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Working Remotely During the COVID-19 Pandemic: Work-Related Psychosocial Factors, Work Satisfaction, and Job Performance Among Russian Employees

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Background. The spread of COVID-19 has forced organizations to quickly offer remote work arrangements to employees.

Objective. The study focuses on remote work during the first wave of the pandemic and describes how Russian employees experienced remote work. The research has three main objectives: (1) to investigate the influence of gender and age on employees' perceptions of remote work; (2) to investigate the relationship between remote work and psychosocial variables, such as remote work stress, remote work engagement, and family–work conflict; (3) to examine whether and how much such psychosocial factors are related to remote work satisfaction and job performance. These objectives were the basis for developing six hypotheses.

Design. A cross-sectional study involved 313 Russian employees. Data were collected using an online survey distributed in April and May 2020. The hypotheses were tested using ANOVA, correlations, and multiple linear regression analyses.

Results. Women experienced more stress and more engagement when working remotely; older employees perceived remote work as a less positive experience; opinions about remote work and remote work engagement were positively related to remote work satisfaction; leader–member exchange (LMX) was a significant predictor of job performance.

Conclusion. During the lockdown, remote work was perceived as a positive experience. We discuss some practical implications for organizations and managers.

Keywords: Remote work stress, remote work engagement, family–work conflict, opinions about remote work, leader–member exchange

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Introduction

The health emergency caused by the spread of the new coronavirus (COVID-19) forced organizations and employees to rapidly adopt flexible work arrangements with the primary goal of slowing down the diffusion of the infection.

A report published by Ernest & Young (27 March 2020) showed that, during the first wave of the COVID-19 pandemic, all the interviewed Russian employers adopted measures that changed their way of working, and 97% of companies partially or fully implemented remote work programs. The switch to remote work was the primary adjustment that Russian organizations used to respond to the health crisis. The adoption of this new arrangement was a challenge, because it was necessary to introduce some changes to work procedures and to Russian legal regulations, which only partially supported this type of work. In 53% of cases, remote work was implemented through an additional agreement between employers and staff. In 32% of organizations, a new contract was requested, requiring additional effort for the organizations and their representatives. The health emergency raised the need for a step forward in the legislation. On 8 December 2020, Federal Law No 407-FZ amended the Russian Labor Code, introducing remote work and equating it with the pre-existing concept of "distance work".

The scientific literature describes such work in many ways. One of the most common terms is teleworking, which is defined as "an alternative work arrangement in which employees perform tasks elsewhere that are normally done in a primary workplace, for at least some portion of their work schedule, using electronic media to interact with others inside and outside the organization" (Gajendran & Harrison, 2007, p. 1525). Other terms such as remote work, nomadic working, agile working, and homeworking (Groen, van Triest, Coers, & Wtenweerde, 2018; Karia & Asaari, 2016) are often used interchangeably with it. Despite differences in terminology, these names all emphasize the absence of a stable workplace and the use of information and communication technologies (ICTs). This paper uses the term "remote work" to describe the working from home that many Russian employees experienced during April and May 2020.

During the lockdown and subsequent phases of the health emergency, the pandemic forced employees to transfer to their homes as much as possible of the work regularly done in the office. Such arrangements made working in this period a bit different from the remote work experience of the past, when employees alternated working at the office and in other places. The pervasiveness of the technological component made, instead, this work from home similar to the remote work experienced in the past by employees.

Over the years, many authors have studied the consequences of remote work for employers and employees (Groen et al., 2018). Baruch (2000) suggests that remote work may have consequences for a) identity (self-concept as teleworker and change in the family role); b) skills (the development of time management skills); c) context (control of environmental distractions); d) role demands (demands and constraints related to job activities and social relationships); and e) role outcomes (changes in job satisfaction and job performance).

Mainly focusing on this last type of outcome, this study offers an overview of the experience of a sample of Russian remote workers during the first wave of the pandemic. In particular, this research contributes to: a) assess whether some socio-demographic variables (gender and age) affect Russian employees' perceptions about the psychosocial experience of remote work (opinions about remote work, remote work engagement, remote work stress, work–family conflict); b) evaluate whether the percentage of office activities accomplished at home and the extent of goal formalization affect these psychosocial factors; c) test whether the aforementioned psychosocial factors and the relationship of employees with their supervisor (leader–member exchange, LMX) are related to employees' remote work satisfaction and job productivity.

In the next section, we explore the influence of gender and age on employees' perceptions of remote work. Then, we describe the relationship between remote work and different psychosocial variables, such as opinions about this way of working, remote work stress and engagement, and family–work conflict. Finally, we review the literature on predictors of remote work satisfaction and general job performance in order to clearly express the purposes of our study and then to show and comment on its results.

Literature Review and Hypotheses

Gender, Age, and the Experience of Remote Work

Various studies have investigated the association between socio-demographic variables and telework behavior (Drucker & Khattak, 2000; Parasuraman & Simmers, 2001; Sener & Bath, 2011; Zhang, Moeckel, Moreno, Shuai, & Gao, 2020). Scholars found that flexible work was more attractive for females than males because it decreased work–family conflict, that is, the interference of work commitments over family commitments (Parasuraman & Simmers, 2001). Such evidence confirmed remote work as the perfect solution for combining work and family demands (Huws, 1996).

Home-based teleworking, however, should not be considered the remedy for all the difficulties that women experience when trying to arrange family life and work. In fact, remote work may reinforce the gendered division of labor (Sullivan & Lewis, 2001) and increase men's expectations that women should take care of family work (Hartig, Kylin, & Johansson, 2007; Toscano & Zappalà, 2020a). Accordingly, since women tend to dedicate more time and energy to household chores and childcare responsibilities than their partners, remote work may lead women to an increased perception of stress and isolation (Parasuraman & Simmers, 2001; Weinert, Maier, & Laumer, 2015).

On the other hand, the research also highlights that females are more motivated to work remotely by its flexibility, convenience, and autonomy. Therefore, lowering the conflict and increasing flexibility and autonomy may enhance women's motivation to engage with remote work (Chapman, Sheehy, Heywood, Dooley, & Collins, 1995). This consideration, combined with the previously stated research findings, leads us to hypothesize that:

Hypothesis 1: During the remote work experienced in the lockdown, women were more engaged and had more positive opinions about remote work, but they were also more stressed and perceived greater family–work conflict than men.

The relationship between age and telework has been extensively investigated by scholars. Young and older workers constitute groups that experience both advantages and disadvantages of remote work. For example, older workers are considered more frequently trustworthy, reliable, independent, and able to manage time, and therefore more suitable for remote work. On the other side, they may be less capable of adjusting to changes, especially to new technology, and therefore may be less suitable for remote work (Sharit, Czaja, & Hernandez, 2009). For instance, Sener and Bath (2011) found that employees over 30 years old can exercise personal choices regarding work arrangements and goal setting, while younger employees are more accustomed to working on-site in order to create relationships with colleagues and supervisors. Therefore, according to this study, young people would be less interested in remote work than older ones.

In contrast, according to Drucker and Khattak (2000), younger workers generally prefer to work from home because they are more comfortable using ICTs than are older workers. On the other hand, a study conducted in the academic context of an advanced post-Soviet country found no significant age differences in telework use (Arvola & Kristjuhan, 2015).

Despite the conflicting results, younger generations place greater importance on work–family balance than their older colleagues. They use telework to improve their quality of life and reduce conflict with their partner (Kwon & Jeon, 2017). At the same time, a recent study by Raišienė, Rapuano, Varkulevičiūtė, and Stachová (2020) found that older workers emphasized the disadvantages of telework. They preferred more contact with managers and colleagues, faced several difficulties in self-organization, and perceived higher work–family conflict. In contrast, their younger colleagues mostly recognized that work flexibility required specific skills and competencies. Therefore, based on previous literature, we hypothesize the following:

Hypothesis 2: During remote work experienced in the lockdown, age was positively related to remote work stress and negatively related to opinions about remote work, leader–member exchange, remote work engagement, and family–work conflict.

Percentage of Office Activities Done Remotely and Remote Work Goals

An important area in the study of remote work pertains to the practical aspects of teleworking, such as the number of office activities carried out at home or the modalities used to define work goals. However, despite the importance of these remote work characteristics, research has not yet focused much attention on these aspects.

In this study, the amount of activities performed remotely indicates the percentage of tasks usually performed at the office that employees were able to perform from home (which we defined as "percentage of office activities at home"). Our conceptualization considers how much the office work was reorganized to be performed at home during the health emergency.

Two studies treated the number of remote activities in terms of hours spent working remotely, finding that too much teleworking may have harmful effects (Golden & Veiga, 2005; Virick, DaSilva, & Arrington, 2010). However, although a later study partially disproved their thesis (Vander Elst et al., 2017), these authors claimed that there is a curvilinear relation between the extent of remote work and job satisfaction: at low levels of remote work, individuals are still capable of taking advantage of social interactions with colleagues, which enhances their job satisfaction; conversely, large amount of remote work increases social isolation, which decreases job satisfaction (Toscano & Zappalà, 2020b).

In the case of the COVID-19 pandemic, many employees were forced to perform their work activities only from home. There is little evidence of the effects of substituting direct contact among colleagues with communication via the Internet (Fonner & Roloff, 2012). On the other hand, the introduction of communication systems increasingly similar to face-to-face interaction, made possible by advances in technology (e.g., video call programs), may reduce social isolation by increasing social participation (Baker et al., 2018; Kato, Shinfuku, & Tateno, 2020).

Due to the absence of specific studies on the subject, there is limited evidence on the amount of "usual office activities" carried out in remote work. There is only some evidence on the amount of weekly time spent working remotely. We hypothesize that employees having an adequate amount of activities to carry out remotely experience the same psychological effects when they work the same amount of time (in terms of hours per week) in the office. In other words, we expect that the possibility to carry out remotely the same amount of work done in the office may have positive consequences for homeworkers, such as more engagement and less stress. Therefore, we hypothesize that:

Hypothesis 3: During remote work experienced in the lockdown, the percentage of office activities was positively related to opinions about remote work, remote work engagement, and leader–member exchange, and negatively related to remote work stress and family–work conflict.

Goal formalization in remote work during the pandemic was also a focus of our attention. This study considers how supervisors and managers established goals that employees had to pursue when working at home. Setting goals is critical for increasing job performance because it leads employees to act according to the goal's requirements (Locke, Frederick, Lee, & Bobko, 1984).

We distinguished three degrees of goal formalization: a) undefined goals, b) orally defined goals, and c) written goals. Although the previous literature did not study the differences among these modalities, we conceive written goals as the most advanced way, since they give employees a clear guideline, clarify when they reach the goal and, in the end, improve their engagement toward work goals.

Research highlights the importance of setting goals as a functional and motivational practice (Locke & Latham, 2006), but less attention has been given to its implementation modalities. To solve this theoretical gap, we hypothesize that setting written goals has positive outcomes for homeworkers, since they can check objectives at any time and set sub-goals to organize their work. Thus, we hypothesize the following:

Hypothesis 4: During remote work experienced in the lockdown, the formalization of work goals was positively associated with opinions about remote work, remote work engagement, and leader–member exchange, but negatively associated with remote work stress.

Predictors of Remote Job Satisfaction and Job Performance

The scientific literature suggests that remote work is generally related to higher job satisfaction and job performance (Allen, Golden & Shockley, 2015; Toscano & Zappalà, 2020a).

Gajendran and Harrison (2007) observed that telework was positively related to employees' job satisfaction. As mentioned above, previous studies (Golden & Veiga, 2005; Virick et al., 2010) found a curvilinear relation between remote work and job satisfaction, and that remote work is positively related to job satisfaction when there are lower levels of teleworking. Remote work satisfaction—that is, the satisfaction experienced for work done remotely—is also positively related to good relationships in the workplace (e.g., with colleagues; Allen, et al., 2015), organizational support, and leader–member exchange (Baker, Avery, & Crawford, 2007; Golden, 2006). Furthermore, remote work is perceived as a positive experience, and when employees are highly engaged in remote work, they also have a reasonable opinion of it (Derks, van Duin, Tims, & Bakker, 2015). Therefore, in line with previous literature (Nakrošiene, Buciuniene, & Goštautaite, 2019), we argue that engagement and positive opinions about remote work are positively related to satisfaction with remote work and, according to the previous results, we hypothesize that:

Hypothesis 5: During remote work experienced in the lockdown, remote work satisfaction was positively related to remote work engagement, opinions about remote work, and LMX, and negatively related to remote work stress and family–work conflict.

Previous studies examined several variables affecting the relationship between remote work and job performance. For example, Gajendran and Harrison (2007) argued that relationships with colleagues and supervisors influence job performance. In particular, LMX enhances productivity and supervisors' evaluation. Breevaart, Bakker, Demerouti, and van den Heuvel (2015) demonstrated that work engagement is also positively associated with job performance, because vigor, dedication, and absorption (the components of work engagement) allow employees to work with energy and enthusiasm, and to be absorbed in the work tasks. Therefore, even during a lockdown, high levels of remote work engagement may ensure good job performance.

On the contrary, family–work conflict and job stress should be associated with decreased job performance. Among the numerous studies on this aspect, Netemeyer, Maxham, and Pullig (2005) found a negative relationship of family–work conflict with both in-role performance and extra-role performance as evaluated by supervisors. Analogous results have been confirmed also by recent studies (e.g., Nohe, Michel, & Sonntag, 2014). Although these relationships were less investigated in a remote work context, we argue that comparable results should be observed in remote work during the lockdown, especially considering that governments mandated it and

that there was limited opportunity to prepare employees to work remotely. In other words, we argue that the family–work conflict experienced during the lockdown may decrease job performance. Therefore, based on previous literature, we hypothesize that:

Hypothesis 6: During remote work experienced in the lockdown, job performance was positively related to remote work engagement, opinions about remote work, and LMX, and negatively related to remote work stress and family–work conflict.

Methods

Procedures

The current study has a cross-sectional design. Data were gathered through an online survey administered through the platform Qualtrics, distributed in April and May 2020 and aimed to investigate the experience of homeworking during the first wave of the pandemic in Russia.

The study used a convenience sampling technique based on voluntary participation. To follow the Declaration of Helsinki concerning ethics in research, complete confidentiality of individual responses was guaranteed, and the questionnaires were collected anonymously.

Participants

The sample consisted of 313 participants, 219 (70%) of whom were females. Fifty percent of respondents were between 36 and 55 years old. Length of service ranges between 0 and 34 years old, with a mean value of 7.6 years. Half of the participants (50%) had a Master's Degree or a Ph.D. Most respondents work in the tertiary sectors: 143 (45.7%) in the private sector, 134 (42.8%) in the public sector, and the remaining 10% in the primary or secondary sector. The majority of the sample (64%) was composed of employees, while 34% were supervisors, managers or middle managers.

Measures

The survey was composed of different sections: 1) the first investigated opinions and experiences about remote work during COVID-19; 2) the second investigated opinions and experiences about one's work in general and, 3) the third included socio-demographic information. Except where otherwise specified, the study used a 5-point Likert-type response scale ranging from 1 (completely disagree) to 5 (completely agree). All items were administered in the Russian language.

1) Opinions and Experiences About Remote Work

The percentage of office activities (tasks usually performed at the office) that employees performed at home was measured with a single item. The possible answers were: less than 25%, between 25% and 50%, between 50% and 75%, and more than 75%.

Goal formalization: a question examined how supervisors defined task goals during the lockdown. The answer options were "not defined at all", "defined orally" or "defined in writing".

Remote work stress was measured using the 4-item scale developed by Weinert et al. (2015). An example of an item is "I feel exhausted working from home".

Remote work engagement was measured using the ultra-short 3-item scale validated by Schaufeli, Shimazu, Hakanen, Salanova, and De Witte (2019). Examples of items are "When working remotely: 1) I feel full of energy; 2) I am excited about my work".

Family–work conflict was measured using three items of the scale developed by Netemeyer, Boles, and McMurrian (1996). An example of an item is "The demands of my family or partner interfere with my work activities".

Opinions about remote work were investigated using the 4-item scale developed by Staples, Hulland, and Higgins (1999). Examples of items are "Remote work is not a productive way of working" and "Remote work is difficult".

Remote work satisfaction was measured using three items derived by Lee and Brand (2005) and previously used by Toscano and Zappalà (2020b). Two examples of an item are "Once the emergency is over, if I had to decide to work remotely again, I would choose it" and "If a friend asked me if it is appropriate to work remotely, I would recommend it".

2) Opinions and Experiences About One's Work

Leader–member exchange (LMX) was measured using the 7-item scale developed by Graen and Uhl-Bien (1995). An example of an item is "My leader recognizes my potential".

Job performance was measured using a 6-item scale developed by Staples et al. (1999). Examples of items are "I believe I am an effective employee" and "I am happy with the quality of my work output".

3) Socio-Demographic Measures

Finally, we recorded gender (1 = male, 2 = female), and age (six age ranges were provided; 1: less than 25 years old, 2: 26–35; 3: 36–45; 4: 46–55; 5: 56–65; 6: over 65).

Data Analysis

Before testing the hypotheses, Cronbach alphas, means, and standards deviations were computed. ANOVA was used to test hypothesis 1, and correlations and linear regressions were used to test, respectively, hypotheses 2–4 and hypotheses 5 and 6. All the analyses were carried out using SPSS 26.

Results

Mean values, standard deviations, bivariate correlations, and Cronbach alphas are presented in *Table 1*. Scores higher than the mean value were observed for several variables and suggest, for instance, that employees were generally engaged and satisfied with the experience of remote work and had a reasonable opinion of their remote work experience during the lockdown.

Table 1

Means, standard deviations, alphas, and bivariate correlations among the study variables

	M	*SD*	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1. Gender	1.70	0.46	–										
2. Age	2.97	1.24	.05	–									
3. Percentage of office activities	3.46	0.86	–.01	–.12	–								
4. Goal formalization	2.86	0.60	.03	–.05	.10	–							
5. Remote work stress	2.87	1.39	.22**	.03	–.10	.09	*(.92)*						
6. Remote work engagement	3.08	0.95	.11	–.15*	.27**	.15*	–.39**	*(.69)*					
7. Family–work conflict	2.29	1.25	.05	.02	–.07	.01	.42**	–.28**	*(.81)*				
8. Opinions about remote work	2.97	1.07	–.04	–.15*	.29**	.06	–.61**	.57**	–.39**	*(.79)*			
9. LMX	3.85	0.90	.11	–.15*	.11	.04	–.13*	.27**	–.10	.13*	*(.89)*		
10. Remote work satisfaction	3.19	1.32	–.03	–.09	.17**	.07	–.59**	.57**	–.29**	.73**	.15*	*(.90)*	
11. Job performance	4.18	0.69	.12	–.05	.00	.04	–.04	.20**	–.04	.09	.00	.47**	*(.89)*

*Note. N = 313. *p < .05. **p < .01, two-tailed tests. In the diagonal, within parentheses, Cronbach's alphas.*

An ANOVA performed to test hypothesis 1 showed that women reported greater perceived stress than men (M_w = 3.06; M_m = 2.39; F = 13.03, p < .01). No gender differences were observed in family–work conflict and opinions about remote work, whereas women showed greater remote work engagement than men, although the difference was only marginally significant (M_w = 3.15; M_m = 2.92; F = 3.42, p = .06). Hypothesis 1 is thus only partially confirmed.

Age was negatively correlated with remote work engagement (r = -.15; p < .05), opinions about remote work (r = –.15; p < .05), and LMX (r = -.15; p < .05), thus indicating that older employees experienced remote work less positively. Age was not related to family–work conflict and remote work stress. Thus, hypothesis 2 was partially confirmed.

The percentage of office activities performed remotely was positively related to opinions about remote work (r = .29; p < .01) and remote work engagement (r = .27; p < .01). No significant relationships were found with LMX, remote work stress and family–work conflict.

The formalization of the work goals was associated with remote work engagement (r = .15; p < .05), while it was not related to opinions about remote work, remote work stress, and LMX. Therefore, the observed results confirm only partially hypothesis 4.

Finally, to test the remaining two hypotheses, our independent variables were regressed on remote work satisfaction and remote work job performance. *Table 2* shows that remote work satisfaction was significantly and positively related to remote work engagement (β = .20; p < .01) and opinions about remote work (β = .47; p < .01), and negatively related to remote work stress (β = –.25; p < .01). Since LMX and family–work conflict were unrelated to remote work satisfaction, hypothesis 5 was only partially confirmed. The second regression showed that job performance was significantly and positively related only to LMX (β = .43; p < .01), making hypothesis 6 only minimally confirmed.

Table 2

Linear regression with remote work satisfaction and job performance as dependent variables

	Remote work satisfaction			**Job performance**		
	B	**SE**	**β**	**B**	**SE**	**β**
1. Remote work stress	–.23**	.05	–.25**	.02	.04	.04
2. Remote work engagement	.28**	.08	.20**	.08	.05	.11
3. Family–work conflict	.02	.05	–.01	.00	.04	–.01
4. Opinions about remote work	.60**	.08	.47**	.00	.05	.00
5. Leader–Member Exchange	–.02	.07	–.02	.34**	.05	.43**
R^2		.60			.21	
F		64.99**			11.78**	

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

Discussion

The current study had the main objective of investigating how Russian employees perceived homeworking during the lockdown. To slow down the spread of the coronavirus, Russian companies rapidly reorganized their way of working, allowing employees to work from home. The results only partially confirmed our six research hypotheses, and five main results could be highlighted in this section.

First, women experienced greater remote work stress and remote work engagement than men. Being more stressed and, at the same time, more engaged with remote work during the lockdown is coherent with previous literature: remote work offered more flexibility and more autonomy to women that increased their remote work engagement (Chapman et al., 1995). On the other hand, the long period of social isolation from the workplace and the increased time dedicated to family needs may have also exacerbated feelings of stress (Wang et al., 2020).

