. A CFI of this model suggested good fit of our data ($\chi^2 = 5.61$, $df = 4$, $p = .230$, CFI = .98,

TLI = .95, RMSEA = .067, SRMR = .035). Negative schizotypy significantly predicted lower scores of innovative capacities ($\beta = -.58, p = .001$). According to the model 33.2% of the variance of innovative capacities are explained by negative schizotypy.

Figure 1. The baseline model from negative schizotypy to innovative capacities



** $p < .01$; $N=91$

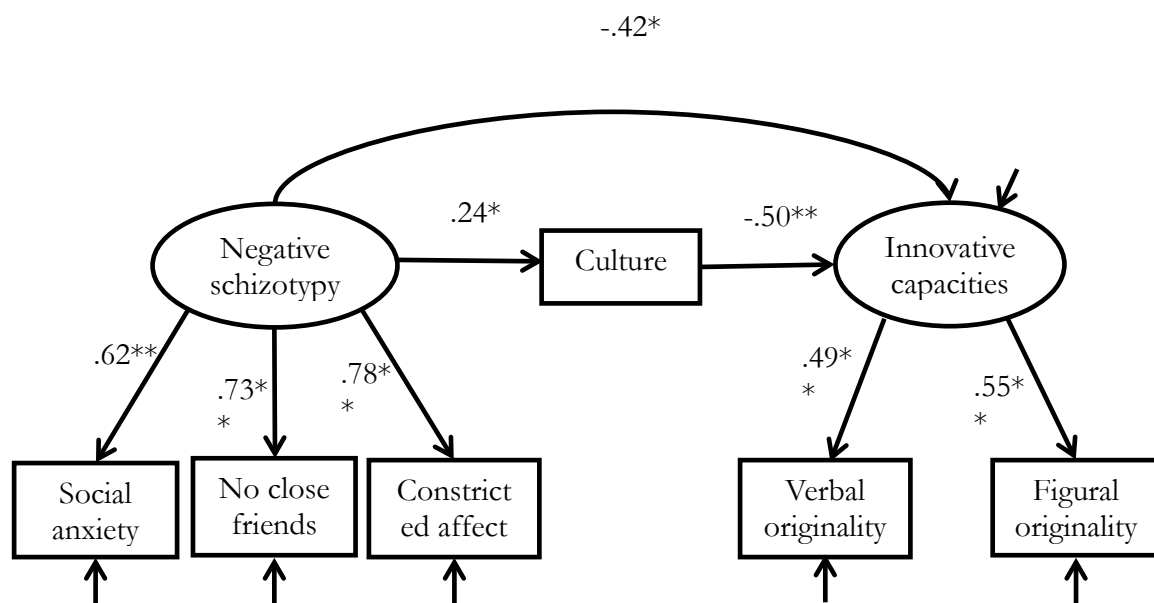
Because of the approximately equal correlation coefficients between the traits of negative schizotypy (social anxiety and no close friends – $r = .53, p < .001$; social anxiety and constricted affect – $r = .54, p < .001$; no close friends and constricted affect – $r = .53, p < .001$), we fixed all three factor loadings of the indicator variables of negative schizotypy to 1 (Geiser et al., 2012). A CFI of this model suggested appropriate fit of our data ($\chi^2 = 10.28, df = 6, p = .113, CFI = .95, TLI = .92, RMSEA = .089, SRMR = .061$). The Chi-square difference test revealed no significant differences between the restricted model and the baseline model ($\Delta\chi^2 = 4.677; \Delta df = 2, p = .096$). Thus, we took the restricted model for further modeling.

3.4.2. The specified (restricted) model with culture as mediator

Our second model examined whether the association of negative schizotypy on innovative capacities was mediated by culture. This model specified as one mediator culture (Germans or Russians) – as well as a direct effect of negative schizotypy on innovative capacities.

A CFI of this model suggested adequate fit of our data ($\chi^2 = 16.72$, $df = 9$, $p = 0.053$, CFI = 0.93, TLI = 0.88, RMSEA = 0.097, SRMR = .063). Figure 2 displays the specified model. Negative schizotypy significantly predicted culture, $\beta = .24$, $p = .041$. In turn, culture significantly predicted innovative capacities, $\beta = -.50$, $p = .001$. But the direct effect of negative schizotypy on innovative capacities, $\beta = -.42$, $p = .013$, was mediated by culture and did not become significant, $\beta = -.14$, $p = .094$. In the specified model with mediator, negative schizotypy explained 52.9% of the variance of innovative capacities, which is statistically significantly higher than in the baseline model without mediator, $\varphi = 2.88$, $p < .01$.