Second, the results highlighted that homeworking was, in general, a worse experience for older employees than for their younger counterparts. As age increased, participants reported lower engagement, less positive opinions about remote work, and lower LMX. This result is coherent with that observed by Drucker and Khattak (2000), who maintain that remote work engagement and opinions may depend on the extent of confidence in the use of ICTs. Older employees are less engaged with remote work probably because they are less accustomed to such technology. Thus, our results confirm the findings by Raišienė and colleagues (2020) that older employees tend to emphasize the disadvantages of telework. Finally, the decrease in social interactions with managers or supervisors might cause a lower LMX.

Even hypothesis 3 was only partially confirmed. The results showed that when employees performed a higher percentage of office activities at home, they also had more positive opinions about remote work and greater remote work engagement. Our results are not in line with those of Golden and Veiga (2005) and Virick et al. (2010), who found that more hours spent teleworking are associated with negative perceptions about it. However, homeworking during the lockdown can be considered a very different situation from teleworking before the pandemic. In a few words, our respondents probably emphasized the importance of carrying out as many office activities as possible at home, as a sort of reassuring substitute for normality that reduced social isolation and kept them busy with daily work tasks.

Fourth, hypothesis 4 was only minimally confirmed, suggesting that having clear and explicit work goals has a limited correlation with individual and work aspects. The extent of goal formalization was associated only with work engagement, which suggests that having clear and written goals (rather than oral or no formal goal at all) can be a significant motivational factor to pursue work goals with time, energy, and effort. Having clear goals and guidelines usually increases the opinion that remote work can be a suitable and valid alternative to office work and improves the relationship with the leader that assigns clear goals and tasks, but this was not the case. According to the goal-setting theory (Locke & Latham, 2006), a possible explanation is that, regardless of whether employees received goals from their supervisor, respondents had their own work goals and used them to drive and monitor their job performance. Furthermore, we cannot exclude that our inconsistent results might

be related to the operationalization of the goal formalization variable that we used. Future studies should use a different measure of goal formalization, which might also include self-assigned goals.

Finally, hypotheses 5 and 6 were also only partially confirmed by the multiple regression analyses. In particular, we notice that remote work satisfaction and job performance, as two different outcomes (the first related to remote work and the second related to general work), also have different predictors. Remote work satisfaction was mainly related to individual factors (positive opinions about remote work, remote work engagement, and reduced remote work stress). In contrast, job performance was related to the social-organizational aspect of leader–member exchange. Contrary to our expectations, family–work conflict was not related to remote work satisfaction. One possible explanation is that, when present, family–work conflict might delay or undermine work tasks without affecting satisfaction with remote work as a form of flexible work arrangement. Thus, future studies should better examine whether employees would recommend remote work to others or work remotely themselves regardless of potential interference of family duties with their work. In addition, the patterns we found can be explained by the fact that remote work satisfaction is a subjective experience and thus more related to individual variables connected with remote work (such as remote work engagement or stress). In contrast, job performance is a more general concept that includes both home and office tasks and thus is more related to general work processes, such as LMX. This reasoning might explain why none of the remote work variables was related to job performance.

Practical Implications

The spread of the coronavirus and the diffusion of remote work pose major challenges to the world of work, in Russia and elsewhere. The findings of this research suggest some practical implications for companies, managers, and human resources experts.

First, the study suggests that organizations and HR officers should consider sociodemographic characteristics when implementing remote work programs. Women and older employees may find impediments in adopting flexible work arrangements, especially at home. The whole society should consider that the workload experienced by women, who have to attend to both remote work and family duties during the pandemic, might cause stress with its adverse effects. Although gender was not related to family–work conflict, the issue should be further investigated. The needs of older employees should also be more thoroughly explored and addressed: older workers showed more reluctance to work remotely than their younger colleagues. Therefore, managers and HR officers should develop practices that support them in switching from office to remote work. Their reluctance might also be related to difficulties using technological tools, so organizations should provide older workers with the necessary skills to manage the devices and software that enable remote work.

An interesting finding of this study is the positive relationship between the percentage of office work performed at home and more positive opinions about homeworking and greater remote work engagement. These results suggest that organizations should establish activities to be implemented outside the office to involve more employees in remote work programs, increase the variety of home tasks, improve

employees' remote work engagement, and set work goals to pursue at home, thus increasing engagement. Organizational performance might eventually be improved by this activity.

Organizations may improve their remote work programs also by empowering the relationships between employees and managers. Trust and the quality of the relationship between managers and workers acquire even more importance and seem to predict job performance. Structuring meetings, as well as virtual events, become very important to maintain a positive relationship. Finally, the literature suggests that, in preparing plans to implement long-term remote work, alternating employees' presence in the office and at home should be preferred (Golden & Veiga, 2005; Zappalà, Toscano, & Topa, 2021).

Limitations and Future Research

The contributions of this study should be considered in light of its limitations. First, the research used a cross-sectional design, which limits the possibility of drawing causal inferences. Since the findings of this study may be essential to understand the difficulties of the workforce due to the health emergency, the results should be confirmed using a longitudinal study design. Future research regarding remote work during the COVID-19 pandemic should use this type of research design.

A second concern relates to the sampling technique used for the participants' selection. The convenience sampling technique based on voluntary participation decreases the generalization of the findings, including because the survey was distributed online and respondents belong to different industries, organizations, and job positions. Future research should involve a sampling technique in which specific contexts (sector or organization) should be addressed. The study also suggests additional research directions. In this research, we introduced two new variables related to the percentage of office activity and how goals are formalized. We emphasize the need for further analyzing these variables, since we consider them very promising. Finally, although we have highlighted the importance of performance and satisfaction, it is important first to assess the performance of remote work and, second, consider remote work performance measured at the group level or using objective criteria.

Conclusion

The health emergency has extensively changed our way of performing work and considering flexible work arrangements. This study underlines how some aspects can be important for employees who work remotely. On the one hand, psychosocial variables such as remote work engagement and leader–member exchange positively influence, respectively, remote work satisfaction and job performance. On the other hand, employees' opinions about remote work were more positive when performing a high percentage of office activities at home. This highlights the importance of remote work not only as a parachute for the COVID-19 pandemic, but as a more complex transformation of organizations and their way of working. For this reason, organizations should plan the implementation of remote work with a long-term perspective if they are to observe positive consequences for both organizations and employees.

Ethics Statement

This study fully respects the Declaration of Helsinki. All the research ethical guidelines were followed. The Italian side of the study was approved by the BioEthic Committee of the University of Bologna (prot. 0252554, 02/11/2020). Informed consent was obtained from all subjects involved in the study.

Author Contributions

S.Z. and F.T. conceived of the idea, designed the survey, and managed the online data collection; M.V.P. and E.V.K. edited the Russian version of the questionnaire and invited respondents to participate in the study; E.B. and F.T. performed the computations and drafted the manuscript; S.Z., M.V.P., and E.V.K. reviewed and edited the final version of the manuscript. All authors discussed the results and contributed to the final manuscript.

Conflict of Interest

The authors declare no conflict of interest.

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The Psychological Space of Professionals' Trust and Distrust in Socio-Technical Systems

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Background. The spatial aspect of professionals' trust and distrust in socio-technical systems has not been sufficiently explored. The study of its structure, criteria for spatial distribution, and interrelationships of elements is of both scientific and practical interest.

Objective. To perform a comparative analysis of the trust and distrust experienced by professional operators in a socio-technical system of subject–subject and subject–object interactions.

Design. This work is based on A.B. Kupreychenko's methodological approach to studying trust and distrust in socio-technical systems, adapted by the authors to the railway transport system in Russia. The subjects were 86 locomotive crew members. The main focus was on their trust/distrust in the operation of the socio-technical (railway transport) system, including their workmates, managers, and themselves, as well as the technical objects they operate (locomotives), manufacturers of railway equipment, and conditions of its operation.

Results. The authors identified two relatively independent groups of indicators of trust/distrust in subject–subject and subject–object interactions. Trust in the elements of subject–subject interactions (involving workmates, managers, and the study participants themselves as specialists) was reliably higher than their trust in the elements of subject–object interactions (technical objects, manufacturers of railway equipment, and conditions of its operation). The correlations between trust and distrust in the elements of the socio-technical system were positive.

Conclusions. Trust and distrust perform the functions of integrating/differentiating elements of a socio-technical system according to their predictability in various operating conditions. The degree of trust/distrust in the system elements and their "location" in the space of trust/distrust are important when professionals make decisions in the course of performing professional actions. The results of the study can be used for designing socio-technical systems to increase the predictability of their operation in unstable conditions.

Keywords: Socio-technical system, trust, distrust, subject–subject interactions, subject–object interactions

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Introduction

We address the concept of socio-technical systems (STS)[1] due to a search for effective ways of organizing the labor of teams of professionals who use complex technical devices and technologies to perform socially significant tasks. When designing a specific STS, its developers should consider not only the relationship among its technical devices and processes, but also the relationship between professionals and these devices and processes (subject–object interactions) as well as the relationship among the professionals themselves (subject–subject interactions). Therefore, it is necessary to take into account social and psychological factors, which include professionals' trust and distrust in the STS being designed (Batchelor & Perkins, 2008; Kupreychenko, 2012; Pozdeeva, 2018; Said, Bouloiz, & Gallab, 2019; Schebel, 2009; Shlyakhovaya, 2018; Winby & Mohrman, 2018; Xiao & Gorman, 2018; Zhuravlev & Lepsky, 2018; and others).

Russian psychologists have discussed the legitimacy of using the concepts of trust and distrust in relation to subject–object interactions—interactions of human professionals with inanimate objects (technical devices and technologies). Some researchers promote the view that relations of trust and distrust arise on the basis of mutual conscious assessments, psychological attitudes, and expectations of people as partners in interaction; therefore, these relations can be considered only in terms of subject–subject interactions (Skripkina, 2015a). Others (including the authors of this article) admit the possibility of applying the concepts of trust and distrust to subject–object interactions, to inanimate objects as artifacts that are created and exist as a result of human activities and which, according to human design, perform certain social functions (Akimova & Oboznov, 2016; Kupreychenko, 2012). These artifacts include technical objects and technologies with which professionals interact in the STS. Our study suggests that professionals may express their trust and distrust both in subject–subject and subject–object interactions.

The structure and interrelationships of trust and distrust in the elements (subjects and objects) of socio-technical systems have been underexplored; therefore, their study is of scientific and practical interest.

The objective of our work was to comparatively study how professional operators' trust and distrust are manifested in subject–subject and subject–object interactions in the STS.

The Concepts of Trust and Distrust in Psychology

A significant amount of psychological research has been devoted to the problem of people's trust and distrust in other people and groups of people, themselves, technical objects, and systems. The current state of the problem has been highlighted in recent scientific papers and analytical review publications (Aldasheva, Zelenova, & Runets, 2020; Antonenko, 2019; Bachmann & Kroeger, 2016; Bodu, 2020; Brattstrem, Faems, & Mehring, 2018; Brion, Lount, & Doyle, 2015; Budyakova, 2017; Chancey, Bliss, & Yamani, 2016; Chapman, Hornsey, & Gillespie, 2020; Miller, Batchelor, & Perkins, 2008; Skripkina, 2017; Strauch, 2016; Tatarko & Nestik, 2019; Woodall & Ringel, 2019; Zinchenko, Zotova, & Tarasova, 2017; and others).

[1] The concept of *socio-technical systems* was introduced in the 1960s by E. Trist and F. Emery from the Tavistock Institute of Human Relations (UK).

The authors of this article refer to the understanding of trust and distrust that has developed in Russian psychology as conscious personal attitudes towards other people, objects in the world around one, and the world in general (Antonenko, 2020; Kupreychenko, 2008; Skripkina, 2011; and others). The relationships of trust and distrust, according to this understanding, include a person's ideas about the participants in interaction, expectations associated with this interaction, emotional assessments of interacting subjects and objects, and readiness or unreadiness for certain actions in relation to these subjects and objects. Trust and distrust perform a number of functions in various spheres of human life, including the integration or disintegration of people's relationships with themselves, those around them, and the world as a whole; a decrease or increase in the stress level in human interactions; regulation of interpersonal and group interactions; etc.

Theoretical and empirical studies have indicated that trust and distrust arise in situations of uncertainty associated with diversity of choice of further actions and difficulty in predicting the behavior of a subject or object interacting with a person (Kupreychenko, 2008; Skripkina, 2015a; and others).

A number of factors of trust and distrust have been identified. Of particular importance are those that reflect the features and significance of the interaction situation, the characteristics of the object of trust, and the personal characteristics of the subject of trust (Aldasheva, et al., 2020; Antonenko, 2019; Kupreychenko, 2008; Skripkina, 2015a; and others). In relation to interactions with the socio-technical system, such factors include a person's ideas about the reliability of all components of the system, knowledge about the functioning of technical elements and the competence of those managing the system, experience in working with the system, assessment of one's own capabilities, individual characteristics (Akimova, 2013; Kupreychenko, 2012; Strauch, 2016; and others).

Trust and distrust in another person or an object can be manifest in two ways: as inversely dependent or independent relationships. In the first case, if trust in a person or an object increases, distrust decreases, and vice versa. With extremely high trust, distrust becomes zero. In other words, these relationships can be mutually exclusive. In the second case, any combination of trust and distrust is possible—e.g., simultaneously expressed both trust and distrust in the same person, an ambivalent attitude. In the space of manifestations of trust and distrust, we can distinguish between the area in which they act as dependent relationships and the area in which they appear as independent relationships (Kupreychenko, 2008).

Psychological Space of Professional Operators' Trust and Distrust in the STS

We can explore the spatial aspect of professional operators' trust and distrust in the STS due to their psychological relationships, which are "an integral system of individual, selective, conscious personal connections with various aspects of objective reality" (Myasishchev, 1957, p. 143). These connections are formed during interactions of professionals with the elements of the STS: the technical objects they operate, as well as their workmates, managers, service personnel, equipment developers, etc.

According to researchers of the spatial aspect of psychological relationships (Pozniakov, 2015; Skripkina, 2015b; Zhuravlev & Kupreychenko, 2012; and others), trust

and distrust in various elements of the STS (professionals' trust and distrust in the technical objects; trust and distrust in the people who ensure the system's operation, such as workmates, managers, and service personnel; trust and distrust in equipment developers such as manufacturers; trust and distrust in themselves as professionals; etc.) form the space of professionals' trust and distrust in the STS.

The analysis of this space can be associated with the localization of ideal images of the system elements as objects of trust and distrust in the professionals' subjective space.

The very idea of "space", according to the Russian psychologist V.P. Pozniakov, is embedded in the understanding of psychological relationships as manifestations of a person's "internal" position in interaction with objects and subjects of the surrounding world (Pozniakov, 2015). Interactions of professionals with the elements of their STS are largely determined by their idea about the importance of these elements for the successful operation of the system (they may regard some elements as very significant and disregard or deliberately ignore others). It therefore seems reasonable to consider the subjective significance of an object or subject of trust and distrust, using as a criterion their location in the space of professionals' trust and distrust in the STS. Thus, the more significant elements of the STS can be presented in their experiences as "closer" ones, deserving of higher trust. Less significant ones appear to be "more remote", trust in which is lower (or even distrust is expressed towards them).

On the basis of the above, we formulated the following research hypotheses:

- The space of professional operators' trust and distrust in the STS is differentiated and includes trust and distrust in the system in subject–subject and subject–object interactions; and
- Professional operators' trust and distrust in the elements of the STS in subject–subject interactions differs from their trust and distrust in the elements of the STS in subject–object interactions.

Methods

Content of the Validated Material

This work was based on the methodological approach to studying trust and distrust in socio-technical systems proposed by A.B. Kupreychenko (2012). The main focus was on the general properties and elements of trust and distrust, which were considered the interconnected and opposite poles of a single concept. Focusing on the above consideration of trust and distrust, we will refer to them as "trust/distrust".

According to this approach, the following elements can be distinguished in the structure of trust/distrust in the socio-technical system:

- trust/distrust in the system organization and operation;
- trust/distrust in individual functional modules (hierarchical levels, material and technical base, technologies, individual units and elements);
- trust/distrust in various categories of people who ensure the system's operation (organizers, moderators of the system, and other interested parties);
- trust/distrust in oneself as a professional or user; and
- trust/distrust in the system's operating conditions.

We studied the space of trust/distrust of locomotive crew members in the elements of the socio-technical system of railway transport (hereinafter referred to as "the railway system"). The components of the railway system include: trains; infrastructure (centralized control systems, level crossings, railway stations, etc.); locomotive crew members directly managing the trains; dispatchers providing remote control of railway flows; workers and specialists serving the structure of railway transport (train builders, electromechanics, station attendants, engineers, technologists, managers, etc.); developers and manufacturers of railway transport, etc.

Locomotive crews, which directly operate trains, are a key component of the railway system and determine its overall performance. The specificity of their activities allows them to be considered professional operators (Nersesyan, 1992). In previous studies, the authors of this article obtained data on trust and distrust among locomotive crew members using railway equipment under operating conditions, and a correlation was established between the effectiveness of activities and the degree of trust in the technology (Akimova, 2013; Akimova & Oboznov, 2016; and others).

Participants

The study involved 86 locomotive crew members. The sample was formed by random selection from the general population of crews. The data on the study participants are presented in *Table 1*.

Table 1

Data on the study participants

Indicator name	Indicator value	
	Number	%
Total sample size	86	100
Gender		
Male	86	100
Female	0	0
Age groups		
18–30 years	29	33.7
31–40 years	15	17.5
41–50 years	26	30.2
51–60 years	16	18.6
Position		
Operator	58	67.4
Assistant operator	28	32.6
Work experience in the position		
Up to 10 years	46	53.4
11–20 years	19	22.1
21–30 years	12	13.9
More than 30 years	9	10.6

Procedure

To assess the trust/distrust of locomotive crew members (hereinafter referred to as "operators') in the railway system, the authors used a questionnaire based on the methodological approach proposed by A.B. Kupreychenko (2012) and adapted to the railway transport system. The questionnaire contained 36 statements to assess six indicators of trust/distrust in the socio-technical system: five indicators — Reliability, Predictability, Attachment, Identity, and Prudence — were assessed by the participants using bipolar trust/distrust scales, and the Hazard indicator, related only to distrust, was assessed according to a monopolar scale. The participants assessed their trust/distrust in the following elements of the railway system: 1) the technical object (locomotive); 2) the operating conditions of the equipment (locomotive), 3) themselves; 4) another locomotive crew member (workmate); 5) the direct supervisor (operator-instructor), and 6) railway equipment manufacturers.

Here are some examples of the questionnaire statements:

"The locomotive I work on is reliable

"The operator-instructor's actions are predictable.

They were instructed to rate the degree of agreement with the statements on a 5-point scale: from 1 (strongly disagree) to 5 (strongly agree).

Data were collected by the researchers in person. A preliminary conversation was held with the participants about the purpose of the research, as well as about the anonymity of the subsequent use of the results. Then the participants were presented with a form with the stimulus material of the questionnaire, on which they recorded in writing the degree of agreement with the statements. The duration of the study was 20–30 minutes. Statistical data processing was carried out using the SPSS Statistics 22 software.

Results

Taking into account the validity of using the categories of space in relation to the concepts of trust and distrust, a hierarchical cluster analysis of the research results was carried out (the intergroup communication method, with the measure of "proximity" being the squared Euclidean distance). Subjected to clustering were the indicators of trust/distrust placed by the participants in their workmates, managers, and themselves in the context of the railway transport system's operation, as well as the technical objects (locomotives), manufacturers of railway equipment, and its operating conditions (see *Figure*).

The cluster analysis revealed two clusters of indicators of trust/distrust in the elements of the socio-technical system.

The first cluster includes the indicators of the operators' trust/distrust in their workmates, managers, and themselves as specialists. Within this cluster, the "closest" to each other — i.e., "similar" in the subjective assessment of the participants — are the indicators of trust/distrust in their workmates and themselves (cluster distance = 760). Less "close" to these indicators is the indicator of trust/distrust in their managers (cluster distance = 1,021).

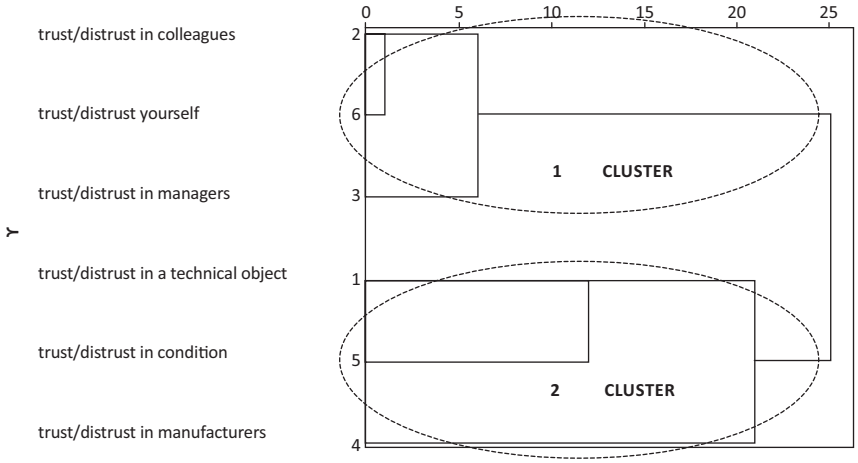

Figure. The results of hierarchical cluster analysis of the indicators of the operators' trust/distrust in the elements of the railway transport system

It should be emphasized that the above indicators are "the closest" to each other, "the most similar" as compared to any indicators included in the second cluster (inter-cluster distance = 1,752).

The second cluster includes indicators of trust/distrust in the technical object, its operating conditions, and equipment manufacturers. Within this cluster, "the closest" to each other are the indicators of trust/distrust in the technical object and its operating conditions (cluster distance = 1,199); somewhat "more remote" from them are the indicators of trust/distrust in the railway equipment manufacturers (cluster distance = 1,309).

Table 2

Indicators of trust/distrust in the elements of the railway transport system identified by the locomotive crew members

Element of the railway transport system	Indicators of trust/distrust in the elements of the railway transport system	
	Mean	SD
Workmates	23.45	2.53
Operators themselves as professionals	22.92	2.62
Managers	22.91	3.25
Technical objects (locomotives)	21.40	3.71
Equipment operating conditions	21.38	3.41
Equipment manufacturers	20.81	3.98

Comparing the average values of trust/distrust in the elements of the socio-technical system clearly shows that the locomotive crew members who took part in the

study put significantly more trust in their workmates, managers, and themselves (according to the indicators of the first cluster) than in the technical objects (locomotives), manufacturers of railway equipment, and its operating conditions (according to the indicators of the second cluster) (see *Table 2*). The differences between the closest values of trust/distrust in the elements belonging to the different clusters (managers and technical objects) are statistically significant according to the Mann-Whitney U test (U = 2,857.5, significance level p = .01).

The validity of identifying two groups of indicators in the space of trust/distrust in the railway transport system was confirmed by factor analysis (principal components analysis) with varimax rotation. Two relatively independent factors were identified, describing 58.67% of the explained variance. Factor loadings less than .60 were excluded from further meaningful analysis (see *Table 3*).

Table 3

Results of the factor analysis of trust/distrust in the railway transport system conducted among the locomotive crew members

Element of the railway transport system	Factor loadings of indicators of trust/distrust in system elements	
	Factor 1	Factor 2
Workmates	.800	
Operators themselves as professionals	.662	
Managers	.722	
Technical objects (locomotives)		.773
Equipment operating conditions		.805
Equipment manufacturers		.669

The first factor included indicators of trust/distrust in the workmates, managers, and study participants themselves. The explained cumulative variance of the first factor was 29% of the original correlation matrix. The second factor includes indicators of trust/distrust in the technical objects, equipment manufacturers, and equipment operating conditions. The explained cumulative variance of the second factor was 30% of the original correlation matrix.

Thus, the indicators of trust/distrust in the elements of the socio-technical system form a structure of two relatively independent factors. Within each factor, the interrelationships of the components are stronger than the interrelationships with the components of the other factor.

A correlation analysis was also carried out (using Spearman's rank correlation coefficients) to determine all the existing relationships of trust/distrust in the system elements (see *Table 4*).

According to the correlation analysis, there were 12 statistically significant correlations out of 15 possible (80%); all the correlations were positive. Thus, in the space of the operators' trust/distrust in the STS, the change in trust/distrust in most

elements of the system occurs in a coordinated manner (either as an agreed increase or as an agreed decrease).

Table 4

Results of the correlation analysis of trust/distrust in the elements of the railway transport system

Element of the railway transport system	Operators themselves as professionals	Managers	Technical objects	Equipment operating conditions	Equipment manufacturers
Workmates	.382**	.393**		.280**	.159*
Operators themselves as professionals		.369**	.273*	.250*	
Managers				.254*	.382**
Technical objects				.466**	.238*
Operating conditions					.406**

*Note. * p <.05; ** p < .01; the table shows only statistically significant rank correlation coefficients.*

Furthermore, despite being assigned to different groups, trust/distrust in the operators themselves as professionals is directly interconnected with trust/distrust in the technical object and equipment operating conditions, whereas trust/distrust in workmates and managers is interconnected with trust/distrust in the manufacturers of railway equipment and its operating conditions.

Discussion

Prior studies of trust/distrust in technical systems have focused on the level of a professional's trust in these systems, largely determined by the characteristics of the systems (Hancock et al., 2011; Hancock, Kessler, Kaplan, Brill, & Szalma, 2021; and others). The level of trust, according to the available data, determined the effectiveness of the actions performed (Kraus, Scholz, Stiegemeier, & Baumann, 2020; Lee & See, 2004; Verberne, Ham, & Midden, 2015; and others). However, modern technology, becoming more autonomous and "intellectual", performs roles more similar to those of members of a production team. The result of the work of such a team is more determined by interaction (coordination, cooperation, etc.) than by the reliability and serviceability of equipment (Adams, Breazeal, Brooks, & Scassellati, 2000; Sheridan, 2016; Shneiderman, 2020; and others). According to Chiou and Lee (2021), further study of trust/distrust in technical systems should be based on a relational approach. This assumes that all participants in the interaction (specialists, technical system, production situations) are inextricably linked and act as its integral components.

Agreeing with this statement, we examined the structure of relationships of professional operators' trust/distrust in the elements of a socio-technical system, in which all these elements (including the professional operators themselves) are parts of this system.

The results of the study indicate that the subjective space of the operators' trust/distrust in the elements of the STS are located in different ways and form two groups of objects. The objects within each group are "closer" to each other than to the objects in the other group. Considering that the "closeness–remoteness" of their location reflects the subjective significance of the object of trust/distrust for the operators, we can make the following assumptions.

In the space of trust/distrust in the STS, those elements that belong to the same group are similar in subjective significance: first, the relationships of trust/distrust in the operators themselves, their workmates and managers, which can be attributed to subject–subject interactions; and, second, the relationships of trust/distrust in the technical objects (locomotives), manufacturers of railway equipment, and its operating conditions), which can be attributed to subject–object interactions.

The selected groups of trust/distrust in the elements of the STS have different subjective significance for the operators and are, according to the factor analysis, relatively independent. Consequently, the space of trust/distrust in the STS is structured and forms two relatively independent components, meaningfully reflecting the relationships of professional operators' trust/distrust in subject–subject and subject–object interactions.

It should be emphasized that the operators who took part in the study put significantly more trust in the elements of the first group than in those of the second group.

The data obtained in the study are consistent with those from a study on the structure of conceptual models among nuclear power plant (NPP) operators included in the corresponding STS operation (Oboznov, Chernetskaya, & Bessonova, 2017). In that study, it was shown that the operators consider the operation of plant units as a man–machine complex, which is characterized by numerous intrasystem and intersystem interactions, including nonlinear and unstable ones, non-stationary extreme conditions of the working environment, etc. It was noted that most of the professionals are of the opinion that when one of the characteristics of a technical system changes, the change in other characteristics is difficult to predict. At the same time, the majority of NPP professionals believe that joint involvement in activities increases the predictability that all services will properly perform their duties, thereby ensuring the stable operation of the entire system.

Taking into account the similarity of the basic patterns of functioning of various socio-technical systems, we can assume that the conclusions of the NPP study, in general, are applicable to the railway transport system. This allows us to conclude that the trust/distrust of locomotive crew members in the elements of their STS in its spatial aspect performs the functions of integrating/differentiating the elements according to the degree of predictability of their behavior in various operating conditions. Subjectively, more predictable and therefore more trustworthy, are elements that are "the closest" to each other. Such relationships are those of trust/distrust in oneself, one's workmates, and managers. "More remote" and subjectively less predictable are the relationships of trust/distrust in the technical object, its operating conditions, and manufacturers.

After conducting a meta-analysis of more than 230 studies of operators' trust/distrust in automated systems, conducted from 1974 to 2021, American researchers

John D. Lee and Erin Chiou concluded that the essence of performance in systems associated with the management of complex equipment is not to maximize or even "calibrate" trust, but to maintain the trust process for more sustainable partnerships between humans and automated processes (Chiou & Lee, 2021).

Our study provided empirical confirmation of this conclusion. A significant number of positive relationships of operators' trust/distrust in the elements of the railway system were shown to be determined, indicating the agreed nature of the change—an increase or decrease—in trust/distrust in these elements. On the other hand, it was shown that, despite the differentiation of trust/distrust in the elements of the system according to the degree of their subjective significance, this nature of their interrelationships reflects the integrity of these attitudes towards all the elements of the STS and the subjective importance of each element for the operators in ensuring the system's operation.

Conclusion

The study confirmed our hypotheses. First, it was found that trust/distrust in individual elements of the STS forms a structured space of trust/distrust in the entire system. This space is differentiated and includes two groups of relatively independent relationships of trust/distrust in subject–subject and subject–object interactions within the system. Second, the trust that professional operators have in the STS elements in subject–subject interactions that form the first group is significantly higher than their trust in the STS elements in subject–object interactions that form the second group. The "location" of the indicators of trust/distrust in the system elements within the space of trust/distrust that professional operators have in the STS is largely determined by the subjective significance of the elements for the predictability of the STS operation.

It can be assumed that the relationships of trust/distrust perform the functions of integrating/differentiating the elements according to the degree of predictability of their behavior in various system operating conditions and, therefore, play an important role in professionals' decisions about their professional actions in various interactions with the system elements.

Positive relationships of professional operators' trust/distrust in the STS elements were determined: trust in most elements of the system changes (increases or decreases) consistently. Such interrelationships probably reflect the integrity of trust/distrust in all the system elements, as well as the importance of each element in ensuring the system's operation.

The results of the study can be used for designing socio-technical systems, in order to include trust in both subject–subject relations between professionals, and subject–object relations—the attitude of professionals to technical objects. In the latter case, a promising direction is the development of interfaces that are intuitive for professionals, the inclusion of decision support systems (particularly artificial intelligence), as well as the design of ergonomic and comfortable workplaces. In addition, the data on relationships trust/distrust in various elements of the system obtained in the research can find practical application in training of professionals who make decisions on managing complex technical objects in various working conditions. In

particular, assessing trust in elements of the socio-technical system can be introduced into the professional training program, and the results of the assessment can be used to adjust training programs. For example, the implementation of continuous development programs for professionals will contribute to the growth of their competence and, consequently, increase their self-confidence. As a result, such professionals increase the degree of trust in subject–subject and subject–object interactions. In the first case, this leads to the optimization of interactions within the work team, the maintenance of a favorable socio-psychological climate, and consequently, a more coordinated and efficient implementation of production tasks. In the second case, it can reduce the subjective complexity of the working situation, mitigate tension in difficult and dangerous situations, and, in general, facilitate appropriate actions in operating technical objects.

Limitations

The research results should be considered within the theoretical framework not of a separate role of trust/distrust in technology, people (professionals, managers), and other factors, but specifically in terms of trust/distrust in the socio-technical system, which is characterized by the functional relationships of all these elements.

This is the novelty of the study and, at the same time, a limitation on the application of its results to socio-technical systems, but not to social or technical ones taken separately. The research data were obtained on a sample of locomotive crew members in railway transport.

Possible restrictions on the use of the results may be associated with the lack of data on the gender specificity of trust/distrust in socio-technical systems, since all the study participants are men. In addition, the object of the study was the railway transport system. It can be assumed that the structure of the space of trust/distrust in other socio-systems will have its own characteristics. At the same time, the results and further conclusions are applicable, in our opinion, to professional operators of other types of long-term operation vehicles.

Ethics Statement

This research was approved at a meeting of the Department of General and Social Psychology, Lobachevsky State University of Nizhny Novgorod. No ethical violations have been identified. Participants gave informed consent to the study.

Author Contributions

A. Oboznov conceived of the idea, developed the theory, and supervised the findings. A. Akimova performed the computations and verified the analytical methods. The authors discussed the results, and both contributed to the final manuscript.

Conflict of Interest

The authors declare no conflict of interest.

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CLINICAL PSYCHOLOGY

The Relationship between FFMQ Mindfulness and Harmony in Life among Patients with Celiac Disease

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Background. Patients with Celiac Disease (CD) experience psychological disorders and emotion-regulation disruptions. Although following a gluten-free diet alleviates their symptoms, these patients report social relationship problems.

Objective. The first aim of this study was to analyze the level of FFMQ mindfulness (describing emotions, acting with awareness, observing, non-judging of inner experience, and non-reactivity to inner experience) and harmony in life (HiL) in patients with CD. The second goal was to examine the relationship between the FFMQ and HiL scales in patients with CD. The third was to detect the effects of the duration of the illness, education level, and employment status on FFMQ-measured mindfulness and HiL.

Design. The study involved 111 Turkish patients with CD (N Females = 75, 67.6%) living in Turkey. The patients filled out the FFMQ and HiL questionnaires via a google form survey. The duration of their diagnosis, age, employment status, and education level were nominal variables. A Pearsons' correlation test, independent t-test, multiple linear regression, and one-way ANOVA were implemented.

Results. The results showed that patients with CD had a low level of HiL. The total FFMQ score was positively related to the HiL scale. Education and duration of diagnosis had a significant impact on the FFMQ and HiL scores. Age affected the level of describing emotions, and employment status had a strong effect on acting with awareness. However, gender affected neither the FFMQ nor HiL levels.

Conclusion. The results showed that patients with CD expressed a low level of HiL. Non-reactivity to inner experience, observing, and acting with awareness were positive predictors of the HiL scores. Moreover, since the HiL and FFMQ scales showed high internal consistency, the FFMQ and HiL questionnaires can be used in further studies of patients with CD.

Keywords:
FFMQ, mindfulness, celiac disease, harmony in life, duration of diagnosis

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Introduction

Celiac disease (CD) is an inflammatory, chronic immune-mediated disease characterized by persistent intolerance to gliadin in the small intestines (Rubio-Tapia, Hill, Kelly, Calderwood, Murray, & Murray, 2013). The prevalence of CD is 0.6 to 1.0% of the population worldwide (Singh et al., 2018). The incidence of CD has been increasing in many developing countries because of the westernization of the diet, changes in wheat production and preparation, and increased awareness of the disease (Fasano & Catassi, 2012).

Patients with CD have sensitivity to foods that contain gluten. A gluten-free diet alleviates the symptoms of the disease. However, it is difficult to detect this disease. Because some celiac disease symptoms resemble those of other diseases such as irritable bowel syndrome (IBS) and lactose tolerance (Makharia, Catassi, & Makharia, 2015), patients with CD face stressful conditions (Castilhos et al., 2015). In addition, gluten-free restaurants are limited. Therefore, patients with CD report problems around participating in social events. They often refuse to meet with their friends. During this time, their emotion-regulation is disrupted. Patients with CD feel frustrated and embarrassed due to their diet restrictions. They feel lonely and socially isolated (Ciacci et al., 2013). Their levels of depression and anxiety are related to emotion-regulation strategies. Cognitive reappraisal has been shown to be negatively related to depression in patients with CD (Kerswell & Strodl, 2015).

In addition to emotion-regulation difficulties, physical problems have been found in patients with CD. One of the most common complaints is feeling fatigued (Siniscalchi et al., 2005). Such symptoms may result in depressive tendencies and less adherence to a gluten-free diet (Campagna et al., 2017). A study conducted in Turkey found that patients with CD had a low level of quality of life, with participants reporting dysfunction in their social, emotional, and physical health (Sevinç, Çetin, & Coşkun, 2017). However, implementing a gluten-free diet decreased anxiety and depression symptoms, and raised the level of mental well-being (Wagner et al., 2015). Knowing about gluten-free products and the disease has a strong impact on mental well-being (Halmos et al., 201 8). One study demonstrated that anxiety, depression, and fatigue were prevalent in patients whose CD was untreated, and thus induced a lower quality of life satisfaction (Zingone et al., 2015).

These mental health disruptions affect patients' behavior and their family relationships (Martínez-Bermejo & Polanco, 2002). Symptoms of the disease affect the social activities and emotional states of the patients (Passanati et al., 2013). Patients with CD experience dissatisfaction with their body shape and weight (Arigo, Anskis, & Smyth, 2012). A narrative review analysis has indicated that eating disorders were positively associated with CD (Slim, Rico-Villademoros, & Calandre, 2018).

The effects of the disease are more serious in children. The research on children and adolescent samples between 7-18 years old has demonstrated that children with CD have higher scores for harm avoidance and somatic complaints. They tend to have more social, cognitive, and attention problems (Mazzone et al., 2011), and social phobias (Addolorato et al., 2008). Moreover, adults with CD tend to use a higher level of antidepressants than a control group (Zylberberg, Ludvigsson, Green, & Lebwohl, 2018). Their sense of social and emotional well-being is distorted (Al-Qefari, Al-

Twijri, Al-Adhadh, Al-Rashed, & Al-Jarallah, 2018). It can be said having CD is a significant risk factor for psychological disorders.

One of the significant components related to the level of mental well-being in patients with CD is gender. Female patients perceive the burden of the disease more heavily than male patients do. They have lower levels of mental well-being than male patients with CD (Rodríguez-Almagro, Rodríguez-Almagro, Solano-Ruiz, Siles-González, & Hernandez-Martinez, 2019). In addition, women patients with CD report a higher ratio of gastrointestinal symptoms, even though they followed a gluten-free diet (Roos, 2011). Therefore, it can be said that women patients with CD are less resilient in the face of the impact of the CD than men with CD.

The second factor that affects the burden of the disease is the level of education. If patients complete higher education, they tend to be aware of the disease. Patients with higher education levels are less vulnerable to psychological problems (Leino-Kilpi et al., 2005). Furthermore, the duration of the disease plays an important role in determining the patients' mental well-being. The first year of diagnosis has been shown to be a significant predictor of higher suicide risk in patients with CD (Ludvigsson, Sellgren, Runeson, Långström, & Lichtenstein, 2011). On the other hand, the mental well-being of patients with CD who were treated for more than 10 years has not shown a significant difference in the level of anxiety, depressed mood, positive well-being, and self-control compared to a control group (Roos, Kärner, & Hallert, 2006).

In this case, integration with society has a significant role in determining mental well-being. Patients with CD need time to harmonize with their environments and adapt to novel life conditions. It has been reported that five years after diagnosis, patients with CD have fully adapted their skills in domestic and international travel. In the first two years after diagnosis, patients with CD still have problems explaining their disease (Clerx, Silvester, Leffler, DeGroote, & Fishman, 2019), and their subjective well-being is positively related to their levels of friendships and perception of support (Shani, Kraft, Müller, & Boehnke, 2020). Hence, harmonization with society may be disrupted during the first years of diagnosis in patients with CD.

It has been found that experiencing harmony in life (HiL) is negatively related to depression, anxiety, and stress, whereas it is positively correlated with subjective happiness, life satisfaction, psychological well-being, and social desirability (Kjell, Daukantaitė, Hefferon, & Sikström, 2016).

Furthermore, a positive interaction with society and family members might have an impact on the patients' mindfulness score. One study found that the components of FFMQ mindfulness (describing, awareness, non-judging of inner experience, and non-reacting to inner experience, and observing) were negatively associated with depression, anxiety, and somatization (Cebolla et al., 2012). Another concluded that a high level of FFMQ mindfulness was negatively related to Alexithyhmia and depressed mood rumination (Lilja, Lundh, Josefsson, & Falkenström, 2013). A meta-analysis study reported that FFMQ-measured mindfulness had a negative relationship with generalized anxiety disorder and post-traumatic stress disorder. Acting with awareness and non-judging of inner experience were found to be negative predictors of social anxiety disorders (Carpenter, Conroy, Gomez, Curren, & Hofmann,

2019). Describing and non-judging of inner experiences were predicted to be related to the anxiety and depression symptoms with 7 percent of variance in patients with IBS, according to a study by Gaylord et al. (2011).

Overall, we can conclude that both FFMQ mindfulness and HiL can be significant variables in analyzing psychological well-being in patients with CD.

The main goal of this study was to determine the relationship between FFMQ and HiL scales in patients with CD. The second goal was to ascertain the effects of education level, age, duration of illness, and gender differences on the HiL and FFMQ levels.

There were several hypotheses to be tested in the study:

1. There will be a positive relationship between HiL and FFMQ in patients with CD.
2. Duration of diagnosis and education will have a significant impact on the HiL and FFMQ mindfulness in patients with CD.
3. Gender differences will have a significant effect on the HiL and FFMQ mindfulness in patients with CD.

Methods

Participants and Design

This study was carried out between March 23 and April 15 in 2020 in Turkey. Participants were contacted via CD Social Media Platforms. There were 111 participants (Females N = 75, 67.6%) who had been diagnosed with CD. Two individuals did not mark their gender. Age, duration of diagnosis, employment status, and education were nominal variables. The majority of the participants were over 30 years of age (N = 58, 52%), had been diagnosed with CD more than 5 years before (N = 53, 47.7%), and had a university degree (N = 41, 37%). Detailed information on the sample is shown in Table 1. Participants filled out the FFMQ and HiL scales via a google form. All participants had been diagnosed with CD for at least one year were included in the study.

Procedure

Five Facets Mindfulness Questionnaire (FFMQ)

The FFMQ (Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006) is a comprehensive scale of dispositional mindfulness and contains statements about our thoughts, experiences, and actions in daily life. In this study, the Turkish version of the FFMQ (Kınay, 2013) was used. In this version, the observing sub-scale has 9 items instead of 8, while the non-judging of inner experience sub-scale has 6 items instead of 7. The entire scale consists of 39 questions with five subscales, which participants were to evaluate numerically, with 1 = strongly disagree to 5 = "strongly agree." The higher scores therefore reflect higher levels of FFMQ mindfulness. The five subscales are:

1. Observing/noticing/attending, which includes feelings, sensations, perceptions, thoughts, and sensory awareness of the internal and external world

around us (e.g., "When I'm walking, I deliberately notice the sensations of my body moving");
2. Describing, or the ability to label experiences and express them in words (e.g., "I'm good at finding words to describe my feelings");
3. Acting with awareness and focusing on the information present at the moment (e.g., When I do things, my mind wanders off and I'm easily distracted);
4. Non-judging of inner experience, which includes accepting both one's own and others' thoughts, emotions, and the empathy statements (e.g., I criticize myself for having irrational or inappropriate emotions); and
5. Non-reactivity to inner experience, which refers to accepting one's negative thoughts and emotions rather than internalizing them (e.g., I watch my feelings without getting lost in them)

In the current study, all scales showed adequate to high internal consistency (Omega coefficient values obtained, FFMQ = .80; observing = .81; acting with awareness = .92; describing = .85; non-judging of inner experience = .88; and non-reactivity to inner experience =.81).