Figure 2. Model 2 with mediator ‘culture’



* $p < .05$, ** $p < .01$; $N=91$

4. Discussion

The findings of our study provide an important insight into the cross-cultural differences in the association between creativity and schizotypy. In fact, to the best of our knowledge, no cross-cultural studies comparing German and Russian citizens has been conducted with regard to this topic. The main results of this study are, first, that German participants show greater creative performance. In particular, they scored higher on verbal originality and figural originality than Russian participants. Second, Russians performed higher on generative capacities, Germans performed higher on innovative capacities. Third, while German men showed greater creativity performance than Russian men, this result reversed in women. Russian women showed greater creativity performance than German women. Thus, performance on creativity of the two genders may be mediated by culture. Third, we found that culture was a significant mediator of the creativity – schizotypy association. Specifically, a structural equation model showed a better fit to our data when we introduced culture as a mediator of the association between originality and negative schizotypy. Overall, our results suggest that creativity and especially negative schizotypal personality traits are closely related. However this relations, as well as creativity performance is cultural and gender specific.

Russian creativity scores may be intermediate between Eastern and Western cultures. In our study, German participants scored higher than Russian participants only on the two originality scores of creativity. The originality score is based on the number of statistically infrequent responses. While no studies have compared Germans and Russians on this measure, several studies are in line with our results. On the one hand, Russian individuals have been shown to not differ from American individuals in both verbal and figural originality measured with the Abbreviated Torrance Test for Adults (Kharkhitin & Motalleebe, 2008). On the other hand, German individuals have been shown to differ from Americans in figural creativity (Jellen &

Urban, 1989). Further, as mentioned above, Rudowicz et al. (1995) and Yi et al. (2013) showed that German participants scored higher on creativity performance than the counterparts from the East (Hong Kong, China). This finding may indicate that creativity performance of Russians may converge to some extent with the performance of Westerners. However, overall, these results suggest that Russian creativity scores may be intermediate between East and Western culture performances and our findings support this view.

Generative capacities and innovative capacities were mediated by culture in our study. Specifically, in the performed factor analysis with the TTCT and RAT results we grouped creative fluency and flexibility as representative for generative capacities, and creative originality as representative for innovative capacities. Generative capacities, or process-oriented creativity (e.g., Mednick, 1962; Rothenberg, 1996), establish a beneficial framework for generating original and novel ideas. Innovative capacities overlap with the definition of product-oriented creativity, which addresses the ability to produce an idea that satisfies the requirements of novelty, appropriateness, and usefulness (Martindale, 1989; Sternberg & Lubart, 1995). Germans compared to Russian students performed higher in innovative capacities. However, Russian compared to German students scored higher in generative capacities. This means that culture specificity was observed because Germans perform higher in product-oriented creativity, Russians perform higher in process-oriented creativity.

While these findings are interesting for an intercultural comparison, they actually may be explained by differences in the *conceptions* of creativity in the West and the East. Lubart (1990) remarked that creativity can take different forms in different cultures. Thus, in Eastern cultures, as opposed to Western cultures, creativity is seen as a process-oriented activity; as a form of self-expression within a collective social context. Eastern conception of creativity is dynamic, involving the reinterpretation of tradition and the importance of appropriateness of creative processes. The Western conception of creativity is primarily concerned with innovation and

novelty, a product-oriented activity (Lubart, 1990, 1999). Russian psychology of creativity was focused primarily on studying, on the one hand, general processes of creative thoughts and their mechanisms, and, on the other, environmental conditions that enhance or prevent creative processes. The cultural-historical Russian school, especially Vygotsky's (1962) conception of creativity, plays a critical role because every creative individual and his/her creativity is a result of his/her time and environment. Individuals may use culturally constructed symbols and tools to produce new cultural artifacts. From the perspective of the Eastern cultural-historical school (Vygotsky, 1962, Yurkevich, 1997) creativity and higher mental functions are socially and culturally mediated (cf. Foucault, 1969). Our findings emphasize the dissociation between the social context of creativity and its closeness to Eastern conceptions of creativity. Further, we show that creative performance of Westerners (Germans) may be related to the assumption that the individual itself is the root of creative products/results (Guilford, 1956).