Harmony in Life Scale (HiL)

The HiL questionnaire (Garcia, Al Nima, & Kjell, 2014) contains statements relevant to one`s perception, evaluation, and judgment relative to balance in one's social relationships. The scale aims to evaluate one`s harmony and integration into both society and one's self. In the current study, patients were scored on the Turkish version of the HiL scale (Satici & Tekin, 2017). The scale consists of five items (e.g., I accept different conditions in my life) ranging from 1 = Strongly disagree to 7 = Strongly agree. A higher score indicated a higher level of the HiL. In the current study, the scale had a high internal consistency (Omega coefficient = .87).

Data Analysis

The data was computed by SPSS, version 26. The values of the skewness, kurtosis, and standardized z-scores of the kurtosis and skewness were measured to detect whether the study was normally distributed or not. It has been suggested that for medium-sized samples that range between ($50<n<300$), the standardized z-score of skewness and kurtosis between -3.29 and +3.29 (Kim, 2013) and between -2 and +2 (George & Mallery, 2010) indicates that the study is normally distributed. In this study, standardized z scores of skewness and kurtosis in all-subscales of FFMQ and HiL were found to be between -3.29 and +3.29 (see Table 2). Thus, the research was analyzed using parametrical tests.

This study had four independent variables – namely, gender, education, age, and duration of illness – with FFMQ and HiL as the two dependent variables. Pearson's correlation test was used to detect the relationship between the components of the FFMQ (describing, observing, acting with awareness, non-judging of inner experiences, non-reaction to inner experiences) and HiL questionnaire.

An independent T-Test was computed to determine the effects of gender on the HiL and FFMQ scores. One-way ANOVA was measured to analyze the effects of

education, employee status, age, and duration of illness on the HiL and FFMQ as well. Multiple Regression Analysis was used to examine the effects of FFMQ components on the HiL. In the second part of the Multiple Regression analysis, education and duration of illness were chosen as independent variables, while HiL and FFMQ were dependent variables. The reliability of the FFMQ and HiL scales was measured using McDonald`s Omega coefficient analysis (Flora, 2020).

Table 1

Demographic Variables

Variables	Frequency	Percentage
	N	(%)
Gender		
Female	75	67.6
Male	34	30.6
Missing	2	1.8
Employment Status		
Employed	53	47.7
Unemployed	32	28.8
Student	26	23.4
Education		
Primary	20	18.0
High School	27	24.3
University	41	36.9
Master	5	4.5
Students under 18 years	18	16.2
Age		
Over 30 years old	58	52.3
26–30 years old	15	13.5
18–25 years old	20	18.0
Under 18 years old	18	16.2
Duration of Diagnosis		
1–2 years	27	24.3
2–5 years	31	27.9
More than 5 years	53	47.7

The power of the sample size was analyzed using G*Power (Faul, Erdfelder, Buchner, & Lang, 2009). Since this power was computed after the study was completed, post hoc analysis was measured. The type of power for the Pearson's correlation test was the bivariate correlation model of the post hoc two tails. The power of the linear multiple regression: fixed model, R2 deviation from zero was used to measure the sample size power of the multiple regression analysis.

Results

The means of the HiL (M = 23.1, SD = 7.7) and dispositional mindfulness scores were obtained. For total FFMQ, M = 124.5, SD = 19.2; for acting with awareness, M = 27.8, SD = 9.3; for describing, M = 28.3, SD = 7.7; for observing, M = 31, SD = 6.8; for non-judging of inner experience, M = 19.8, SD = 7.8; and for non-reactivity to inner experience, M = 17.5, SD = 5.5.

Table 2

Descriptive Statistics

Scale	Mean	SD	Kurtosis (SE)	Skewness (SE)	Kurtosis (Z)	Skewness (Z)
HiL	23.1	7.7	–.08 (.46)	–.64 (.23)	–0.17	–2.78
FFMQ	124.5	19.2	.17 (.46)	–.02 (.23)	.37	–.09
Awareness	27.8	9.3	–.82 (.46)	–.38 (.23)	–1.78	–1.65
Describing	28.3	7.7	–.70 (.46)	–.24 (.23)	–1.52	–1.04
Observing	31.1	6.8	–.58 (.46)	–.50 (.23)	–1.26	–2.17
Nonjudge	19.8	7.8	–.05 (.46)	.61 (.23)	–1.08	2.65
Nonreact	17.5	5.5	–.38 (.46)	–.01 (.23)	–.082	–.004

Note. SD = Standard Deviation; HiL = Harmony in Life; FFMQ = Total Dispositional Mindfulness; Nonjudge = Nonjudging of inner experience; Nonreact = Nonreactivity to inner experience; SE = Standard Error; Z = Standard Score

To test the first hypothesis, the relationship between the FFMQ and HiL scores was analyzed. Pearson's correlation analysis indicated that the HiL scale was positively correlated with the total FFMQ (r = .54, p = .0001), and the following subscales: observing (r = .41, p = .0001); describing emotions (r = .37, p = .0001); acting with awareness (r = .43, p = .0001); and non-reactivity to inner experience (r = .44, p = .0001). The HiL scale showed negative correlation with the non-judging of inner experience (r = –.22, p = .02). Therefore, it can be concluded that the first hypothesis was proven. Detailed analysis of the correlation test is in *Table 3*.

Table 3

Pearson's correlation coefficients between scales

Variable	1	2	3	4	5	6	7
1. HiL	–						
2. FFMQ	.54***	–					
3. Awareness	.43***	.73***	–				
4. Describing	.37***	.71***	.34***	–			
5. Observing	.41***	.35***	–.01	.26**	–		
6. Nonjudge	–.22*	.21*	.17	–.12	–.47***	–	
7.Nonreact	.44***	.52***	.15	.38***	.29**	–.23*	–

*Note. * = p<.05, ** = p<.01, *** = p <.001. HiL=Harmony in Life; FFMQ = Total Dispositional Mindfulness*

Then, multiple regression analysis was computed to find the total variance of the FFMQ score on the HiL score. The results indicated that FFMQ mindfulness was explained with 41 percent total variance by observing, acting with awareness, and non-reactivity to inner experience: F (5, 105) = 16.12, p = .0001, R^2 = .43. It was found that observing (B = .28, SE = .09, p = .001), acting with awareness (B = .39, SE = . 06, p = .0001), and non-reactivity to inner experience (B = .26, SE = .11, p = .002) were positive predictors of HiL. However, non-judging of inner experience and describing emotions were not predicted to be associated with the HiL scores.

Table 4

Multiple regression analysis measured the effects of FFMQ on HiL

Model	Unstandardized Coefficients		p	95.0% CI	
	Estimate	SE		LL	UL
Awareness	.32	.07	.0001	.19	.45
Nonreact	–.37	.11	.002	.14	.60
Observing	.31	.10	.001	.12	.51

Note. DV = HIL; R2 = .43; Adj. R2 = .41; CI = Confidence Interval; LL = Lower Limit; UL = Upper Limit

To test the second hypothesis, the effects of duration of diagnosis and education level were examined. Multiple regression results showed that HiL was explained with 6.5 percent variance by both education and duration of illness; F (2, 108) = 4.8, p = .01. R^2 = .08. Duration of illness (B =.19, SE =.87, p = .04) and education level (B = .20, SE = .59, p =.03) were significantly related to HiL. FFMQ mindfulness was explained with 7 percent total variance by both education level (B = .21, SE = 1.5, p = .02) and duration of illness (B = .19, SE = .2.2, p = .04); F (2, 108) = 5.04, p = 0.008, R^2 = .09. Hence, it can be said that the second hypothesis was proven.

Table 5

Multiple regression analysis measured the effects of education and duration of diagnosis on FFMQ

Model	Unstandardized Coefficients		p	95.0% CI	
	Estimate	SE		LL	UL
Education	4.5	2.16	.04	.22	8.8
Duration of Diagnosis	3.4	1.48	.02	.51	6.4

Note. DV = FFMQ; R2 = .09; Adj. R2 = .07; CI = Confidence Interval; LL = Lower Limit; UL = Upper Limit

One–way ANOVA showed that education level had a significant impact on describing emotions; F (4, 106) = 3.03, p = .02). The mean level of describing by patients

with CD who had masters' degrees was *M* = 33, *SD* = 6.46; for those with university degrees, M = 29.5, SD = 6.9; for those with a high school degree, *M* = 30.1, *SD* = 6.7); for patients who were adolescent students, *M* = 26.4, *SD* = 9.7); and for patients with primary education, *M* = 24, *SD* = 7.48.

Table 6

Multiple regression analysis measured the effects of education and duration of diagnosis on HiL

Model	Unstandardized Coefficients		p	95.0% CI	
	Estimate	SE		LL	UL
Education	1.3	.87	.03	.09	3.5
Duration of Diagnosis	1.8	.59	.04	.14	2.5

Note. DV = HiL; R2 = .08; Adj. R2 = .065; CI = Confidence Interval; LL = Lower Limit; UL = Upper Limit

Duration of diagnosis had a significant effect on total FFMQ mindfulness; F (2,108) = 7.4, p =. 001). Patients with CD who had been diagnosed more than 5 years before (*M* =131, *SD* = 20) had a higher FFMQ score than patients diagnosed between 1-2 years before (*M* = 124, *SD* = 14) and patients who were diagnosed between 2-5 years before *(M* = 115, *SD* = 19).

Employment status affected the level of acting with awareness: F (2, 108) = 3.01, p = .05. Employed CD patients scored a higher level of acting with awareness (*M* = 30, *SD* = 8.36) than patients who were students (*M* = 26.5, *SD* = 10). Unemployed patients had the lowest scores on the acting with awareness scale (*M* = 25.1, *SD* = 9.69)

Age was a significant factor in the scores on describing emotions: F (3,107) = 2.9, p = .04. Patients between 18-25 years old had a higher level of describing score (*M* = 29.8, *SD* = 6.3) than patients who were older than 30 years old (*M* = 29.4, *SD* = 6.9), and adolescent patients with CD (*M* = 26.2, *SD* = 10). Patients between 26-30 years old had a lowest describing level (*M* = 23.4, *SD* = 7.6).

Discussion

This study had two main objectives. The primary aim of the research was to examine the relationship between the CD patients' levels of HiL and FFMQ mindfulness. The second goal was to identify the effects of duration of illness, age, gender, education, and employment status on their FFMQ and HiL levels. In addition, the study posed several hypotheses.

A previous study had reported that patients with CD were likely to complain of depressive symptoms (Smith & Gerdes, 2012). The current research suggested that patients with CD who had low HiL scores had similar scores to participants with high depression, anxiety, and stress symptoms (Satici & Tekin, 2017). The study found that the total FFMQ score (*M* = 114) for the adult depressed patients (Bohlmeijer,

Klooster, Fledderus, Veehof, & Baer, 2011), patients (M = 112) with a social anxiety disorder (Makadi, & Koszycki, 2019), and patients with recurrent major depressive disorders before cognitive-behavioral therapy (M = 120) had a lower total FFMQ score than patients with CD (M = 124.5) (Gu et al., 2016)

FFMQ mindfulness plays an important role in the quality of relationships. A study by Goodall, Trejnowska, and Darling (2012) showed that anxious attachment was negatively correlated with describing, labeling with words, focusing in the present moment, non-judging of experience, and non-reactivity to inner experiences. This study found that HiL was positively related to total FFMQ, including acting with awareness, describing with words, observation, and non-reactivity to inner experience, whereas it was negatively associated with the non-judging of experience in CD patients. Moreover, 41% of the total variance of HiL was predicted by observation, acting with awareness, and non-reactivity to inner experience. It can be interpreted that paying attention to feelings, sensations, focusing on the present time, and accepting both one's own and other people's opinions have a high impact on integrating patients with CD into society.

It has been found that self-compassion has a significant impact on the quality of life and gluten-free diet adherence in patients with CD (Dowd & Jung 2017). On the other hand, patients with CD may have difficulty adapting to their gluten-free diet (Silvester, Weiten, Graff, Walker, & Duerksen, 2016). Previous research has suggested that the duration of diagnosis might affect the personality as well (Rosa, Troncone, Vacca, & Ciacci, 2004). The present study found that the duration of diagnosis had a high impact on FFMQ and HiL scores. When patients had been diagnosed with CD more than 5 years before, they reported a higher level of FFMQ and HiL scores. It can be highlighted that 5 years after diagnosis, patients with CD revive their social interactions and increase their mindfulness skills.

It has been reported that diagnosis of CD is not associated with the education level (Olen, Bigahen, Rasmussen, & Ludvigsson, 2016). However, education level, along with age, has been shown to have a high impact on psychological well-being (Belo, Navarro-Pardo, Pocinho, Carrana, & Margarido, 2020). The present study found that education level had a high impact on describing emotions. People with a higher level of education reported a higher level of expressing emotions. Furthermore, education, along with duration of illness, was positively associated with HiL and FFMQ mindfulness. Therefore, it can be said that a higher level of education for patients with CD might provide a protective effect for integration into society and mindfulness skills.

Age has been shown to be a significant factor in FFMQ mindfulness and psychological well-being (Hohaus & Spark, 2013). A previous study on patients with CD found that age did not have a significant effect on mood disorders and psychological well-being (Canova et al., 2021). However, the present study suggested that the patients' age groups affected the level of their description of their emotions. Patients between the ages of 26-30 had particular difficulty expressing their emotions.

The mindfulness level has been shown to vary due to economic factors (Jensen, Krogh, Westphael, & Hjordt, 2019). When people had economic problems, they were less likely to access to the health care system that might have a significant

impact on the diagnosis of CD (Roy et al., 2016). The present study showed that unemployed patients had a lower score on the acting with awareness scale than employed patients.

Previous research has reported that women patients with CD had a higher level of anxiety symptoms than men (Rostami-Nejad et al., 2020). However, in the current study, gender differences did not significantly affect either the mindfulness or HiL scores. Thus, it should be highlighted that the third hypothesis was proven false.

Conclusion

This study found that HiL was explained with 41 percent of total variance by the FFMQ characteristics of acting with awareness, non-reactivity to inner experiences, and observing. However, observing and non-judging of inner experiences were not predicted to be related to HiL. Moreover, Pearson's correlation test also showed that HiL was positively correlated with the dispositional mindfulness characteristics of acting with awareness, describing, observing, and non-reactivity to inner experiences, whereas non-judging of inner experiences was negatively associated with the HiL.

The study also suggested that education level and duration of illness were associated positively with HiL and FFMQ. One-way ANOVA data showed that duration of illness had a significant impact on FFMQ mindfulness; patients diagnosed with CD more than 5 years before scored a higher level of FFMQ. In addition, education level and age affected the scores on describing emotions. Patients with masters' degrees and those between 18 and 25 years of age had higher scores on describing emotions.

The study found that gender differences did not have a significant impact on the HiL and FFMQ scores. While the research has suggested that people with CD have a low level of HiL, the current findings on the FFMQ's association with psychological disorders remains questionable. Therefore, in future studies, it would be beneficial to evaluate the relationship between FFMQ, anxiety, depression, and social anxiety symptoms in patients with CD.

Limitations

This study had several limitations. The first was that it was the cohort study survey that computed the relationship between variables rather than attempting to predict outcomes. Further studies may focus on an experimental design that examines the effects of cognitive-behavioral therapy on FFMQ mindfulness. The second limitation was the sample size. G* Power analysis indicated that the correlation sample size between HiL and non-judging of inner experiences (.65), and the multiple regression analysis sample size that examined the relationship duration of diagnosis and education level on FFMQ and HiL (.69), had a lower effect size than 80%. However, multiple regression analysis between the FFMQ and HiL had an excellent power sample size (.98).

The third limitation was that, when the adjusted Bonferroni p alpha value was computed, the significant effects of one-way ANOVA data statistics disappeared.

Therefore, the effects of duration of diagnosis, employment status, age, and education level should be determined in further studies. Moreover, the representation of males and females in the ample was unbalanced (*N* Female = 75, Male = 34). Further studies should have a larger sample with equal gender groups.

The fifth limitation was that the research did not have a variable that assessed whether the participants followed a strict gluten-free diet. Therefore, it would be interesting to evaluate whether the FFMQ and HiL levels have been linked to gluten-free diet adherence.

The sixth limitation was that FFMQ and HiL scales were self-report measures, which therefore poses a risk for potential bias. Yet, there has been no previous study based on the FFMQ and HiL scales in patients with CD. The FFMQ and HiL scales had high internal consistency scores in patients with CD and can be used in further studies.

Ethics Statement

This study did not have any risk for the participants. Therefore, no special ethical approval was required. However, all subjects gave their informed consent for inclusion before they participated. Participation in the study was entirely voluntary.

Author Contributions

The idea of the article, the theory, the introduction, the statistical data, and the results were all conceived, carried out, and written by Emrullah Ecer.

Conflict of Interest

The author declares no conflict of interest.

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SOCIAL PSYCHOLOGY

Differences in Attitudes toward Mental Health among Boys from Religious and Non-religious Families Experiencing Religious and Secular Education

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Background. Post-industrial society faces multiple stresses and developmental risks, both environmental and biological. The issues of mental health have become more dramatic and subject to debate. The current discourse about the religiosity-mental health nexus makes the study of differences in attitudes towards mental health among children from religious and non-religious families experiencing religious and secular education significant and relevant for practice.

Objective. We studied the attitudes toward different spheres of life of children from Orthodox and non-religious families experiencing religious and secular education. We hypothesized differences in attitudes toward mental health by children from Orthodox families and non-religious families regardless of school choice. We expected the positive attitudes toward mental health to be greater for the children experiencing religious and secular education.

Design. Our study assessed 340 primary school boys on a number of measures. The boys' average age was 10.4 years old. The participants were divided into three groups, taking into consideration the family's religiosity and educational characteristics.

Results. The boys from Orthodox families had more positive attitudes toward family, life, people, their bodies, and their mental health than the boys from non-religious families. These differences were also significant between groups of boys from religious and non-religious families experiencing secular education. The boys from religious families experiencing religious education had more positive attitudes toward their physical and mental health than the boys from religious families experiencing secular education.

Conclusion. Positive attitudes toward both physical and mental health are more likely to be formed within religious families.

Keywords: Mental health, attitudes, gender, personality development, orthodox families

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Introduction

There are a large number of works supporting the idea of a religion-mental health nexus (Abdala, et al., 2021; Braam, et al., 2010; Wang, Al Zaben, Koenig, & Ding, 2021; Worthington & Langberg, 2012). Although the majority of these studies are focused on mental health issues, some authors have found statistically significant correlations between religiosity and physical health as well (Dutton, Madison, & Dunkel, 2018; Woodley of Menie & Fernandes, 2016).

Using the method of meta-analysis, H. Koenig (2012) concluded that religious belief and participation were positively associated with both physical and mental health, as well as with healthy behavior.

H. Koenig (2012) gives three possible reasons for these findings. The first is religion's role as a specific conscious coping strategy. Religion provides genuine resources for coping with stress by giving eternal meaning to a person's life. The second is religion's pro-social doctrines. By following different religious pro-social guides, a person avoids stresses in social conflict, which helps reduce the risk of poor mental health. And the third is social support. The social dimension of religion builds a religious community that may provide a support network to help alleviate stress in both material and non-material ways (Koenig, 2012).

Besides this, the religiosity-health behavior nexus could be explained by religious teachings (using Biblical justifications) to avoid unhealthy behavior such as extensive alcohol use, drug use, or sexual promiscuity (McCree, Wingood, DiClemente, Davies, & Harrington, 2003; Myers, 2014; Wills, Gibbons, Gerrard, Murry, & Brody, 2003).

H. Koenig's ideas are confirmed in findings that religious individuals use more effective coping strategies when dealing with stressful situations (Myers & Diener, 1995; Siegel, Anderman, & Schrimshaw, 2001). Religious people are considered more likely to help others, and to engage in more volunteering; they report fewer antisocial activities such as lying, cheating, and stealing (Schlenker, 2008). Also, greater moral commitment is associated with attitudes that signify greater psychological well-being, such as effective social functioning, greater internal control, sense of purpose in life, authenticity, and empathy (Schlenker, Chambers, & Le, 2012).

Various studies also report a strong association between genetic stability and religiosity. Thus, non-religiosity or beliefs in the paranormal are associated with a high mutational load (Dutton, Madison, & Dunkel, 2018; Koenig, McGue, Krueger, & Bouchard, 2005). And belief in the paranormal is associated with poor mental health (Dein, 2012; Schulter, & Papousek, 2008), schizophrenia (Schofield & Claridge, 2007), and manic depression (Thalbourne & French 1995). There is also a positive atheism-autism nexus (Woodley of Menie & Fernandes, 2016). So, since the parents and children share their genes, children from religious families and children from non-religious families may have differences in mental health.

Religiosity and moral or other attitude development originate in preschool childhood (Kashirskii, 2006; Kediarova, & Uvarova, 2012). D.V. Kashirskii believes that the first attitudes begin to appear at 6-7 years old, and are associated with the crisis

of the seventh year (Kashirskii, 2006). These attitudes appear for the first time in personal communication with an adult at a child's early age (Vygotsky, 1984). The meaning of any religious or moral concept is initially determined by the adult's explanations of the concept to the child. Then, having discussed this meaning with the adult, the child forms his own sense of this concept, which can then be expressed to any other person as a moral attitude (Klochko, 2005).