We also found an interesting interaction between culture, gender, and creative performance in our study. Previous studies showed contradictory data. Some studies revealed no gender differences between males and females (Baer & Kaufman, 2008; Charyton & Snelbecker, 2007), whereas others revealed that gender differences in creative performance do exist (Hoff, 2005; Matud, Rodríguez, & Grande, 2007; Razumnikova, 2004). Our study may have resolved these contradictory results by showing that gender differences are culturally specific. In fact, this result may be addressed to the specific aspects of the cultural environment, influencing creativity performance and gender differences in German and Russian participants. Ruth and Birren (1985) argued that gender-related differences may not be inherent, but reflect cultural values, which are manifested in upbringing, educational possibilities, and freedom of action for the two sexes. In our study, Russian females had higher scores on figural originality and figural flexibility than German females. In fact, creativity of Russian females may be explained by the 'gender transition' (Kalabikhina & Tyndic, 2014) in the Russian society. The pace of change in Russia, both structural and institutional, has been rapid since 1991 (Gregory & Lazarev, 2004). According to

Kalabikhina and Tyndic (2014), modern Russia represents a transition in gender-related roles of women and men from inequality to equality. These changes are accompanied by transformation of the value system and by individualization. Furthermore, it may be assumed that gender-related roles of Russian females and males are still not identified, which leads to an encouragement of women to exploit their own creative potentials. Baer and Kaufman (2008) argued that any gender differences in creativity stems from environmental factors. Sociocultural values and norms determine and shape the concept of creativity, which in turn may influence the manner, in which a creative potential is apprehended and incarnated among women and men. There is a relative equality in creative abilities between the genders (Baer & Kaufman, 2008). This we also found in our study. However, performance on creativity in women may be mediated by socio-economical factors of culture.

German males were found to be more creative than Russian males. Creativity of German males may be explained by the socio-economic equality between genders in Western cultures (Larsen & Krumov, 2013). Many changes have occurred in the past few decades that have influenced the relationship between men and women. The gender roles are rapidly evolving and changing in the direction of equality. Thus, equality makes sexual partners more readily available for both sexes and females are confronted with lots of choice in Western countries. Previous research has shown that creativity is a trait that women find attractive in a mate (Haselton & Miller, 2006), thus providing support for evolutionary psychology model of creativity and mating success (Buss & Schmitt, 1993). Numerous Western studies (Griskevicius et al., 2006; Nettle & Clegg, 2006; Beaussart et al., 2012) confirm that only men increased their creative performance under short-term mating goals. Therefore, we can assume that superiority in creativity of German men comparing with Russian counterparts may be explained by mating success strategies. Further research is needed to support this assumption.

Perhaps the most important finding of our study is what emerged from our structural equation modeling. The creativity – schizotypy association is mediated by culture. We compared two models predicting innovative capacities (a factor generated by verbal originality and figural originality) from negative schizotypy: (1) without culture as a mediator, and (2) with culture as a mediator. The latter model with culture as a mediator explained the variance significantly better than the former model. While the model without culture as a mediator is consistent with previous research, finding a relationship between creativity and psychopathology, the model integrating culture as a mediator specifies this relationship. In fact, our results are consistent with Eysenck's psychoticism dimension (Eysenck, 1995), which has been observed to be associated with various creativity-related aspects, particularly with the originality facet of creativity (e.g. Abraham et al., 2005; Fink et al., 2012).

Our structural equation modeling further revealed that creativity is negatively predicted by negative schizotypy, which is consistent with previous data. In the Schizotypal Personality Questionnaire (SPQ) of Raine (1991), schizotypy is assessed according to all nine criteria of the schizotypal personality disorder of the DSM-III-R. In our study, the two factors were obtained including positive schizotypy and negative schizotypy. In accordance with our results, former studies have demonstrated relationships between negative schizotypy and self-rated creativity, verbal originality, verbal fluency, and different facets of creativity (Batey & Furnham, 2009; Tsakanikos & Claridge, 2005; Schuldborg, 2001). However, as mentioned above our data also revealed that environmental factors, that is, culture, mediate this association. For instance, an indirect effect of negative schizotypy on innovative capacities mediated by culture did not become significant (see Figure 2). While schizophrenia and its spectrum emerges as one of the most universally similar psychopathologies across ethnicities, nations, and cultures (Gottesman, 1991; Jablensky et al., 1992), culture can influence the content of symptoms (Bhui & Tsangarides, 2008). Stompe et al. (1999) compared Austrian and Pakistani people with schizophrenia. In both countries, persecution was the most frequently mentioned content of delusion. The comparison

of the contents of delusion revealed, on the one hand, significantly higher frequencies of delusions of grandeur, guilt, and religious delusions in Austrian compared to Pakistani patients. Pakistani patients, on the other hand, showed a higher frequency of delusions. Veling et al. (2007) compared psychoses among Dutch and ethnic minorities living in Holland. The authors used the Comprehensive Assessment of Symptoms and History (Andreasen et al., 1992) and found persecutory delusions to be more common among Dutch patients. In turn, Moroccans and Turkish schizophrenic individuals living in Holland showed more affective symptoms than Dutch patients. Moroccans had higher psychopathology scores and more negative symptoms. These results confirm the assumption that the schizotypy – creativity link may vary across cultures, which was also confirmed by the results of our German-Russian sample results. In fact, for future studies we hypothesize that the mediating effect of culture may be more closely related to figural than verbal aspects of creativity, given the pivotal role of the visual system in the development of schizophrenia spectrum disorders (Landgraf & Osterheider, 2013).