So, we understand moral attitudes as a learned tendency to evaluate things in a certain way. Therefore, religiosity or any kind of spirituality (as well as non-religiosity) determines the formation of certain moral attitudes.

The moral attitudes and gender stratification in Orthodox families nowadays are more traditional than those of non-religious families (Mishhenko, 2016). Also, in a religious family, parental modeling is important for the development of personal attitudes (Francis & Casson, 2019). Commitment to tradition and conservatism are considered to be associated with some socially positive qualities, such being happier (Napier & Jost, 2008); being more helpful and generous (Brooks, 2006); working harder and having closer families (Schweizer, 2008); having greater personal agency and greater internal control, a positive outlook, transcendent moral beliefs, and generalized beliefs in fairness (Schlenker, 2012); and also with religiosity (Saroglou, Delpierre, & Dernelle, 2004). One of the key factors here is a sense of control, both personal (internal control, conscientiousness, hard work, perseverance, responsibility, and reliability) and over one's life (by giving it eternal meaning and believing in a God who will ultimately look after a person (Dutton, Madison, and Dunkel, 2018)). It makes sense that religiosity would be closely related to life satisfaction (Myers & Diener, 1995) and mental health.

Thus, given the religion-health nexus, the issue of the impact of religious education becomes significant. The relationship between religious education on one hand, and personal development and mental health on the other, in both formal and non-formal educational settings, may be analyzed from two points of view. The first is how religious education affects personal development, attitude formation, and mental health. The second is how the values of the religious and non-religious worldviews can mediate the educational process. In the case of the children from Orthodox families studying in the Orthodox schools, it means that family, school, and public organizations are all involved in consistent interaction with the child, and work together to develop a consistent system of the child's religious, moral, and gender attitudes (Boiazitova, 2011; Kediarova, 2013). So, as long as family influence is complemented by religious education (Razina, 2013), we would expect the personal attitudes of the boys from Orthodox families to differ from the attitudes of the boys from non-religious families.

Children from Orthodox families and non-religious families have different educational settings. The children from Orthodox families have different formal and non-formal religious educational opportunities available to them. Usually, they study in non-formal schools in their parish, which are organized by the clergy and the local laity. In the big cities, they also have an opportunity to study at Orthodox

schools. The choice of the religious orientation of the school at first falls on the parents. In selecting the schools for their children, parents pursue their educational and developmental goals for them. Later, older children with different characteristics may self-select into different school systems. Under these circumstances, the school preference means a choice of their educational and communicational environment.

Orthodox schools give their students formal religious education as well as a basic secular education. There is a difference between Orthodox and secular public schools not only in the subjects taught (for instance, the Fundamentals of the Orthodox Religion) and disciplines' content (when discussing the moral issues on literature or other subjects), but also in the personal influence of the teachers (who in the Orthodox schools are religious themselves, and some of them are even priests) on the development of students' attitudes. This can explain religious education's effects on the development of personal attitudes (for instance, attitudes toward education, people, work, family, life, and one's physical and mental health) (Kashirskii, 2006). Positive attitudes toward people, family, and life may be an essential basis for a person's capacity for non-conflictual communication (which reduces risks of communicational and emotional stress in conflicts).

Positive attitudes towards one's body, and physical and mental health may determine healthy behavior, while students' attitudes toward education and work may indicate social adaptation and may reflect back upon the educational process.

Thus, our study aimed to identify possible differences in the personal attitudes of the children from Orthodox families studying in Orthodox schools, and children from the non-religious families studying in the secular schools.

In this regard, we postulated the following research questions:

1. How do the moral attitudes of children from Orthodox families studying in Orthodox schools and the children from the non-religious families studying in secular schools differ?
2. Are there any differences in the moral attitudes of children from the Orthodox families and non-religious families studying in the secular schools?
3. Are there any differences in the moral attitudes of children from Orthodox families experiencing religious and secular education?
4. How could religious education be essential for a person's mental health?

Methods

Participants

Our study was conducted in 2021 in the Russian regions of Kemerovo, Krasnoyarsk, Novosibirsk, and Tomsk. Since it was only a part of a more extensive study of the influence of family role distribution on children's attitude formation, in the first stage we chose a sample of only boys. A total of 340 families participated in the survey, including 340 primary school boys: 120 boys from Orthodox families studying in an Orthodox primary school (the Orthodox gymnasium of Kemerovo city, the Ortho-

dox gymnasium of Novokuznetsk city, and the Orthodox gymnasium of Novosibirsk city); 120 boys from non-religious families studying in secular schools; and 100 boys from Orthodox families studying in secular schools. The boys from the Orthodox schools had a religious component to their educational program, including studying such subjects as the Fundamentals of the Orthodox religion, Church singing, Church Slavonic language, etc. Their program also included regular participation in Church services.

The average age of the children was 10.4 years old. All the participants were living in Russia, and all were from urban families from the cities of Kemerovo, Novosibirsk, Tomsk, and Krasnoyarsk. All participants came from two-parent families, where 100% of the fathers were employed, as were 68% of the mothers (89% of mothers in the non-religious families and 58% of mothers in the religious families). The average number of children per family was 2.6 (SD = .89). All the respondents were recruited and compensated through the local research community.

Procedure

A 15-minute, face-to-face interview with each child and at least one of the parents was conducted between January and April 2021. This gave us data on the nature of their responses and their demographic and family educational characteristics. All the participants obtained written permission from a parent, and had to answer several questionnaires.

At first, we compared the level characteristics of our sample with the statistical norms of children of that age. We concluded that our sample did not have considerable differences compared with the other children of the same age. Therefore, we could conduct further analysis of the results obtained from this sample of children.

Then we carried out the following pairwise comparisons: 1) boys from non-religious families experiencing secular education with boys from the Orthodox families experiencing religious education; 2) boys from non-religious families with boys from religious families, both experiencing secular education; and 3) boys from religious families experiencing secular education with ones from religious families experiencing religious education.

The F-Test for Equality of Two Variances at a significance level equal to 0.01 showed that the variances between all groups differed slightly. Also, all parameters were checked by the Kolmogorov Smirnov test and were found to conform to the normal distribution. We used the Student's t-test and one-way ANOVA to find the differences between the groups of participants.

Measures

Family characteristics and characteristics of religious or non-religious education were measured with a semi-structured interview specifically developed to study personal data such as age, gender, family, and educational characteristics.

Masculine Gender attitudes were measured using the questionnaire "Family Role distribution" (a = .63 for the composite) developed by Yu.E. Aleshina, L.Ya. Gozman,

and E.M. Dubovskaya (1987). The children answered questions like "Who should determine the interests and hobbies of the family?;" "Who should have the most influence on the family mood?;" "Who in the family should care more about the comfort and convenience in the apartment?;" "Who in the family should play with the children?;" "Who in the family should do everyday shopping?;" "Whose work should be more important for the well-being of the family?;" and so on. Participants rated the items on a 4-point scale: "Dad = 1;" "Mostly dad, but sometimes mom too = 2;" "Mostly mom, but sometimes dad too = 3;" and "Mom = 4."

The Father's Masculinity Appraisal was studied through self-report using the Five-Item Self-Esteem scale based on the methodology of the self-esteem study developed by Dembo-Rubinstein (Ianshin, 2004). Participants were asked to name five qualities of an ideal person (a man and a woman), and rate the manifestation of those qualities in themselves and their fathers and mothers on a 5-point scale: "corresponds = 5;" "somewhat corresponds = 4;" "corresponds a little = 3;" "doesn't correspond much = 2;" and "doesn't correspond at all = 1."

Attitudes toward ethical standards were measured via self-report using the method called the "Moral motivation measure" (a= .72), which was developed by the moral and ethical culture education laboratory at the Russian State Research Institute of Family and Education (Maliakova, 2005). The children were asked to imagine and choose their reaction in situations like "If one of your classmates cries, you a) will try to help him, b) will think about what might have happened, or c) will not care." They were also asked how they would react to other situations such as "Someone whom you don't know asks to play your game with you," "Someone in the company is upset about losing the game," and "Your classmate is offended by you."

Attitudes toward education, family, attitudes towards life, one's body and physical health, personal responsibility, one's mind, people, and work were measured using the questionnaire of personal development provided by P.V. Stepanov, D.V. Grigoriev, and I.V. Stepanov (2003), which contains 49 statements (a =.77) about attitudes toward different spheres of life.

Statistical analyses

Statistical analyses included calculation of the descriptive statistics, the Student's t-test, and analysis of effect sizes (Cohen's d).

Results

Comparison of the boys from non-religious families experiencing secular education with the boys from the Orthodox families experiencing religious education using the Student's t-test helped us measure the differences between these groups in gender attitudes; attitudes toward ethical standards; attitudes toward personal responsibility, and attitudes toward family, life, work, and people, as well as attitudes toward one's body and physical health, and toward one's mind and mental health protection (*Table 1*).

Table 1

Differences between boys from non-religious families experiencing secular education and boys from Orthodox families experiencing religious education

Attitudes	M(SD)**		p	Cohen's *d*	Cohen's U3
	Boys from non-religious families (secular education)	Boys from Orthodox families (religious education)			
Masculine gender attitudes *	1.86 (.22)	1.96 (.08)	.03	0.50	69.1
Father's masculinity appraisal	3.79 (1.08)	4.01 (3.11)	.001	0.12	54.8
Positive attitudes toward ethical standards*	1.99 (1.38)	2.95 (1.16)	.005	0.57	71.6
Positive attitudes toward personal responsibility *	3.44 (.92)	4.38 (.86)	.005	0.64	79.3
Positive attitudes toward family *	10.68 (9.17)	15.14 (6.56)	.03	0.81	79.1
Positive attitudes toward life*	3.88 (7.62)	12.33 (5.82)	.005	0.51	69.5
Positive attitudes toward work *	4.75 (5.67)	12.43 (4.45)	.005	0.47	68.1
Positive attitudes toward education	11.02 (4.03)	12.04 (4.76)	.05	0.15	56.0
Positive attitudes toward people *	14.79 (6.42)	19.24 (4.88)	.01	0.71	76.1
Positive attitudes toward one's body and physical health *	10.52 (8.22)	16.43 (7.39)	.01	0.92	82.1
Positive attitudes toward one's mind and mental health protection*	9.42 (8.94)	15.67 (6.72)	.01	0.96	83.1

*Note. * = significant differences; ** = standard deviations are in parentheses*

One-way ANOVA undertaken to refine the hypothesis confirmed the results. Comparison of the indicators of the children's gender attitudes showed that the children from religious families had more traditional gender attitudes. They evaluated themselves on gender qualities higher than the boys from non-religious families studying in secular schools.

There were also significant differences between the children from religious and non-religious families in positive attitudes toward different spheres of life (*Figure 1*). The children from religious families demonstrated higher results on these scales.

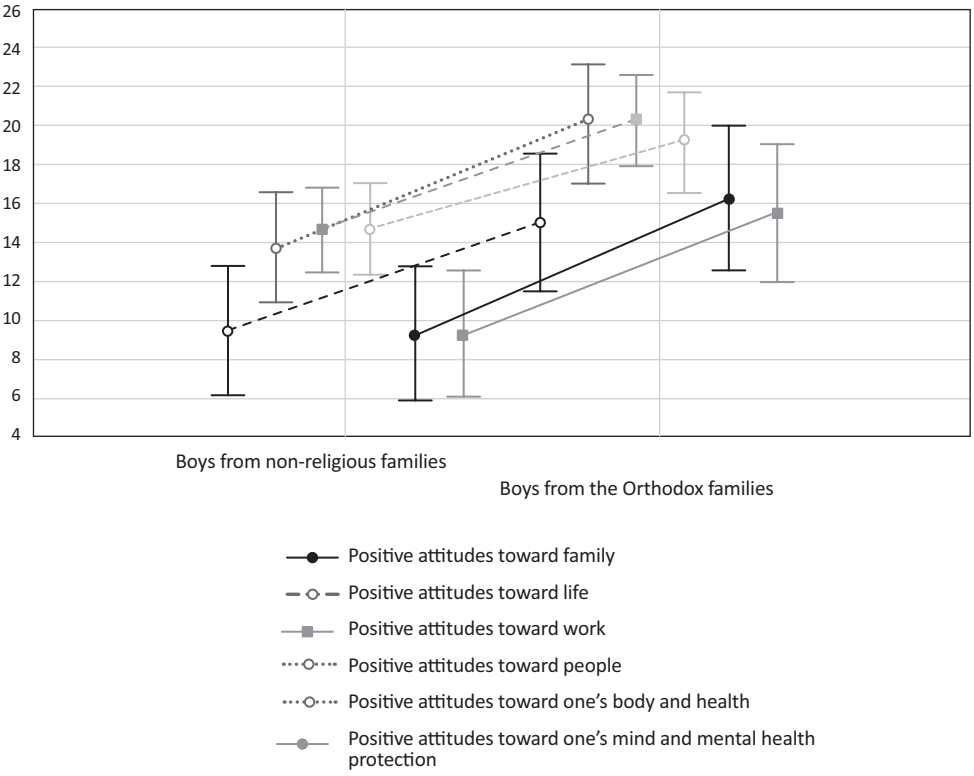

Figure 1. The results of one-way ANOVA for attitudes toward different spheres of life in boys from non-religious families experiencing secular education and boys from the Orthodox families experiencing religious education.

In comparing the results of the children from religious (100 boys) and non-religious (120 boys) families studying in secular schools, we also found significant differences in masculine gender attitudes, attitudes toward ethical standards, personal responsibility, family, life, work, and people, and attitudes toward one's body and physical health, and one's mind and mental health protection (*Table 2*). The children from religious families also demonstrated higher results on these scales.

So, we can conclude that these attitudes are more likely to be formed in the family than in educational institutions. Then we compared children from the Ortho-

Table 2

Differences for boys from non-religious families and boys from Orthodox families experiencing secular education

Attitudes	M(SD)** Boys from non-religious families (secular education)	Boys from Orthodox families (secular education)	p	Cohen's *d*	Cohen's U3
Masculine gender attitudes *	1.86 (.22)	1.91 (.09)	.01	0.45	67.4
Father's masculinity appraisal*	3.79 (1.08)	4.21 (1.02)	.02	0.44	67.0
Positive attitudes toward ethical standards*	1.99 (1.38)	2.94 (.96)	.005	0.55	70.9
Positive attitudes toward personal responsibility *	3.44 (.92)	4.36 (1.06)	.005	0.58	71.9
Positive attitudes toward family *	10.68 (9.17)	15.07 (3.36)	.03	0.80	78.8
Positive attitudes toward life*	3.88 (7.62)	11.23 (4.72)	.005	0.54	70.5
Positive attitudes toward work *	4.75 (5.67)	11.83 (5.75)	.001	0.48	68.4
Positive attitudes toward education	11.02 (4.03)	11.87 (4.99)	.05	0.14	55.6
Positive attitudes toward people *	14.79 (6.42)	19.11 (6.17)	.02	0.69	75.5
Positive attitudes toward one's body and physical health *	10.52 (8.22)	15.93 (5.89)	.02	0.91	81.9
Positive attitudes toward one's mind and mental health protection*	9.42 (8.94)	14.27 (7.88)	.01	0.93	82.4

*Note. * = significant differences; ** standard deviations are in parentheses*

dox families experiencing secular (100 boys) and religious (120 boys) education in school, and found significant differences only in their attitudes toward their bodies and physical health, and toward their minds and mental health protection; the positive parameters were higher among the boys studying in the Orthodox school (*Table 3*).

Table 3

Differences between boys from Orthodox families experiencing religious and secular education

Attitudes	M(SD)** Boys from Orthodox families (secular education)	Boys from Orthodox families (religious education)	p	Cohen's *d*	Cohen's U3
Masculine gender attitudes	1.91 (.09)	1.96 (.08)	.05	0.03	51.2
Father's masculinity appraisal	4.21 (1.02)	4.01 (3.11)	.05	0.09	53.6
Positive attitudes toward ethical standards	2.94 (.96)	2.95 (1.16)	.05	0.14	55.6
Positive attitudes toward personal responsibility	4.36 (1.06)	4.38 (.86)	.05	0.15	56.0
Positive attitudes toward family	15.07 (3.36)	15.14 (6.56)	.05	0.21	58.3
Positive attitudes toward life	11.23 (4.72)	12.33 (5.82)	.05	0.27	60.6
Positive attitudes toward work	11.83 (5.75)	12.43 (4.45)	.05	0.20	57.9
Positive attitudes toward education	11.87 (4.99)	12.04 (4.76)	.05	0.20	57.9
Positive attitudes toward people	19.11 (6.17)	19.24 (4.88)	.05	0.18	57.1
Positive attitudes toward one's body and physical health *	15.93 (5.89)	16.43 (7.39)	.05	0.65	74.2
Positive attitudes towards one's mind and mental health protection*	14.27 (7.88)	15.67 (6.72)	.02	0.69	75.5

*Note. * = significant differences; ** standard deviations are in parentheses*

Discussion

Thus, among boys from religious families, attitudes toward different spheres of life differed from those of boys from non-religious families, which indicated a significant role of the family environment in the formation of child's attitudes at primary school age. These results are comparable with the results of other studies in this field in Canada (Moore, Gomez-Garibello, Bosacki, & Talwar, 2016) and Britain (Francis & Casson, 2019; Francis, Fisher, Lankshear, & Eccles, 2018). Also, positive attitudes toward both physical and mental health, which are believed to be the essential parts

of mental health (Jaberi, Momennasab, Yektatalab, Ebadi, & Cheraghi, 2019), were more likely to be formed at the Orthodox school than at the secular school. But as long as these parameters were still higher among boys from religious families, this finding requires further study, including children from religious families and religious schools of other confessions. Also, there is a need for surveying the effects of the religious educational environment on non-religious children.

Anyway, the main finding of this study is that religiousness is related to mental and physical health among children in Russia. Since the majority of the studies of the religiosity-mental health nexus have involved adults (Dutton, Madison, & Dunkel, 2018; Koenig, et al., 2015; Koenig, King, & Carson, 2012; McCree, et al., 2003; Myers, 2014; Napier & Jost, 2008; Wang, Zaben, Koenig, & Ding, 2021), our findings extend the theory by including children in the analysis.

The practical consequences of this study may lie in the field of psychological work on mental health issues with both individuals and families. Besides this, modern education aims to build a psychologically comfortable and safe educational environment for children. So, the ideas of moral development and its association with mental health outcomes may be helpful for educational practices.

Further studies of religious families' influence on children's attitudes and mental health, and investigation of the ways to build a favorable environment for the formation of attitudes towards mental and physical health in children of other ages using new approaches (Francis, Lankshear, & Eccles, 2021), will help to complement these results and create a holistic psychological basis for the practical work of psychologists dealing with education, parenting, and family problems, as well as help teachers and parents.

Conclusion

Our study helped to determine the differences in attitudes towards different spheres of life (including mental and physical health) among children from religious and non-religious families. Children from Orthodox families had more positive attitudes towards mental and physical health than children from non-religious families, regardless of school choice. But for the children from religious families experiencing religious education, and non-religious families experiencing secular education, the differences were more tangible. So, we can conclude that positive attitudes towards both physical and mental health are more likely to be formed within religious families. But beyond that, children from religious families experiencing religious education scored higher in their attitudes toward mental and physical health than children from religious families experiencing secular education. We can interpret this as an indication that a religious educational environment strengthens positive attitudes toward both physical and mental health.

Limitations

Some limitations of the current study should be mentioned. First, most measures for this study relied on the boys' self-reports. In further studies, some parameters could be evaluated using reports by external observers, such as the parents.

Second, our study was focused on children from two-parent families living with their biological parents. The sample may have underrepresented boys from one-parent families. Children living in adopted families were also not represented. Third, our sample was represented only by boys. In our further study, we plan to explore gender differences, if any. Fourth, this study's use of a convenience sample limits the generalizability of the results.

Finally, the study's results were limited by the fact that we did not use genetic designs. We didn't analyze twin samples and didn't control for the participants' sibling positions or the coincidence of siblings' responses.

Despite these limitations, the current study furthers our understanding of the religion-mental health nexus. We need further study to answer some questions raised by our results. Some of them are: what the reasons of negative model of male behavior in children from non-religious families are; and what educational methods and types of psychological help could contribute to work with these children.

Ethics Statement

This study was approved by the Methodological Committee of the Institute of Education (Kemerovo State University). The study conforms to the recognized standards of the Helsinki Declaration.

Informed Consent from the Participants' Legal Guardians

Informed consent was obtained from all individual participants (or parents of participants under 14 years old) included in the study.

Author Contributions

J.B. conceived of the idea, developed the theory, and performed the computations. J.B. and E.E. verified the analytical methods. Both authors discussed the results and contributed to the final manuscript.

Conflict of Interest

The authors declare that they have no conflicts of interest.

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Understanding Kindness in the Russian Context

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Background. Kindness and acts of kindness have the potential to cause tremendously positive effects on subjective well-being, reflected in improvements in mental and physical health, and interpersonal relationships. Fostering knowledge about kindness may help in self-development and psychotherapeutic interventions aimed to improve an individual's emotional well-being. However, existing research data and understanding of this phenomenon in Russia, as well as descriptions of acts of kindness, are presently relatively limited.

Objective. To study the Russian understanding of kindness, its meaning in the Russian context; to categorize a variety of identified acts of kindness; and to define kindness based on the data derived from a Russian sample.

Design. There were 291 Russian participants, recruited using an online recruiting platform, who filled out an online questionnaire that identified definitions of kindness with corresponding examples. Also captured in the sample were the participant's age, gender, and religiosity. The data underwent qualitative analysis through open, axial, and focused coding.