5. Conclusion

In the present study, we investigated the mediating influence of culture on the relation between creativity performance and schizotypal personality traits. Our findings show that there are significant differences in creative originality between the two cultures. German individuals show a higher creative performance compared with Russian individuals. A culture by gender interaction showed that environmental (socio-economical) factors affect creativity performance differentially in men and women. Finally, structural equation modeling showed that negative schizotypy predicted innovative creative capacities, and this effect was mediated by culture. Overall, these results suggest that the relation between the two constructs – creativity and schizotypy – may be culturally specific. The significance of individual schizotypal traits with regard to creativity may increase or decrease as a function of the cultural basis.

The economic, political, social, and cultural aspects of the environment can have a considerable influence both on levels of creative potential and on how creativity is related with psychopathology. Creativity may be especially important for diverse populations who are acculturating into a new environment and need to quickly adapt to complex cultural changes in society (Coleman & Cross, 2001). In this regard, the study of creativity abilities in relation to psychopathology between Russia and Western countries, such as Germany, is of particular interest.

Acknowledgments

The authors would like to acknowledge the subjects participating in the study and the staff who helped recruit the subjects. Further, we would like to thank Dr. Manja Foth and Sebastian Schmidl for test preparation and conduction. This research profited from conversation with Anna Yashanina, Nataliya Asanova, Eugenia Bykova and Ludmila Aksenova. Finally, we are grateful to Tanja Kutscher for helpful comments about the statistical methods.

This research was supported by a grant of the Erasmus Mundus Action 2, Strand 1, European Community Mobility Programme Triple I 'Integration. Interaction. Institution' launched by Europe Aid Cooperation Office (ESCO), project no. TRIPLEI2010 C123. We would like to thank Matthias Parske for the coordination of this programme at Humboldt-Universität zu Berlin.

References

1. Abraham, A., Windmann, S., Daum, I., & Güntürkün, O. (2005). Conceptual expansion and creative imagery as a function of psychoticism. *Consciousness and cognition*, 14(3), 520-534.

2. American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Arlington, VA: American Psychiatric Publishing.
3. Anderson, T. W., & Rubin, H. (1949). Estimation of the parameters of a single equation in a complete system of stochastic equations. *The Annals of Mathematical Statistics*, 20(1), 46-63.
4. Andreasen, N. C., Flaum, M., & Arndt, S. (1992). The Comprehensive Assessment of Symptoms and History (CASH) an instrument for assessing diagnosis and psychopathology. *Archives of general psychiatry*, 49(8), 615.
5. Baer, J., & Kaufman, J. C. (2008). Gender differences in creativity. *The Journal of Creative Behavior*, 42(2), 75-105.
6. Batey, M., & Furnham, A. (2008). The relationship between measures of creativity and schizotypy. *Personality and Individual Differences*, 45(8), 816-821. doi:10.1016/j.paid.2008.08.014
7. Beaussart, M. L., Kaufman, S. B., & Kaufman, J. C. (2012). Creative Activity, Personality, Mental Illness, and Short - Term Mating Success. *The Journal of Creative Behavior*, 46(3), 151-167.
8. Bhui, K., & Tsangarides, N. (2008). Culture and schizophrenia. *Psychiatry*, 7(11), 454-457.
9. Burch, G. S., Pavelis, C., Hemsley, D. R., & Corr, P. J. (2006). Schizotypy and creativity in visual artists. *British Journal of Psychology*, 37, 177–190. doi:10.1348/000712605X60030
10. Buss, D. M., & Schmitt, D. P. (1993). Sexual strategies theory: an evolutionary perspective on human mating. *Psychological review*, 100(2), 204.