Results. As a result of qualitative analysis, four theme categories emerged to define kindness: a) personal states and qualities (one's own states and self-perception, moral values and qualities, self-regulation and emotional stability); b) openness to others (attention to others, love and positive attitude); c) emotional and cognitive understanding of others and tolerance, actions and behavior (altruistic sacrifice, help, politeness and respect, forgiveness, generosity, pleasing actions). Concrete examples of kind acts and behavior were categorized. A definition of kindness was formulated based on the data.

Conclusion. The research results can be used in training, counselling, and therapeutic sessions to increase subjective well-being. Directions for further research have been defined.

Keywords:
Acts of kindness, kind behavior, kindness, network of kindness, prosocial behavior, well-being

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Introduction

Because kindness has the potential to cause such a positive effect on several important dimensions of life, the topic of kindness has been considered since ancient times. Kindness has been explored in different guises from Aristotle to Darwin (Price, 1989; Seppälä et al., 2017) and continues to be a concern to scholars. Recent studies have demonstrated that kindness improves interpersonal communication and subjective well-being (Algoe et al., 2008; Curry et al., 2018; Hui et al., 2020; Layous, et al., 2012; Shin et al., 2020); acts of kindness performed on a regular basis are documented to activate happiness-neurotransmitters or those parts of the brain associated with well-being (Harbaugh et al., 2007); overall life satisfaction and optimism increase, while anxiety and negative emotions fade (Kerr et al., 2015; Nelson et al., 2016). Moreover, the effect of kindness on longevity is widely established (Brown et al., 2009; Nelson-Coffey et al., 2017), as regular acts of kindness decrease stress (Raposa et al., 2016), pain (Emmons, 2007), and the speed of the aging processes (Hoge et al., 2013; Kok et al., 2013) for the person who performs them. Finally, there is the positive effect experienced by the recipients of kind actions (Alvis et al., 2020).

Many researchers in psychology and related disciplines are inclined to consider kindness as a separate phenomenon manifested in interpersonal communication and interaction, to be developed for the sake of the individual and societal well-being, as kindness and the desire to be kind to others become contagious within a community (Chancellor et al., 2018).

Scientists have defined kindness as a quality reflected within the definitions of altruism, compassion, courtesy, empathy, friendliness, generosity, love, mercy, prosociality, responsiveness, tolerance, intentions to do good towards others, to help in difficult situations, and to care for others (Brazhnikova & Zyuzya, 2011; Mordovina, 2014; Peterson and Seligman, 2004; Seppälä et al., 2017; Yagil, 2015). Kindness is perceived to have moral, emotional, motivational, and behavioral components (Kerr et al., 2015; Mordovina, 2014).

Knafo & Israel (2012) talk about a "network of kindness", which includes interrelated phenomena: altruism, compassion, empathy, generosity, prosocial/helping behavior, and sympathy. Where altruism, despite significant variations in definitions, is often described as actions intended to benefit others, sacrificing one's own interests, or performed secretly for unselfish reasons (Binfet & Passmore, 2017; Kerr et al., 2004; Yigit & Acar, 2020), compassion is an ability to sense others' suffering and a desire to relieve this suffering (Gilbert at al., 2019); empathy is an ability to feel and understand others' states and emotions in particular situations (Ermolova, 2016); generosity is an ability to share material and moral resources with others (Park et al., 2017); prosocial/helping behavior represents the entire spectrum of actions intended to benefit others (Torstveit et al., 2016); sympathy is an ability to relate to another's emotions, needs, and suffering, an attempt to imagine how others feel in particular situations based on one's own experience (Baldner et al., 2020; Nichols, 2001).

In light of the mixed definitions and limited research on kindness in the Russian context, our first research question is: What do Russians perceive kindness to mean? And by extension: Is it possible to establish a definition of kindness based on Russian respondents' opinions?

In some sources, kindness is considered a virtue (Malti, 2020), a moral quality (Brazhnikova & Zyuzya, 2011), a character trait (Lefevor & Fowers, 2016), or a temperamental trait (Knafo & Israel, 2012). Hence, our second research question is: What is kindness in terms of a range of personality characteristics?

Kindness is discussed within certain branches of psychology and psychological theories, such as the following:

Personality psychology, where kindness is considered an aspect of agreeableness (Thielmann & Hilbig, 2015). However, irrespective of the level of agreeableness, it was found that people benefit from loving-kindness meditation and doing kind things to others (Mongrain et al., 2018).

Social psychology is generally concerned about compassion and helping behavior in diverse settings (Seppälä et al., 2017).

Positive psychology defines kindness as one of the components of character strength, "love and humanity" (Seligman, 2002), which includes the capacity for loyalty, compassion, to care about others, and to simply do good things for others on one's own initiative (Peterson & Seligman, 2004). In particular, it is this branch of psychology that is concerned with random acts of kindness and the impact on subjective well-being (Passmore & Oades, 2015) and provides detailed recommendations for development and application of kindness in diverse settings: daily life, school, workplace (Stroekel, 2019). However, this definition of kindness is formulated predominantly through actions and behaviors: to assist, to serve, to do good, to help, to be generous, to care, to manifest compassion, altruistic love and "niceness" — where all of the above are considered as synonyms (Peterson & Seligman, 2004), which limits the definition, as it ignores internal and hidden predispositions and processes that underlie kind behavior.

Social exchange theory states that from the benefactor's point of view, kind acts will lead to immediate or delayed positive consequences perceived as direct or vicarious reinforcement (Dufwenberg & Kirchsteiger, 2018; Honeycutt, 1981, Trivers, 1971), which can be defined under the general term, "reciprocity" (Isoni & Sugden, 2019) or "rewarding reciprocity", which itself may have several forms (Melamed et al., 2020), including: a) direct reciprocity — a desire to pay off one's kindness; b) reputational giving — acting kindly while being observed by people who may reinforce such behavior in various ways; c) generalized reciprocity — a kind action in response to a third party's kindness; d) rewarding reputation — a kind act directed towards someone in recognition of their doing good to someone else. It was found that the "pay-it-forward" style of kindness has a positive impact on the well-being of both the doer and receiver (Pressman et al., 2015).

From the point of view of Poonamallee and Goltz (2014), kind actions are based on mental models that are relatively stable internal representations comprised of cognitive and emotional components based on values and attitudes. Mental models describe a person's interaction with the world according to each unique model. All mental models involved in prosocial behavior may be divided into three categories:

1. egocentric, when kind behavior has beneficial consequences for the actor and prompt reinforcement is expected;
2. tribal-centric, when kind actions are directed toward or beneficial for a close circle of individuals or reference groups (family, friends, colleagues) and reinforcement is expected soon or in the near future;

3. transcendental, when actions are directed towards strangers or society in general, e.g., in cases of emergency (Douty, 1972). Possible benefits are expected in the remote future, if they are expected at all.

Social exchange theory often considers Kohlberg's stages of moral development (Comunian, 1998), where the emphasis is placed on prosocial development with age.

In spite of evolutionary considerations of prosociality highlighted by the theory, internal predispositions and motivation for kind acts are viewed as rather self-serving, and kindness is considered only as helping behavior or generosity.

Theory of reasoned actions (Caldwell, 2017; Fishbein & Ajzen, 2010) defines kindness mostly through kind actions that integrate cognition, attitudes, and intentions resulting from beneficence, a character trait or virtue which is described though altruism, compassion, generosity, mercy, humanity, and love. This theory, in the context of kindness and its inherent nature, describes kindness from the standpoint of several core beliefs, attitudes, intentions, and behaviors.

- *Beliefs* refer to: behavior (what is expected from oneself and others, understanding of others' needs), normative (moral beliefs and judgments regarding acceptable behavior), control (beliefs about own capability to behave in a right way).
- *Attitudes* refer to: behavioral values (self-image and identity; perception of one's own compassion and empathy), perceived norms (behavior that would be ethical and appropriate), perceived control (the degree of confidence that one's actions that will make a difference)
- *Intentions* refer to: benevolence that will allow beliefs and attitudes to be manifested in kind actions; willingness to act upon an assessment of needed efforts and expected results.
- *Behavior* is simply the way a given kind act is actually carried out.

This theory, while useful in describing several internal predispositions and sources of kind actions, does not provide a clear definition of kindness, or illustrations and categorization of kind behavior.

Activity theory. The main components of this theory are activity, consciousness, and personality. Activity is a goal-oriented behavior which has several levels of consideration: special activity, actions, operations, and psychophysiological functions (Leontiev, 1981). Activity is comprised of actions that can be executed in various ways—operations that depend on conditions and contexts. For example, the conditions and context of a given situation will determine what type of kindness will be extended. Goals and motives are at the basis of every activity (Leontiev, 1981). Derived from pedagogical kindness research, this theory provides an understanding of kindness (Leybina et al., 2020). The following themes in the definition of kindness have been identified by research conducted with Russian teachers:

- personal states and qualities: one's own states, values, and moral characteristics, self-regulation and emotional stability;
- openness to others: attention to others, love, and a positive attitude;

- tolerance and cognitive and emotional understanding of others;
- external actions and behavior: help, courtesy and respect, kind and pleasant actions;
- internal actions and behaviors: forgiveness, altruistic internal actions.

Activity theory can be applied here: kindness is not simply a reaction to the environment (e.g., to others' problems), but a well-intended process generated also from within the individual.

It is possible to see some similarities here with the theory of reasoned actions. Activity theory provides meaningful background to study goals and motives in terms of what constitutes kind behavior, and to research the mechanics of corresponding kind actions; these issues currently require further investigation.

Obviously, these theories serve diverse yet important purposes in kindness research. In particular, social exchange theory may be used to study the rationale behind kind behavior and to assess the benefits for those who act kindly. The theory of reasoned actions will allow a study of internal predispositions (beliefs, attitudes) and transformations of kind intentions into kind actions. Activity theory may allow for an assessment of complex reasons, goals, and motives for kind actions, as well as analysis of the operations driving kind actions of a particular type. Additionally, activity theory contributes to investigation of kind acts: decision making, execution, control, and correction. Also, the theory deals with both internal and external actions. All of the above speak in favor of an integrative approach that combines several of these theories to study kindness phenomena in the context of the two central questions addressed herein.

It can be surmised at this stage that all the approaches and theories outlined above indicate that the external manifestations of kindness are indicators of personal qualities. The degree of kindness needs to be evaluated by the intended recipient (Binfet et al., 2016), as a seemingly kind act may be considered unkind, in some cases, by the person it is intended for. It is the way the intentions behind such acts are perceived that is the salient point; for example, if the intentions are hypothesized to be kind, the act itself will be considered kind, regardless of the results (Falk & Fischbacher, 2006).

The range of kind actions is extremely diverse and depends significantly on the situational and cultural context (Layous 2013; Shin et al., 2020). Kind actions lead to an increase in well-being (Curry et al., 2018; Stroekel, 2019). Kind behavior is widely promoted across countries and societies; however the behaviors selected for promotion are of particular relevance. Due to increases in well-being and mental health, a diverse range of kind behaviors has been suggested by scientists, practitioners, and foundations (e.g., Mental Health Foundation, 2020). Individuals choose and practice acts that would be appropriate for their given situation.

It has been demonstrated that memories of kind actions may be as beneficial as the kind acts themselves, both for the person who performs them and for the recipient (Exline et al., 2012; Ko et al., 2019). Hence, a precise classification of kind acts would allow questionnaires for therapeutic intervention that may lead to positive mental health and transformation effects.

However, despite several attempts, precise categorization of kind acts has still not been achieved. Canter et al. (2017b) provided classification for different modes of kindness:

- psychologically passive kindness, which does not require any active behavior (e.g., to let a person who is in a hurry cut into a queue);
- principled proaction, which assumes active help (e.g., volunteering, donations);
- affective-psychologically passive kindness, which is grounded in social norms (e.g., to help when asked; to help some one pick up dropped belongings), which also includes an emotional component (e.g., to allow a person to talk about their problems, to listen);
- affective-proactive kindness (e.g., to secretly search for a gift that can make another person happy; to cancel a trip to stay with a friend or relative who is in need).

Research on this classification is still in progress. Moreover, the data was gathered predominantly from British or English-speaking samples. Although this concept has been found somewhat relevant for Russian teachers (Leybina et al., 2020), the data for Russians may differ to a meaningful degree.

Another aspect of significance is the range of kind behavior, which narrows down a limited number of activities. This focused set of activities can be used in well-being development programs based on kindness. Hence, the third research question is as follows: Is it possible to provide a clear classification of kind actions based on a Russian sample?

Considering the three research questions, the aim of the current research was to study how Russians understand kindness, to categorize acts of kindness, and to define kindness based on data from a Russian sample.

Methods

Participants

There were 291 Russian participants, who currently reside in Russia. Several studies provide evidence that kindness and kindness perception are influenced by socio-demographic characteristics: age and gender (Canter et al., 2017a; Hui et al., 2020), and religiosity (Arslantürk & Harupt, 2020; Bekkers et al., 2020); hence these were used to describe the current sample. The sample comprised 152 (52.23%) females and 139 (47.76%) males. *Table 1* contains the information on socio-demographic characteristics of the participants depending on gender.

Table 1

Socio-demographic characteristics based on gender

Variable	Male	Female
Age	$M = 38.52$ ($SD = 9.11$)	$M = 37.63$ ($SD = 10.47$)
Religiosity		
Yes	59 (20.27%)	55 (18.90%)
No	80 (27.49%)	97 (33.33%)

Measures

The web-based questionnaire was placed on participants' recruiting platforms. The participants were asked to specify their age, gender, and religiosity, to define kindness from their point of view, and to provide examples of kind acts.

Procedure

Data analysis was performed using Intellectus Statistics (2020) for quantitative analysis; qualitative analysis was executed via QDA Miner Lite v 2.0.8. (Provalis Research, 2020) in the form of standard content analysis.

An open coding procedure was used to analyze participant responses based on definitions and examples of kindness (Charmaz, 2014), which resulted in theme classification (Ryan & Bernard, 2003); codes were assigned to these themes for categorization. Subsequently, axial coding was executed (Charmaz, 2014) to group the generated themes into their respective categories. In cases where a response contained more than one theme, these themes were assigned different codes and considered separately. Similar theme categories were grouped into larger categories. Focused coding was used to divide a set of exemplary kind actions in accordance with previously identified themes of kind actions and behaviors (Charmaz, 2014). All the data were collected and processed in the Russian language. English translations of participants' responses are provided in the present article.

Results

What is kindness from a Russian point of view?

When asked to define kindness 96.91% of respondents provided specific "codable" answers (n = 621). From these answers, 14 themes emerged, which are possible to group into four categories (Table 2).

Table 2

Coding manual for kindness definition themes

Theme	Answers (%)	Example descriptions
Personal states and qualities	12.88	General internal predispositions related to attitudes towards oneself and the world, values and moral characteristics, and ability for self-regulation
1. One's own inner states	6.12	"To be honest with oneself", "to see the world from bigger perspective", "to concentrate on good things", "positive thinking", "internal light", "self-respect", "love yourself", "happiness", "positivity", "to live in harmony with the world", "internal harmony", "internal warmth", "internal strength"
2. Values and moral characteristics	5.31	"Justice", "sincerity", "honesty", "responsiveness", "peacefulness", "golden rule: to do to others what you want for yourself", "reliability", "conscientiousness", "trust", "mercy"

Theme	Answers (%)	Example descriptions
3. Self-regulation/ emotional stability	1.45	"Emotional adequacy", "to be calm and to demonstrate positive emotions", "ability for emotional self-regulation", "calmness", "mental fortitude", "equilibrium", "patience"
Openness to others	19.32	Attention to others and general positive attitudes towards others
4. Attention to others	9.50	"Responsiveness", "open heartedness", "disposition to people", "attention to people", "hospitality", "involvement", "to think about others", "sensitivity"
5. Love and a good attitude	9.82	"To love people", "to see good in people", "liking", "humanity", "careful attitude towards others", "positive attitudes for people in general", "good opinion about everyone"
Understanding others	21.09	"To place oneself in others' shoes"
6. Understanding others with the mind	4.83	"To understand people", "try to understand others"
7. Understanding the emotions of others	10.95	"To understand others' feelings and emotions", "empathy", "compassion", "sympathy", "mercy"
8. Tolerance	5.31	"To accept others' peculiarities", "to accept others' opinions, different from yours", "to accept people the way they are with all their flaws", "not to judge others", "loyalty", "tolerance", "leniency", "acceptance of others' weaknesses"
Actions and behaviors	46.71	Observed or hidden actions and behaviors intended to cause positive influence on others and others' lives
9. Help	23.18	"To assist in difficult situations", "support", "care", "mutual help", "to listen when needed"
10. Politeness/ respect	4.34	"Respect", "smile", "niceness", "gratitude", 'tenderness", "to say something good about somebody"
11. Pleasing action	5.15	"Participation in others' happiness", "to make others happy", "to do useful things", "nice gestures", "positive actions towards others", "to make others feel comfortable", "to create friendly atmosphere"
12. Generosity	1.93	"To share happiness and positivity", "to share resources", "material support", "charity"
13. Forgiveness	1.93	"To forgive an enemy", "not to hold grudges", "to forgive mistakes"
14. Altruistic self-sacrifice	10.18	"Concessions", "self-sacrifice", "dedication", "unselfishness", "not to expect anything in return", "to sacrifice a resource for the sake of others", "to give to others more than to yourself", "to do good despite inner obstacles"

Note: respondents' words were used (translated from Russian)

It is clear that most of the definitions are related to actions and behaviors (46.71%), which falls in line with the positions of the above-mentioned theories and approaches, and includes all the components of the "network of kindness" (empathy, compassion, sympathy), as well as understanding others (21.09%). However, 32.2% of the definitions refer to inner aspects or external manifestations of internal states. Hence, it is reasonable to say that a narrow concentration only on kind behavior, or the "network of kindness", may limit a fuller insight into the study of kindness phenomena.

Examples of kind actions

When asked to provide examples of kind acts, 97.60% of respondents gave specific "codable" answers (n = 558). These were categorized in accordance with the themes identified above (Table 3). In accordance with previously discussed theories, it is hypothesized that the defined states and qualities, such as openness to others and an ability to understand others, will be manifest through internal or external actions. All participants who provided examples referred to the set of kind acts and behaviors identified earlier (themes 9–14) and not to themes 1–8, which suggests that the later themes refer to internal predispositions toward kind behavior.

Table 3

Examples of kind acts

Theme	Answers (%)	Examples
9. Help	54.65	"To listen to a person if he/she feels bad", "to help", "to assist the elderly in crossing the street", "to do some work in the garden for parents", "to relieve suffering", "to join someone in their work so the person finishes it faster", "to look after an ill person", "to help carry heavy groceries", "volunteering", "to help in spatial orientation and navigation", "to help in something you are good at", "to save an animal", "rescue"
10. Politeness/ respect	4.66	"To hold the door for a stranger", "to give up your seat in a public transport", "to calm down a rude person", "to try to understand and acknowledge the position of another person", "to stay polite despite rudeness", "to show respect and a good attitude", "to withhold your opinion", "to restrain one's own words and emotions"
11. Pleasing actions	8.60	"To ask about another's state", "to call and talk about how things are going", "to surprise someone with a present", "to give sweets just to make another person happy", "to compliment a stranger to make them smile", "to cheer someone up", "to find a client for somebody's business", "to invite a retired person to talk with young people to make him/her feel needed", "to recommend a good job vacancy to a friend", "to draw a picture or to create another piece of art to make others happy"
12. Generosity	20.07	"To give something away", "to buy things needed for others", "to feed a homeless person", "to share surplus harvest from your garden", "to share internal warmth", "to donate money", "to provide financial help", "to spend time with someone", "to give away old things", "to bake a cake and to share it with a neighbor", "to be a donor"

Theme	Answers (%)	Examples
13. Forgiveness	3.94	"One person let another person down, and the later did not get offended but asked if he/she can be of any help", "to forgive and let go", "not to respond to aggression with aggression", "to forgive a person who abused ones'trust"
14. Altruistic self-sacrifice	8.08	"To listen to another person when not interested", "to give your ice cream to a child if he/she dropped theirs", "to assist a stranger even if it means being late to an important meeting", "to secretly help"

Note: respondents' words were used (translated from Russian)

Based on the sample results, it is possible to define several tendencies:

1. Help (54.65%) and generosity (20.07%) received the most examples, consistent with social exchange theory. Other themes also received corresponding examples from the sample, which indicates the need for more precise categorization of kind acts. There were no examples that could not be categorized.
2. Among behaviors that were categorized as "help", a special group of examples identified as "rescue" gathered 9% of the examples, mostly referring to animals.
3. Some actions may be both internal and external. For example, it is possible to forgive internally, or to openly demonstrate forgiveness.
4. Some categories of kind actions are interrelated, so it is impossible to identify them as a single type (e.g., "material assistance" may be considered as help, and as generosity).
5. Withholding negativity is also considered as an act of kindness: "to keep one's opinion for oneself", "to restrain one's own words and emotions", "not to respond to aggression with aggression".
6. The examples provided by Russian respondents reflect kindness behaviors identified by Canter et al. (2017b) including: psychologically passive kindness — "to demonstrate respect", principled proaction — "volunteering", "donation", affective-psychologically passive kindness — "to assist in spatial orientation", "to listen to others when needed", and affective-proactive kindness — "to help while keeping it a secret". There were, however, actions that are impossible to categorize based on the perspectives of Canter and colleagues, especially those that refer to pleasing actions, politeness, respect, and forgiveness.
7. There were no specific examples relating to sympathy, empathy, or compassion, which may suggest that these characteristics should be regarded as internal predispositions of kind acts, even though they can be expressed and observed.

Discussion

This discussion aims to answer the four research questions formulated in the Introduction.

How kindness is understood by Russians

Based on the qualitative analysis of the respondents and their answers, the following themes and theme categories have been identified:

Theme category 1. Personal states and qualities: one's own inner state, values and moral characteristics, self-regulation and emotional stability. This theme category refers to the set of inner qualities mentioned by respondents as kindness. It is assumed that these characteristics can be considered as separate psychological phenomena, e.g., values or self-regulation, and their exact connection with kindness is yet to be explored.

Theme category 2. Openness to others: attention to others, love and a good attitude. This theme category refers to orientation towards others, and, again, can be considered as a set of well-known psychological phenomena.

Theme category 3. Understanding others: understanding with the mind, understanding the emotions of others, tolerance. This theme category essentially refers to characteristics usually attributed to empathy and sympathy as essential components of kindness.

Theme category 4. Actions and behaviors: help, courtesy and respect, pleasing actions, generosity, forgiveness, altruistic self-sacrifice. All of the sub-categories have been considered by various of the abovementioned authors as kind.

Evidence from the sample indicates that from the Russian point of view, kindness can not only be described in terms of activity and behavior, but also includes internal attitudes and predispositions. It is also evident that the Russian perspective is not limited to the phenomena included in the "network of kindness", because it is not restricted to definitions of altruism, compassion, empathy, generosity, prosociality, and sympathy, but rather also includes other characteristics. Responses from this Russian population in general is not significantly different from that of Russian educators (Leybina et al., 2020), which is reasonable, since Russian teachers also represent the Russian population. There are, however, several differences. Generosity was not mentioned by the Russian teachers, but was highlighted by 1.93% of the participants in the current research, which goes in line with other studies. Altruistic sacrifice has been defined as a more precise category (vs. altruistic behavior for educators), where the accent has been made on self-sacrificing behaviors to benefit others. Also, for the Russian population in general, unlike for educators, it was not possible to provide a clear differentiation for internal and external kind actions, as respondents' definitions of kindness referred to actions and behaviors that can equally be hidden and observed. The reasons for such differences are yet to be explored.

Kindness as a personality characteristic

Based on participant responses, kindness is understood as a set of internal predispositions, characteristics, and abilities that are reflected in actions and behaviors

considered as kind. Values and moral characteristics are considered as the ingredients of kindness, but do not provide a full explanation of this phenomenon; rather they describe internal sources of kind behavior. Despite convincing arguments provided by Knafo and Israel (2012) regarding kindness being a temperamental trait, their conclusion is based on narrow research relating to the separate elements that comprise a "network of kindness". Temperamental traits may contribute to the ability to self-regulate and be open to others (Strelau, 2020; Trofimova et al., 2018), but given the current findings, kindness cannot simply be called a temperamental trait. However, considering the evident connection between character and temperament (Asmolov, 2001), as well as definitions of character (Borozdina, 2015; Gippenreiter, 2020) as one of the personality's substructures, which comprises definitions of the "stable individual" (i.e., traits and predispositions), what emerges through the analysis of individuals in the context of social interactions is a definition of kindness as a set of character traits which are closely aligned with the definitions of agreeableness outlined by scholars of personality psychology (Mongrain et al., 2018).

Therefore, kindness in the Russian context can be defined as a character trait generated by personal states and qualities, openness to and ability to understand others, which is manifested in external and internal positive actions and behaviors towards others.

Classification of kind actions

Six categories of kind behavior have been revealed: help (including rescue), polite/respectful actions, pleasing actions, generous actions, acts of forgiveness, and altruistic sacrifice. Some actions, however, cannot be unequivocally categorized and may overlap with more than one category of kind acts and behaviors. Canter and colleagues' classification can be considered, and yet, some examples provided by the respondents do not fit into this classification. It is clear that more detailed categorization for prosocial/helping behavior is required; for example there are several forms of volunteering (Kelemen et al., 2017).

Conclusion

The results of current research can already be used for various purposes: to create and log "a personal acts diary" (Kerr et al., 2015); to enhance kindness for well-being purposes by accessing memories of kind acts conducted or experienced in the past (Exline et al., 2012); to develop the ability and inclination to compliment others (Boothby & Bohns, 2020); to develop detailed questionnaires designed to assess kindness levels for purposes of providing directions for personal development; and to construct thematic training programs in order to achieve positive psychological transformation. For future research, it is recommended to analyze goals and motives that elicit kind behavior; to define the mechanics of kind behavior (actions and operations); and to study the ingredients that lead to kind behaviors: decision making, execution, control, and correction. It may also be possible to consider kindness as a resource quality. Quantitative measures to explore the current construct can also be suggested.

Limitations

First, given the limitations of sampling method, we are unable to assess the response rate and drop-out rate. Therefore, a significant limitation of our work lies in the possibility that the results reflect self-selection along dimensions relevant to kindness—put simply, more altruistic individuals may have been more likely to participate, distorting perception of kindness and biasing our results in the direction of greater prosociality than is actually prevalent in the general Russian population.

Second, given that participants knew that the survey was about kindness, their responses might have been affected by social desirability bias (Paulhus, 1984).

Third, because this was a cross-sectional design, recent experiences, transient affective states, and other variable factors may have influenced participants' responses.

Despite the above limitations, our study benefited from a sample that was substantial in both size and diversity along the measured demographic variables, allowing us to present a preliminary portrait of kindness as it is perceived by Russians. We hope that our findings will be of use as scholars continue to probe the endogenous and exogenous determinants of kindness, that most vital of human characteristics.

Ethics Statement

The study was conducted in line with Research Ethics Board of Faculty of psychology of Lomonosov Moscow State University and did not require separate ethical approval, as the research was not associated with any risks. Adult participants gave their informed consent to voluntarily take part in the study by filling out an online questionnaire. They were informed about the research nature, purposes, and the anonymous form of participation.

Author Contributions

Anna Leybina conceived the idea, developed the theoretical background, and performed the analysis. Mergalyas Kashapov supervised the analysis and discussion of the findings. Both the authors discussed the results and contributed to the final manuscript.

Conflict of Interest

The authors declare no conflict of interest.

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Fake News through the Eyes of Three Generations of Russians: Differences and Similarities in Social Representations[1]

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Background. The problem of fake news becomes especially prominent during periods of social exacerbation, such as the coronavirus pandemic, wherein the events have a significant impact on many lives. Generational differences are considered as a factor affecting perceptions of the reliability of news.

Objective. The aim of this study was to reveal and compare the social representations of information reliability and news verification criteria among people belonging to the Generation of Reforms (born 1968-1981), the Millennial Generation (1982-2000) and Generation Z (2001 and later) in Russia.

Design. The study involved 431 participants and was comprised of two stages: focus groups and a survey. The data analysis methods employed were thematic analysis, qualitative and quantitative content analysis, coefficient of positive answers (according to J. Abric), Kruskal-Wallis H test, Pearson's chi-square test, Spearman's rank correlation coefficient, and Kendall's t-rank correlation coefficient.

Results. We have found significant differences between the Generation of Reforms (CPA: 80,5; p = 0,000) and Generation Z (CPA: 90,2; p = 0,000), and similarities between the Millennial Generation (CPA: 90,3; p = 0,000) and Generation Z, in the structure and content of social representations regarding "fakes". Notably, Generation Z favors a fact-checking strategy to identify news reliability, while "Reformists" rely on offline contacts.

Conclusion. Generations in Russia differ with respect to their tolerance of "fakes" and their strategies for news verification. The results advance our understanding of "fakes" as purely social constructs. The attribution of media incompetence to older and younger cohorts by each other was discussed as the generational conflict.

Keywords: generation, social representations, fake news, media trust, Generation Z, Millennials

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Introduction

Our time is often referred to as the "post-truth era". Modern-day people rely on emotional factors as opposed to facts, and turn to the mass media for verification of opinions. Thus, the *reliability* of information becomes uncertain (Tulupov, 2020; McIntyre, 2018; d'Ancona, 2017). There is a paradox that describes information consumption today: blind trust leads to deception, while distrust paralyses one's ability to choose between many sources that appear unreliable. In such circumstances, a person's capacity to think critically and discern so-called *"fakes"* decreases.

Fake news is rarely identified due to the following:

1. A disinclination to abandon beliefs and attitudes that are encouraged by fake news.
2. Personal rigidity and coping strategies that exist to maintain an accustomed order and image of the world.
3. A lack of competence or knowledge of the need for fact-checking (i.e. verification of information for accuracy) (Barthel et al., 2016)
4. The effects of "information warfare", which is made up of fake news and mutual accusations of the production of "fakes".

Thereby, "fakes" have become a classic example of a social construct (Raskin, 2006). A "fake" could be identified by the expert community, but this is almost unattainable in everyday discourse, due to the perceptual replacement of facts with *media facts* (media content that a person considers to be fact) (Beloyedova, Kazak 2017; Morozova, 2017; Prom, 2020). Identification of fake news is a complex activity requiring certain competencies and skills. At the same time, it is necessary to understand that in several cases where in-depth expert analysis was employed, a perfect method to distinguish between "fakes" and "non-fakes" was not found. Therefore, even critical-minded specialists are forced to stop at some iteration of fact-checking.

In this study, we define fake news as completely or partially false information, *deliberately* presented as veracious news to mislead the audience (Kalsnes, 2018). Fake news can spread rapidly, as authors use techniques to manipulate people's emotions, capture attention and arouse interest, trust and desire to share the information (Yershov, 2018; Zelinskiy, 2018). In particular, the COVID-19 pandemic has generated nationally specific "fakes" that depend on the cultural environment and level of technological development (Sadykov, Akhmetianova, 2020).

The crucial difference between modern "fake news" and old "newspaper ducks" lies in its circulation: information can now be disseminated through reposts easily, quickly, and extremely widely. The issue of the appearance of fake news is aggravated by the reaction to it, leading to decreased *trust* in mass media (Nazarov et al., 2019) and likely contributing to the culture of low trust in public institutions in Russia. Trust in mass media is based on the recent understanding of mass media as a social media, which implies a reciprocal process of transferring information, communication, and feedback (Dukin, 2016; Nenasheva, 2018; Thornley, 2008). According to the latest trends, people consider the internet to be a reliable a source of information, while they perceive television as a form of entertainment and attribute negative

features to it i.e., mental disruption and mass consciousness manipulation. Similar results can be found in sociological surveys (Zhizhina, 2018; Efanov, 2018).

In *Figure 1*, we present the key concepts in our study (truth, trust, trust in the media, trust in information, reliability of information) and the relations between them. Trust in the media is associated with personal and situational factors, values, emotional and motivational domain, and peculiarities of thinking and behavior (Shanin, 2018). Special attention is paid to the four information types presented in the media: 1) business, practically useful, 2) business, practically useless, 3) entertaining, practically useful, 4) entertaining, practically useless (Kupreychenko, Shlyakhovaya, 2012). In this report , we focus on generational differences as a factor affecting social representations of the reliability of information. We consider generations in the sociopsychological paradigm as contemporaries i.e., people who may be of different ages, but experience the same events and historical periods at the same time (Kon, 1978; Sadykova, 2015; Mannheim, 1970; Isaeva, 2011b).

Recent intergenerational studies conducted abroad on this subject have shown interesting results. An experimental study implying the publication of fake news concerning Brexit on Facebook found that most people who took headlines at face value without clicking, belonged to older generations (Loos, Nijenhuis, 2020). On the other hand, D.Trninic and colleagues from Bosnia and Herzegovina have shown that younger generations also lack competence when it comes to fake media fact-checking. They have also shown that promoting education in the social media sphere might bring about a long-term solution for the battle against "fake news" (Trninic et al., 2022). The problem seems to also be relevant to children of elementary school age (Pilgrim, Vasinda, 2021).

In our research, we classify the generations to be investigated based on the works of Y. Levada (2011) modified by V.V. Radaev (2020): the Generation of Reforms (born 1968-1981), the Millennial Generation (1982-2000) and Generation Z (2001 and later). Consistent with previous research, we use this particular classification due to its adaptation to the Russian social context and ongoing events, as well as its significant empirical validity (Radaev, 2020). The study involves representatives of these three cohorts that frequently consume media information. Generation Z has previously been found to possess greater information surfing abilities (Soldatova, Chigarkova, Rasskazova, 2020), hence our assumption that this generation might be more tolerant towards fake news and more competent in identifying "fakes".

The *object* of this study is the evaluation of information reliability in the media and on social media. The *subject* is social representations of information reliability in the mass media and on social media among people belonging to different generations. The *goal* is to reveal the structure and content of social representations regarding the reliability of information in the mass media and on social media among people belonging to the Generation of Reforms, the Millennial Generation and Generation Z. We *hypothesize* that there are differences between the Generation of Reforms, the Millennial Generation and Generation Z in the structure and content of social representations of the criteria for evaluating the reliability of news in the mass media and on social media.

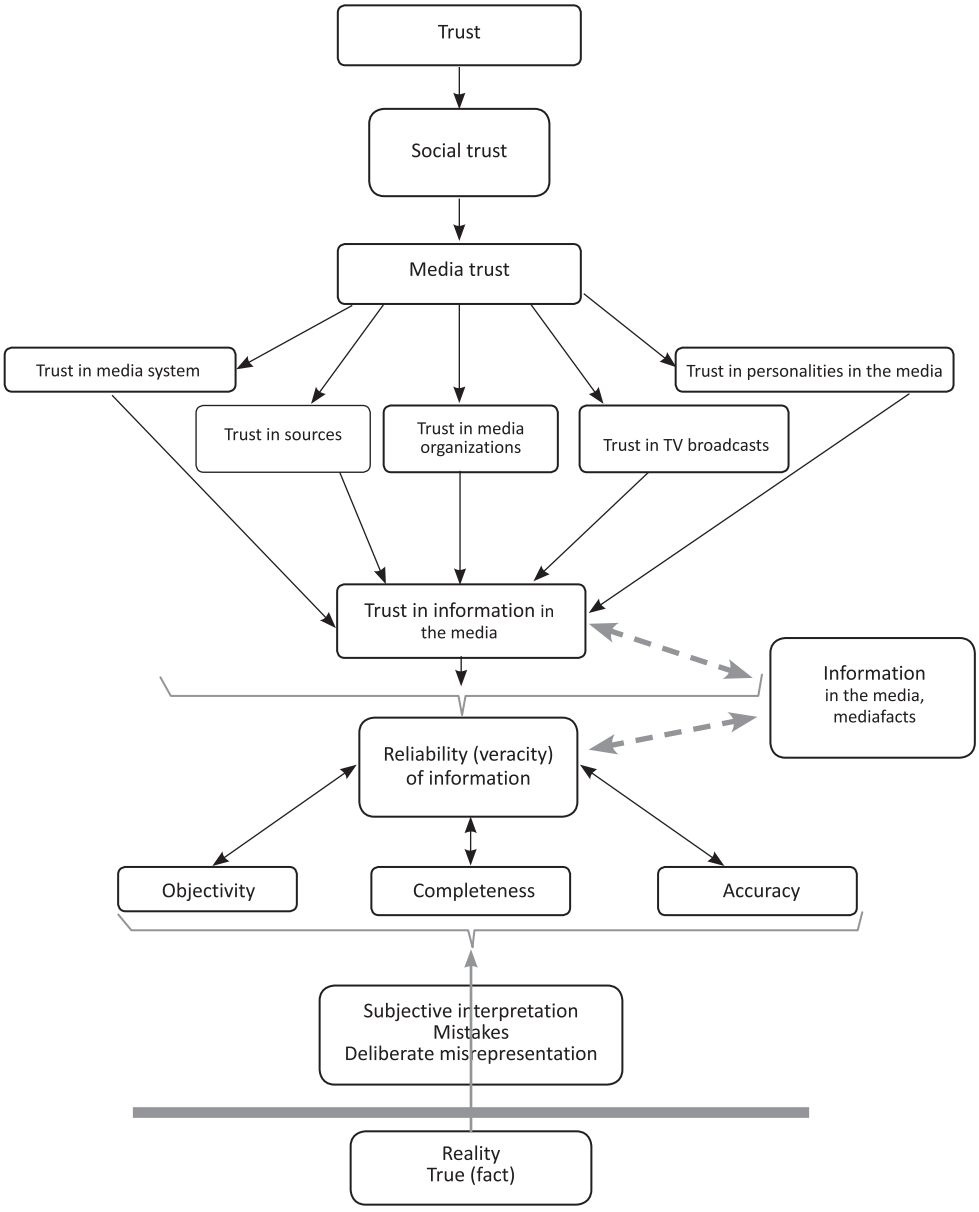

Figure 1. Key concepts of trust in information.

Note. The scheme illustrates the relationships between concepts in our study.

Methods

Participants

The pilot stage of the study (focus groups) involved 31 participants (women — 21 (68%), men — 10 (32%); 10 people from Generation Z (over 17 years old), 11 people from the Millennial Generation, 10 people from the Generation of Reforms). 29 participants were from Moscow or the Moscow region; most of the respondents possessed higher education qualifications or were in the process of obtaining them, the rest were in upper secondary education. We held 9 focus groups, three for each generation. The second stage of the study (survey) involved 400 respondents (women — 297 (74.2%), men — 103 (25.8%); 123 (30.8%) people from Generation Z, 154 (38.5%) people from the Millennial Generation, 123 (30%) people from the Generation of Reforms). More than 60% of the participants were from Moscow, and less than 40% were from other regions. 236 respondents (60%) possessed higher education qualifications, 103 (25.8%) were in the process of obtaining higher education qualifications, 19 (4.8%) had been through specialized secondary education, 30 (7.5%) had been through secondary education, and 12 (3%) were in the process of completing their secondary education.

Procedure

Data collection methods: focus group, survey (online). Data analysis methods: thematic analysis, qualitative and quantitative content analysis, coefficient of positive answers (according to J. Abric), Kruskal-Wallis H test, Pearson's chi-square test, Spearman's rank correlation coefficient, Kendall's t-rank correlation coefficient.

Questionnaires: (1) "Interpersonal Trust Scale" by J. Rotter (levels of social and institutional trust) (Leonova, Leonov, 2016); (2) "Faith in People" by M. Rosenberg (level of basic trust) (Robinson et al., 2013); (3) The authors' questionnaire, based on the results of the pilot stage of the study (focus groups) — the structure and content of social representations regarding the reliability of news in the mass media and on social media.

Our questionnaire includes: (3a) Demographic questions, questions regarding preferred news sources and an estimation of the likelihood of spread of reliable and fake news within these sources, open-ended questions about the concept of "fake news" and how respondents interpret it; (3b) Seven blocks of statements (total: 105): 1) the evaluation of fake news presence in news sources, 2) reasons for fake news presence, 3) the person's interaction with fake news, 4) criteria for the identification of the reliability of news, 5) an assessment of people from other generations, 6) an evaluation of the scope of false information spread in the past, present and forecast for the future, 7) possible actions to solve the problem of fake news.

We based this study on the concept of social representations by S. Moskovici, in order to investigate "fakes" within social constructionism (Molliner, Bovina, 2020; Molliner, Bovina, 2021). S. Moscovici defines social representation as "a set of concepts, beliefs and explanations that emerge in everyday life in the process of interpersonal communications". He also calls it "a modern version of common sense" (Emelyanova, 2001). "Reliability of information" is studied as an object of social representations.

Firstly, this is because it is considered part of the widespread discourse within society (Ershov, 2018; Kolesnichenko, 2018). Secondly, when people are confronted with new information, particularly news (both reliable and fake), they develop a need to establish a stance on this new knowledge and to find a place for it within their existing belief systems. This relates information in the mass media to the criteria of reliability, which contributes to the formation of social representations. Thirdly, the structure and content of social representations is understood clearly by researchers in times of social crises and upheavals such as the COVID-19 pandemic (Levada, 2021).

In this study, we apply the structural approach of J. Abric (Abric, 2000). The approach involves allocation of the core and peripheral system. The core is associated with concepts of collective memory i.e., the common historical experience of the group. It is stable and its cognitive elements are shared by the whole group, providing homogeneity and generating the meaning of the social representation. The peripheral system is more sensitive to context and not as stable as the core. It takes into account individual experience and distinct features of each group member and plays a part in adaptation to environmental changes (Abric, 1993; Emelyanova, 2001). To identify the structure of social representation, we use the Vergés prototypical analysis method (Vergés, 1992; Bovina, 2011) and the method for calculating the coefficient of positive answers (hereinafter CPA) by J. Abric (TCP — Tauxcatégoriquepositif), adapted by T.P. Emelyanova (Abric, 2000; Emelyanova, 2015; Emelyanova, Schmidt, 2021). This approach allows us to highlight the similarities and differences between the three generations, and to obtain a holistic picture of the social representations for the various thematic blocks identified within focus groups and the survey.

Results

Across the two stages of the study, we reveal the generation-dependent social representations of information (news) reliability in the mass media and on social media and of the problem of fake news. The results of each stage are presented below in blocks: they complement each other and allow us to compare representations between different generations, as well as between people with varying levels of trust.

What is "reliable information" and "fake news"?

Consistent with the thematic analysis, participants interpreted reliable information as information that corresponds to reality, correctly and completely reflects real events and facts, excludes distortion during transmission, and has confirmation that it was accurately conveyed. Accuracy of information should be verified by professional journalists. Fake news *was interpreted* by participants as completely or partially false and misleading information, which may contain deliberate or accidental misrepresentation of information about reality. Authors create fake news with the aim of manipulating people's consciousness, deceiving for some goal, and increasing the popularity of the author. Fake news can be *recognized* by loud headlines, eye-catching words, and clickbait. When compared with a similar social phenomenon — rumors, "fakes" were understood as a more modern, digitized counterpart. Participants evaluated news *sources* by the number of fake vs. reliable news items they contain. Within the three

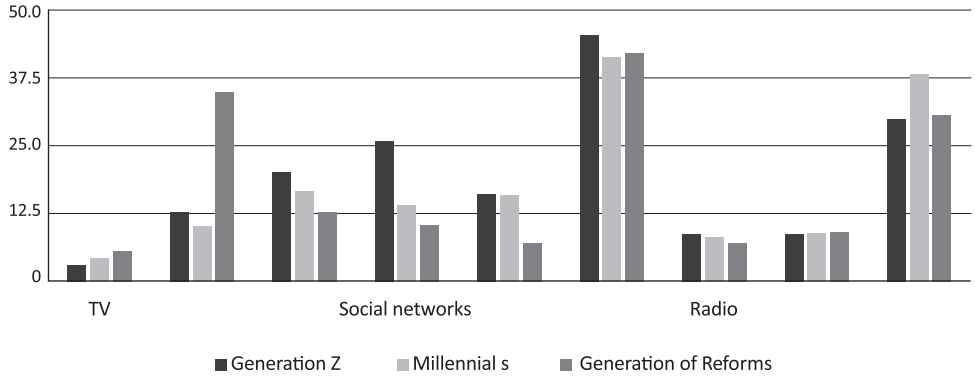

Figure 2. News sources with a high percentage of reliable news (according to participants).