11. Calkins, M. E., Curtis, C. E., Iacono, W. G., & Grove, W. M. (2004). Antisaccade performance is impaired in medically and psychiatrically healthy biological relatives of schizophrenia patients. *Schizophrenia Research*, 71(1), 167-178.
12. Calkins, M. E., Iacono, W. G., & Ones, D. S. (2008). Eye movement dysfunction in first-degree relatives of patients with schizophrenia: a meta-analytic evaluation of candidate endophenotypes. *Brain and Cognition*, 68(3), 436-461.
13. Carter, J.R., & Neufeld, R.W.J. (1998). Cultural aspects of understanding people with schizophrenic disorders. In S.S. Kazarian & D.R. Evans (Eds.), *Cultural clinical psychology: Theory, research and practice* (pp. 246-266). New York: Oxford University Press.
14. Chapman, L.J.; Chapman, J.P.; Kwapil T.R.; Eckblad, M.; and Zinser, M.C. Putatively psychosisprone subjects 10 years later. *Journal of Abnormal Psychology*, 103:171-183, 1994.
15. Charyton, C., & Snelbecker, G. E. (2007). Engineers' and musicians' choices of self-descriptive adjectives as potential indicators of creativity by gender and domain. *Psychology of Aesthetics, creativity, and the arts*, 1(2), 91.
16. Claridge, G., & Blakey, S. (2009). Schizotypy and affective temperament: Relationships with divergent thinking and creativity styles. *Personality and Individual Differences*, 46, 820–826.
17. Coleman, L. J., & Cross, T. L. (2001). *Being gifted in school; an introduction to development guidance and teaching*. Waco, Texas: Prufrock.
18. Csikszentmihalyi, M. (1999). *Creativity: Flow and the psychology of discovery and invention*. New York: HarperCollins.

-
19. Efremov, A. G., Enikolopov, S. N. (2002). Aprobaziya biosozial'noy metodiki Klonindzhera – struktura kharaktera I temperamenta (TCI-125) I metodiki vyrazhennosti shizotipicheskikh chert (SPQ-74) [Approbation of Cloninger' method to assess psychobiological model of temperament (TCI-125) and the schizotypal personality questionnaire (SPQ-74)] Vestnik MGU, 92-93.
 20. Eysenck, H. J. (1995). *Genius: The natural history of creativity* (Vol. 12). Cambridge University Press.
 21. Fernandes, L. O. L., & Miller, G. A. (1995). Compromised performance and abnormal psychophysiology associated with the Wisconsin scales of psychosis proneness. In G. A. Miller (Ed.), *The behavioral highrisk paradigm in psychopathology* (pp. 47–87). New York: Springer.
 22. Fink, A., Slamar-Halbedl, M., Unterrainer, H. F., & Weiss, E. M. (2012). Creativity: Genius, madness, or a combination of both?. *Psychology of Aesthetics, Creativity, and the Arts*, 6(1), 11.
 23. Fink, A., Weber, B., Koschutnig, K., Benedek, M., Reishofer, G., Ebner, F., ... & Weiss, E. M. (2013). Creativity and schizotypy from the neuroscience perspective. *Cognitive, Affective, & Behavioral Neuroscience*, 1-10.
 24. Fisher, J.E., Mohanty, A., Herrington, J.D., Koven, N.S., Miller, G.A., & Heller, W. (2004). Neuropsychological evidence for dimensional schizotypy: Implications for creativity and psychopathology. *Journal of Research in Personality*(38), 24-31.
 25. Fisher, J. E., Heller, W., & Miller, G. A. (2013). Neuropsychological differentiation of adaptive creativity and schizotypal cognition. *Personality and individual differences*, 54(1), 70-75. doi: 10.1016/j.paid.2012.08.003

-
26. Fink, A., Weber, B., Koschutnig, K., Benedek, M., Reishofer, G., Ebner, F., . . . Weiss, E. M. (2013). Creativity and schizotypy from the neuroscience perspective. *Cognitive, affective & behavioral neuroscience*. doi: 10.3758/s13415-013-0210-6
27. Frolov, I. V. (2001). Russkaya sistema zennostey i spory o budushem Rossii v nachale XX veka [Russian system of values and debates of the future at the beginning of the XX century] *Vestnik Nizhegorodskogo universiteta*, (1), 132-138.
28. Geiser, C., Eid, M., West, S. G., Lischetzke, T., & Nussbeck, F. W. (2012). A comparison of method effects in two confirmatory factor models for structurally different methods. *Structural Equation Modeling: A Multidisciplinary Journal*, 19(3), 409-436.
29. Green, M. J., & Williams, L. M. (1999). Schizotypy and creativity as effects of reduced cognitive inhibition. *Personality and Individual Differences*, 27, 263–276.
30. Gregory, P. R., & Lazarev, V. V. (2004). Structural change in Russian transition. Economic Growth Center, Yale University.
31. Griskevicius, V., Cialdini, R. B., & Kenrick, D. T. (2006). Peacocks, Picasso, and parental investment: The effects of romantic motives on creativity. *Journal of personality and social psychology*, 91(1), 63.
32. Gottesman, I. I. (1991). *Schizophrenia genesis: The origins of madness*. WH Freeman/Times Books/Henry Holt & Co.
33. Guilford, J. P. (1956). The structure of intellect. *Psychological bulletin*, 53(4), 267. doi:10.1037/h0040755
34. Gulyanskaya, E. A. (2008) Individualism i kollektivism v sisteme zennostey organizatsionnoy kultury sovremennoy Rossii [Individualism and collectivism in the system of values of organizational culture in Russia], *Vestnik Stavropolskogo gosudarstvennogo universiteta*, (56), 191-197.

-
35. Haselton, M. G., & Miller, G. F. (2006). Women's fertility across the cycle increases the short-term attractiveness of creative intelligence. *Human Nature*, 17(1), 50-73.
 36. Heine, S. J. (2012). *Cultural psychology*. (2nd ed.). New York: W.W. Norton
 37. Hoff, E. V. (2005). Imaginary companions, creativity, and self-image in middle childhood. *Creativity Research Journal*, 17(2-3), 167-180.
 38. Hu, L. T., & Bentler, P. M. (1998). Fit indices in covariance structure modeling: Sensitivity to underparameterized model misspecification. *Psychological methods*, 3(4), 424.
 39. Ilinykh, A., van der Meer, E., Shemelina, O., & Landgraf, S. (2013). Predicting self-actualization and creativity in the sample of Russian students. *Creative Personality. Collection of Internationally Reviewed Scientific Papers*. - Riga: RTTEMA, 2013, Vol. XI, 52-61.
 40. Ilinykh, A., van der Meer, E., Shemelina, O., Osterheider, M., Landgraf, S. (2014) The difference between real-life creative achievements and creativity: The influence of schizotypy and social intelligence (submitted).
 41. Jablensky, A., Sartorius, N., Ernberg, G., Anker, M., Korten, A., Cooper, J. E., ... & Bertelsen, A. (1992). Schizophrenia: manifestations, incidence and course in different cultures A World Health Organization Ten-Country Study. *Psychological medicine. Monograph supplement*, 20, 1-97.
 42. Jablensky, A. (1995). Schizophrenia: recent epidemiologic issues. *Epidemiologic Reviews*, 17(1), 10-20.
 43. Jellen, H. G., & Urban, K. K. (1989). Assessing creative potential world-wide: The first cross-cultural application of the test for creative thinking—drawing production (TCT-DP). *Gifted Education International*, 6(2), 78-86.

-
44. Kaiser, H. F. (1958). The varimax criterion for analytic rotation in factor analysis. *Psychometrika*, 23(3), 187-200.
 45. Kalabikhina, I., & Tyndik, A. (2014). Does Current Demographic Policy in Russia Impact on Fertility of Different Educational Groups? Results from Quantitative and Qualitative Studies. Results from Quantitative and Qualitative Studies (February 10, 2014).
 46. Kaufman, J. C. (2005). The door that leads into madness: Eastern European poets and mental illness. *Creativity Research Journal*, 17, 99-103. doi:10.1207/s15326934crj1701_8
 47. Kaufman, J. C. (2009). Creativity, intelligence, and culture: Connections and possibilities. In J. Funke & P. Meusburger (Eds.), *Milieus of creativity* (pp. 155-168). Germany: Springer.
 48. Kharkhurin, A. V., & Samadpour Motalleebi, S. N. (2008). The impact of culture on the creative potential of American, Russian, and Iranian college students. *Creativity Research Journal*, 20(4), 404-411.
 49. Klein, C., Andresen, B., & Jahn, T. (1997). Erfassung der schizotypen Persönlichkeit nach DSM-II-R: Psychometrische Eigenschaften einer autorisierten deutschsprachigen Übersetzung des "Schizotypal Personality Questionnaire" (SPQ) von Raine [Assessment of schizotypal personality according to DSM-III-R: Psychometric properties of an authorized German translation of the "Schizotypal Personality Questionnaire" by Raine]. *Diagnostica*, 43, 347-369.
 50. Landgraf, S., Amado, I., Berthoz, A., Krebs, M. O., & van der Meer, E. (2012). Cognitive Identity in Schizophrenia: Vision, Space, and Body Perception from Prodrome to Syndrome. *Current Psychiatry Reviews*, 2(8), 1-20.

-
51. Landgraf, S., Amado, I., Bourdel, M. C., Leonardi, S., & Krebs, M. O. (2008). Memory-guided saccade abnormalities in schizophrenic patients and their healthy, full biological siblings. *Psychological Medicine*, 38(6), 861-870.
 52. Landgraf, S., Krebs, M. O., Olie, J. P., Committeri, G., van der Meer, E., Berthoz, A., & Amado, I. (2010). Real world referencing and schizophrenia: Are we experiencing the same reality? *Neuropsychologia*, 48(10), 2922-2930.
 53. Landgraf, S., & Osterheider, M. (2013). "To See or Not To See: That is the Question": The "Protection-Against-Schizophrenia" (PaSZ) Model: Evidence from Congenital Blindness and Visuo-Cognitive Aberrations. *Frontiers in Psychology*, 4, 352.
 54. Larsen, K. S., & Krumov, K. (2013). The relationship between men and women: Culture, sex, gender. *Advances in International Psychology. Research Approaches and Personal Dispositions, Socialization Processes and Organizational Behavior*, 267.
 55. Lau, S., Hui, A.N.N., Ng, G.Y.C. (2004). *Creativity: When East meets West*. World Scientific Publishing, River Ridge, NJ.
 56. Lubart, T. I. (1990). Creativity and Cross-cultural Variation. *International Journal of Psychology*, 25(1), 39
 57. Lubart, T. I. (1999). Componential models of creativity. In M. A. Runco & S. Pritzer (Eds.) *Encyclopedia of creativity* (pp. 295-300). New York : Academic Press.
 - Markus, H. R., & Kitayama, S. (1991). Culture and the self: Implications for cognition, emotion, and motivation. *Psychological review*, 98(2), 224.
 58. Markus, H. R., & Kitayama, S. (1994). A collective fear of the collective: Implications for selves and theories of selves. *Personality and Social Psychology Bulletin*, 20(5), 568–579.
 59. Martindale, C. (1989). Personality, situation, and creativity. In J. A.

-
60. Matud, M. P., Rodríguez, C., & Grande, J. (2007). Gender differences in creative thinking. *Personality and individual differences*, 43(5), 1137-1147.
61. Martynenko, A. V. (2001). Problemy dukhovnosti I proniknoveniya zapadnykh zennostey v Rossiyu [The problems of spirituality and penetration of Western values in Russia] *Integratsiya obrazovaniya*, (1).
62. Glover & R. R. Ronning (Eds.), *Handbook of creativity* (pp. 211–232). New York: Plenum Press.
63. Mednick, S. A. (1962). The associative basis of the creative process. *Psychological Review*, 69(3), 220–232. doi:10.1037/h0048850
64. Miller, G. F., & Tal, I. R. (2007). Schizotypy versus openness and intelligence as predictors of creativity. *Schizophrenia Research*, 93(1), 317-324.
65. Muthén, L. K., & Muthén, B. O. (2012). *Mplus. The comprehensive modelling program for applied researchers: user's guide*, 5.
66. Nelson, B., & Rawlings, D. (2010). Relating schizotypy and personality to the phenomenology of creativity. *Schizophrenia Bulletin*, 36, 388–399. doi:10.1093/schbul/sbn098
67. Ng, A. K. (2001). Why creators are dogmatic people, “nice” people are not creative and creative people are not “nice.” *International Journal of Group Tensions*, 30, 291–324.
68. Ng, A. K. (2003). A Cultural Model of Creative and Conforming Behavior. *Creativity Research Journal*, 15(2/3), 223-233
69. Niu, W., & Kaufman, J. C. 2005. Creativity in troubled times: Factors associated with recognitions of Chinese literary creativity in the 20th century. *Journal of Creative Behavior*, 39: 57–67

-
70. Nettle, D. (2006). Schizotypy and mental health amongst poets, visual artist, and mathematicians. *Journal of Research in Personality*, 40, 876-890.
doi:10.1016/j.jrp.2005.09.004
71. Nettle, D., & Clegg, H. (2006). Schizotypy, creativity and mating success in humans. *Proceedings of the Royal Society B: Biological Sciences*, 273(1586), 611-615.
72. Ogawa, M. (1991). Differences in Creative Thinking between Japanese and American Fifth Grade Children. *Ibaraki University Faculty of Education Bulletin*, 40, 53-59.
73. Raine, A. (1991). The SPQ: A scale for the assessment of schizotypal personality based on DSM-III-R criteria. *Schizophrenia Bulletin*, 17(4), 555-564.
doi:10.1093/schbul/17.4.555
74. Razumnikova, O. M. (2004). Gender differences in hemispheric organization during divergent thinking: an EEG investigation in human subjects. *Neuroscience Letters*, 362(3), 193-195.
75. Realo, A., & Allik, J. (1999). A cross-cultural study of collectivism: A comparison of American, Estonian, and Russian students. *The Journal of Social Psychology*, 139(2), 133-142.
76. Rothenberg, A. (1996). The Janusian process in scientific creativity. *Creativity research journal*, 9(2-3), 207-231.
77. Rudowicz, E., Lok, D., & Kitto, J. (1995). Use of the Torrance Tests of Creative Thinking in an exploratory study of creativity in Hong Kong primary school children: A cross-cultural comparison. *International Journal of Psychology*, 30(4), 417-430.
78. Runco, M. A., & Cayirdag, N. (2012). The theory of personal creativity and implications for the fulfillment of children's potentials. *Contemporary perspectives on research in creativity in early childhood*, 31-43.

-
79. Ruth, J. E., & Birren, J. E. (1985). Creativity in adulthood and old age: Relations to intelligence, sex and mode of testing. *International Journal of Behavioral Development*, 8(1), 99-109.
80. Saeki, N., Fan, X., & DUSEN, L. (2001). A comparative study of creative thinking of American and Japanese college students. *The Journal of Creative Behavior*, 35(1), 24-36.
81. Schuldberg, D. (2001). Six subclinical spectrum traits in normal creativity. *Creativity Research Journal*, 13, 5-16. doi:10.1207/S15326934CRJ1301_2
82. Shlapentokh, D. (Ed.). (2007). *Russia between East and West: scholarly debates on Eurasianism* (Vol. 102). Brill.
83. Simonton, D. K., & Ting, S. S. (2010). Creativity in Eastern and Western civilizations: The lessons of historiometry. *Management and Organization Review*, 6(3), 329-350.
84. Sternberg, R. J., & Lubart, T. I. (1995). *Defying the crowd: Cultivating creativity in a culture of conformity*. New York: Free Press.
85. Sternberg, R. J. (2006). The nature of creativity. *Creativity Research Journal*, 18(1), 87-98. DOI: 10.1207/s15326934crj1801_10
86. Stompe, T., Friedman, A., Ortwein, G., Strobl, R., Chaudhry, H. R., Najam, N., & Chaudhry, M. R. (1999). Comparison of delusions among schizophrenics in Austria and in Pakistan. *Psychopathology*, 32(5), 225-234.
87. Torrance, E. P. (1966). *The Torrance Tests of Creative Thinking-Norms-Technical Manual Research Edition-Verbal Tests, Forms A and B-Figural Tests, Forms A and B*. Princeton, NJ: Personnel Press.
88. Torrance, E. P., & Sato, S. (1979). Differences in Japanese and United States styles of thinking. *Creative Child & Adult Quarterly*.

-
89. Tsakanikos, E., & Claridge, G. (2005). More words, less words: verbal fluency as a function of 'positive' and 'negative' schizotypy. *Personality and Individual Differences*, 39(4), 705-713.
 90. Uyrkevich, V. S. (1997). O "naivnoy" i "kulturnoy" kreativnosti [About "naïve" and "cultural" creativity]. *Osnovnye sovremennye konceptzii tvorchestva*. Edited by Bogoyavlenskaya, D. B., Molodaya gvardiya, Moscow.
 91. Veling, W., Selten, J. P., Mackenbach, J. P., & Hoek, H. W. (2007). Symptoms at first contact for psychotic disorder: comparison between native Dutch and ethnic minorities. *Schizophrenia Research*, 95(1), 30-38.
 92. Vygotsky, L. S. (1962). *Language and thought*. Massachusetts Institute of Technology Press, Ontario, Canada.
 93. Walker, E., & Tessner, K. (2008). Schizophrenia. *Perspectives on Psychological Science*, 3(1), 30-37.
 94. Wang, A. Y. (2011). Contexts of creative thinking: A comparison on creative performance of student teachers in Taiwan and the United States. *Journal of International and Cross-Cultural Studies*, 2(1), 1-14.
 95. Yi, X., Hu, W., Scheithauer, H., & Niu, W. (2013). Cultural and bilingual influences on artistic creativity performances: Comparison of German and Chinese students. *Creativity Research Journal*, 25(1), 97-108.
 96. Yung, A. R., & Nelson, B. (2011). Young people at ultra high risk for psychosis: a research update. *Early Interv Psychiatry*, 5 Suppl 1, 52-57.
 97. Zha, P., Walczyk, J. J., Griffith-Ross, D. A., Tobacyk, J. J., & Walczyk, D. F. (2006). The impact of culture and individualism-collectivism on the creative potential and achievement of American and Chinese adults. *Creativity Research Journal*, 18(3), 355-366.

Eidesstattliche Erklärung

Hiermit versichere ich,

dass ich die vorgelegte Dissertation selbstständig und ohne unerlaubte Hilfe angefertigt habe,

dass ich mich nicht bereits anderwärts um einen Doktorgrad beworben habe beziehungsweise einen Doktorgrad im Promotionsfach Psychologie besitze,

dass ich die zu Grunde liegende Promotionsordnung vom 3. August 2006 kenne.

Berlin, den 28. März 2014

Anastasiia Ilinykh