Note. The histogram illustrates the representations of three generational groups regarding reliable sources of news.

generational groups, a large proportion of people (see *Figure 2*) chose "news sites" as a news source with a high percentage of reliable news. However, the second most popular category of choice was "none of the above", indicating that the respondents tend to consider few sources of information as reliable. The differences between fed-

Table 1

The core elements of social representations for the block "evaluation of fake news presence in news sources".

Statements	Generation Z (CPA)[a]	Millennials (CPA)	"Reformists" (CPA)
Statements included in the cores of all generations			
On federal channels, news is often presented from a certain position to shape the opinion of the population	93.5	100.0	95.1
News broadcasts on federal channels often hide facts	91.9	91.6	84.6
In current Russian media and social media, there is a large percentage of misrepresentation of news, partial inaccuracy	91.1	96.1	83.7
Fake news is published in those sources that are popular with people	75.6	76.6	78.0
Statements included in the cores of 1-2 generations			
I try not to watch the news on TV, as I think that there is a lot of unreliable news	72.4	77.9	–
There is a large percentage of fake news in modern Russian media and on social media	72.4	73.4	–

Note. [a]CPA= the coefficient of positive answers by J. Abric.

eral television channel ratings given by different generations is also pronounced (see *Table 1*). The Generation of Reforms rated *federal channels* significantly higher than the Millennial Generation and Generation Z in terms information reliability (Chi-square, p = < 0.00). At the same time, Generation Z (after "Millennials") rated *social networks* higher in terms of news reliability (Chi-square, p = <0.14).

Messengers were rated significantly higher (Chi-square, p = <0.03) by Generation Z and "Millennials" as sources with a large percentage of reliable information. The Millennial Generation and Generation Z placed "television in general" first in the fake news the category followed by "federal channels" in second place. The percentage of people who agreed with this assignment from the Generation of Reforms was less. Those from the Generation of Reforms were less likely to agree with the assumption that facts are often withheld on federal channels, and less prone to avoid watching news on federal channels, than people from younger generations.

How are other generations affected by fake news?

Upon assessment of the generations according to their views on the susceptibility of other generations to trusting fake news, all generations demonstrated a high level of agreement (CPA 80.5, 87.8 and 92.2) that people over 60 and between 51-60 tend to trust fake information, although the Generation of Reforms gave lower scores on this item than the other two generations (see *Table 2*). Generation Z scored people between the ages 41-50 significantly higher (CPA 61.0, p = 0.00) than the Generation of Reforms did. It is also typical that the Generation of Reforms rated the 17–20 age group significantly higher than the younger generations did (CPA 60.2, p = 0.00). Thus, there is a general tendency to estimate that people who are younger or older than you are credulous towards fake news, although such an assessment is not supported by facts.

Table 2

The core elements of social representations for the block "assessment of people from other generations"

Statements	Generation Z (CPA)[a]	Millennials (CPA)	"Reformists" (CPA)
Statements included in the cores of all generations			
I think that people over 60 are very susceptible to trusting fake news	87.8	92.2	80.5
I think that people 51–60 are very susceptible to trusting fake news	81.3	87.0	56.9
Statements, included in the cores of 1–2 generations			
I think that people younger than 17 are very susceptible to trusting fake news	–	–	60.2 /
I think that people 41–50 are very susceptible to trusting fake news	61.0	–	–

Note. [a]CPA= the coefficient of positive answers by J. Abric.

What are the reasons for the spread of fake news?

Participants associated fake news presence with the malicious dissemination of false information by those who strive for power (political or informational) or quick money trying to increase their popularity. Participants from all three generations supposed that fake news is one of the weapons used in information warfare. However, according to participants, fake news is published not only purposefully by professionals but also due to the mistakes and incompetence of journalists (this was considered more by the younger generations, CPA: 67.5, 68.3, compared to the Generation of Reforms — 43.9, $p = 0.006$, $p = 0.000$). The spread of fake news is also related to technological development and an increase in the number of news sources. During the focus group stage, participants reflected that globalization and increasing individualism in society can influence the spread of fake news; participants also noted that, in the history of Russia, fake news is a common and deep-rooted phenomenon.

The core of the social representations of Generation Z contains an element of understanding of fake news as a phenomenon native to society (CPA: 74 for Generation Z, while for "Millennials" 53.9, $p = 0.000$ and for "Reformists' 59.3, $p = 0.009$). These findings can be explained by the assumption that Generation Z actively interacts with various information sources from earlier years. Thereby, the phenomenon of fake news becomes habitual and commonplace, just as information misrepresentation in the mass media and on social media, in fact, is.

Where does fake news fit into my own life?

Many participants reported that they are faced with fake news in their lives and make efforts to filter reliable information sources from unreliable ones. For instance, many respondents during the coronavirus pandemic had difficulties navigating the news, as they faced conflicting information on the issue. Naturally, the need to filter fake news becomes especially important when the news is significant for the person, their family and friends. Another central element of social representations is the knowledge that this social phenomenon affects everyone in society. Respondents seemed to believe that fake news is a danger to society and tended to distrust information initially, prior to verification. This was most typical for Generation Z ($p = 0.000$; CPA: 90.2, 90.3, 80.5 for Generation Z, "Millennials" and the Generation of Reforms, respectively). In general, fake news evoked mostly negative emotions (sadness, irritation, anger, a sense of inevitability, etc.) among respondents. As people of Generation Z and "Millennials" noted, conflicts often arise when discussing this issue with the older generation, since many parents believe in a kind of news that respondents deem obviously unreliable.

Are there criteria for identifying the reliability of news information?

We have identified several key criteria for assessing the reliability of information, which are common core elements of social perceptions for all generations (see *Table 3*).

The criteria in *Table 3* include intentions to check information using several news sources, check official information, turn to primary sources, or read not only a brief

Table 3

The core elements of social representations for the block "criteria for the identification of the reliability of information in mass media".

Statements	Generation Z (CPA)[a]	Millennials (CPA)	"Reformists" (CPA)
Statements included in the cores of all generations			
An important criterion for the reliability of the news is the evidence (links, quotes, photos, videos)	90.2	90.3	80.5
To assess the reliability of the news, I check the news using several sources	86.2	83.1	87.8
To define the reliability of the news, I go to the original source, the official source	85.4	85.1	85.4
The reputation and authority of the news source is an important criterion for me	77.2	87.0	81.3
I rely on my own understanding of the situation, on what I already know about the situation, when I define the reliability of the news	83.7	83.8	84.6

Note. [a]CPA= the coefficient of positive answers by J.Abric.

overview of the situation but also follow the links provided to get better acquainted with the information. Respondents also considered their own knowledge and representations about various social situations, as well as their intuition and common sense when assessing news credibility. Checking news with their own representations helps people navigate the large volume of news and partition it into reliable and fake (unreliable) information. It was common for all generations to refer to the evidence provided in the news (quotes, videos, photos, links), but for younger generations this criterion was more important than for the Generation of Reforms ($p = 0{,}000$; CPA: 90,2, 90,3, 80,5 for Generation Z, Millennials and Generation of Reforms, respectively). Also, it was common for the three generations, especially "Millennials", to assess the reputation and authority of the source, and pay attention to how the news is presented i.e., whether it is possible to distinguish the author's opinion from fact. Participants negatively perceived the catchy, attention-grabbing headlines that are written in "marketing discourse". Many "suspicious" advertisements that appeal largely to emotion make people doubt the reliability of the information. Generation Z was characterized by the belief that there are real ways to check the credibility of news oneself, whereas the Generation of Reforms was more prone to ask others — whether it be experts in a particular field, or people who are aware of and involved in the situation (between Generation Z and the Generation of Reforms: $p = 0.029$; between Generation Z and "Millennials": $p = 0.027$; CPA: 71.5; 58.4 and 63.4). For example, during the focus group stage, several participants said that they were calling acquaintances in other countries to ensure that the news being broadcast in this country was true (about the "lockdown" or troubles during the coronavirus pandemic).

What factors shape my representations of the criteria for evaluating news information?

According to the participants, in addition to social institutions (parents, school, university), a significant factor is the personal experience of being confronted with fake information or making and analysing mistakes. The coverage of public events in Russia in the mass media has also impacted people's attitudes towards certain sources of information. For example, the younger generations mentioned rallies and their conflicting coverage in different media (television vs. the internet). Participants tended to place more trust in sources that give information in full, without hiding facts, and provide photos and video evidence (mostly social media or the internet). The Generation of Reforms mentioned the period of the 90s, when, in their opinion, politicians often deceived the public, which led to a decrease in the level of trust in the media and government.

What is the scope of false information spreading in the media now, and what is the forecast for the future?

In general, participants considered that there currently exists a lot of fake news, though percentage estimates differed (see *Table 4*). The most stable elements of the social representations are those associated with the understanding of fake news as a constant social phenomenon i.e., it existed before and will continue to exist forever. This view was especially pronounced among Generation Z (significant differences according to the Kruskal-Wallis criterion were between Generation Z and "Millennials", $p = 0.004$; and between Generation Z and "Reformists" $p = 0.000$; CPA: 96.7, 93.5 and 95.9). Also, respondents believed that the quality and complexity of fake news will increase, making it harder to identify. This was a belief regarding which there were no significant generational differences.

Table 4

The core elements of social representations for the block "evaluation of the scope of false information spreading in the media in the past, present and the forecast for the future"

Statements	Generation Z (CPA)[a]	Millennials (CPA)	"Reformists" (CPA)
Statements, included in the cores of all generations			
Fake news has always been and will always be	96.7	93.5	95.9
Fake news will become more complex, better quality and more difficult to identify	76.4	72.1	78.9
There will be more and more unreliable news, as the internet and social networks will develop	47.2	53.2	53.7
Statements, included in the cores of 1–2 generations			
The amount of fake news used to be less than there is now	–	47.4	56.9
The amount of fake news will increase in the future	–	52.6	48.0

Note. [a]*CPA= the coefficient of positive answers by J. Abric.*

The development of social media and the internet is one of the factors influencing this trend, as the total number of news sources and opportunities for news dissemination has and will continue to increase. Although the notion that there was less fake news in the past than there is now and will be in the future is quite stable, the forecasting capabilities of participants are still limited: they have difficulties with making unambiguous predictions.

How do we solve the problem of the excessive prevalence of fake news?

In accord with the social representations of respondents, possible solutions to the fake news problem include improving the education system in the country, which will allow people to acquire information analysis skills and develop critical thinking. According to participants, uneducated people are more inclined to trust fake news. All generations considered it possible to influence the situation by helping their children navigate the large stream of information, teaching them how to filter and evaluate information, and nurturing them, so that they do not become the creators and distributors of fake news. As the participants also noted, the problem lies in the fact that many people are simply too lazy to check information and are quick to believe falsities (see *Table 5*).

Table 5

The core elements of social representations for the block "possible actions to solve the problem of fake news".

Statements	Generation Z (CPA)[a]	Millennials (CPA)	"Reformists" (CPA)
Statements, included in the cores of all generations			
The main way to influence the presence of fake news is to improve the education system, educate people	89.4	88.3	89.4
The main way to reduce the amount of fake news is to influence our children, educate them morally and teach them critical thinking	81.3	93.5	91.1
If people weren't too lazy to check the information, there would be fewer problems with fake news	82.1	85.1	83.7

Note. [a]CPA= the coefficient of positive answers by J. Abric.

Younger generations perceived the situation as a problem that needs to be dealt with. Generation Z believed that special independent professional organizations should exercise control over the situation; and the difference between "Z" and "Reformists" was significant (CPA = 81.3, p = 0.008). Participants of all generations (representing the stable core element of social perceptions) considered that journalists should be given more freedom, so that they can visit event locations, communicate with eyewitnesses and find out the truth.

How do trust, "trust in people" and representations about "fakes" correlate?

We measured the levels of basic trust in people, social trust, and institutional trust (see *Figure 3*). By all parameters, the average level of trust was low within this sample of respondents (most of the respondents scored between the 25th and 50th percentiles).

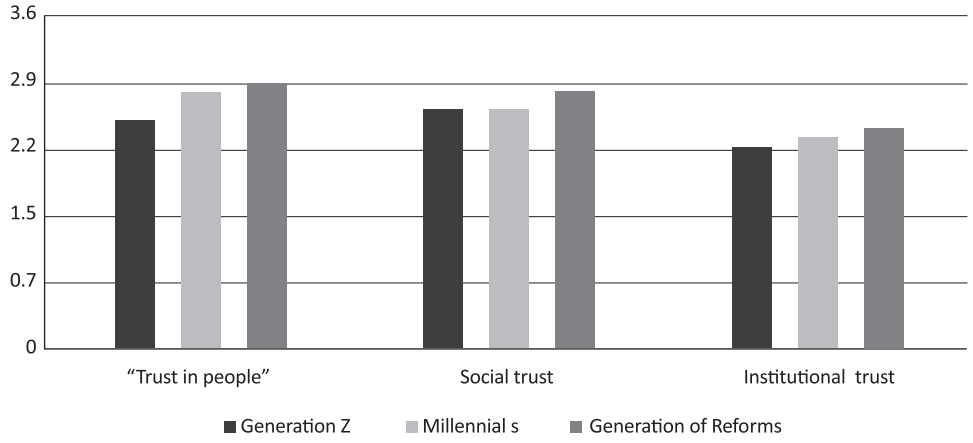

Figure 3. Measures of three types of trust.

Note. The histogram illustrates the levels of basic trust in people, social trust, and institutional trust within the three generational groups.

People from Generation Z had a lower level of "trust in people" ($p = 0.00$, Kruskal-Wallis) than other generations. Respondents from the Generation of Reforms had a higher level of social and institutional trust ($p = <0.00$) than the younger generations. It was found that there are mostly negative correlations between the levels of trust and the core elements of social representations. A lower level of trust in people in general, society and social institutions is associated with the perception of fake news as a severe problem, behind which are representatives of social institutions or persons who deliberately seek to deceive people for their own gain (money, power, information warfare, etc.). If people do not trust other people, society, or social institutions, then they are more likely to perceive fake news as a danger and to believe that the media may broadcast fake information with the aim of deceiving or manipulating. In such situations, people are more likely to believe that politicians and authority figures may have something to do with it. High levels of trust in people will, on the contrary, contribute to trust in the creators of the news and create reliance on the author's authority.

What are the differences and similarities between generations in the social representations of "fakes"?

An important criterion for assessing news reliability for participants of all generations was relying on their own knowledge, representations of the situation, and intuition. People of different generations agreed that the main solutions to the problem

are improving the education system in the country, educating their own children, avoiding laziness in information checking, and giving journalists more freedom to establish the truth. Younger generations were more likely to attribute fake news to accident, a mistake or incompetence on the part of the journalists, while "Reformists" mostly alluded to malicious intent of the creators of fake news. Generation Z were more inclined to perceive fake news as a habitual phenomenon for people and society, but this did not hinder their willingness to solve the problem. People of this generation were more convinced that there are certain ways to assess the reliability of information. Generation Z and "Millennials" focused on the presentation of information, the use of language, and headlines when identifying "fakes". The Generation of Reforms tended to seek expert opinion or interact with people who are relevant to the situation.

Discussion

Social representations regarding "fakes"

1. The respondents we asked have **learned to live in a world of "fakes"**. Their understanding of "fakes", representations about information reliability and its criteria, and the reasons for the appearance of inaccurate media facts correspond to theoretical studies of the phenomenon. Participants realize that "fakes" can be both intentional and accidental (due to journalistic faux pas), but they also often blame those with a vested interest in achieving selfish goals (striving for power, popularity, etc.). These effects are especially evident among respondents with low levels of trust. It is clear that: **the less I trust various social institutions, the more I must be on guard and the more it will seem to me that someone wants to deceive me deliberately.** This way of thinking allows a person to be in a state of heightened critical thinking. However, at peak levels of distrust, its carriers are approaching the a conspiracy theorist state (Egorova et al., 2020).

2. Participants are developing skills in extracting obviously unreliable information (for instance, everyone admits mistrusting the "marketing", "overemotional", "flashy" news presentation). Nevertheless, the strategies for masking fake information and deception in the media environment are developing and changing much faster than the audience can adapt to them. Thus, the respondents are confident in the need to educate media competence in society (courses in universities and schools), to stimulate the development of critical thinking and to bring up family correctly. It is also obvious that with the regularly changing design and form of "fakes", a more important skill is discerning the content. An important element of the "core" is the representation of the necessity to increase freedom among journalists to reduce the number of "fakes". Fake news prevalence as a result of a lack of journalistic freedom is an interesting conviction that deserves special attention.

3. "Fakes" turn out to be more significant the more they affect a person's personality. This predictable result is vividly manifested in the context of the COVID-19 pandemic. Alarmingly for the majority of respondents, the disease has caused a large number "fakes" and discussions about them on social media (Egorova et al., 2020).

Representations of "fakes" through the eyes of different generations

4. The representations of **Generation Z** stand apart: for them the presence of "fakes" in the media space is a habitual and familiar one. Their conscious strategy is associated with increasing verification of the surrounding information, so they use more fact-checking tools than other generations. At the same time, as mentioned above, fact-checking is not a clearly defined procedure: people can only assume that they can check information, due to the potential complexity of fact-checking and other obstacles such as value patterns.

5. At the same time, each generation demonstrates a certain way of dealing with "fakes": if Generation Z uses digital verification (photos, videos, screenshots, correct quotes), then **"Reformists"** admit that they are prone to double-check the news through offline contacts with acquaintances and experts. Perhaps the pronounced propensity for fact-checking among Generation Z is just the outer shell, caused by a deeper knowledge of the environment of digital communication. Generation Z has come to terms with the reality of "fakes" and predicts that the amount of fake news will only increase as the media space becomes increasingly complex. Generation Z and **"Millennials"** have more core elements in their social perceptions of news reliability than the **Generation of Reforms**. It was expected that the Generation of Reforms rely on television more and on messengers less than Generation Z, which irritates the younger generation. The representation regarding the technological incompetence of the older generation in the eyes of the younger generation is reinforced by the less thorough fact-checking by older generations. Social representations of Generation Z and "Millennials" contain more negative core elements related to emotional attitudes towards fake news (the core element is the emotion of annoyance). In general, "Z" and "Millennials" are closer to each other in terms of representations than "Millennials" and "Reformists". However, it should be remembered that comparing generations in relation to "fakes" can be problematic, especially when comparing different methods of information processing.

6. The **generation gap** with regards to "fakes" can be considered as a typical socio-psychological phenomenon: social perception manifests itself here in an explicit form, according to which we evaluate the age groups furthest from our own negatively. Thus, all generations consistently assess the media competence of people over 60 negatively, and at the same time, "Reformists" and "Z" negatively assess each other's ability to recognize fakes. The fact that these two generational groups do not perceive "Millennials" in such a negative way only confirms the aforementioned claim, because millennials are a neighboring group for both older and younger generations. Also, both the "Reformists" and "Z" generations attribute high levels of media competence to their own groups. Mutual accusations of distant cohorts are a classic example of outgroup aggression, embedded within a typical intergenerational conflict.

7. It is curious that all generations consider that "news sites" are the least "fake" type of media. Generation Z is more prone to trust social networks as a source of information. The Generation of Reforms, as mentioned above, more often trusts TV news. At first glance, it seems that this evidence could be explained by the preference and familiarity of using certain media tools for older and younger participants.

Nonetheless, this new hypothesis should be tested: *the fact that respondents tend to categorize information sources (television / internet / social networks), stereotypically and with overgeneralization, as more or less reliable, shows the vulnerability of these generational groups to potential fake information.* For example, if a respondent from Generation Z is convinced that television is more likely to deceive him than a telegram channel, he immediately becomes more vulnerable to unscrupulous communicators in modern social media, and vice versa.

Conclusion

We have revealed the structure and content of social representations regarding the fake news and information reliability in the mass media and on social media among three generations of Russian people: the Generation of Reforms, the Millennial Generation and Generation Z. Upon comparison, we have found prominent differences between "Z" and "Reformists", as well as similarities between "Z" and "Millennials". Each generation demonstrated a certain way of identifying "fakes" ("Z" relies on fact-checking and digital verification; the Generation of Reforms checks the information through offline contacts with acquaintances and experts) and identified their preferred sources of reliable information ("Z" — social media, "Reformists" — TV).

Our findings provide evidence that "fakes" are purely social constructs: we tend to trust information that is consistent with our representations, beliefs, and attitudes. Moreover, people with rigid attitudes, regardless of their belonging to a particular generation, seem to be more vulnerable: if you understand that your knowledge is conditional, it is easier for you to live in a world of "fakes"; the more axiomatic ideas you have, the more problems you face with inaccurate information. In this respect, generations differ not in the quality of their fake news diagnostics, but in their tolerance towards "fakes", and in their news verification strategies. The attribution of media incompetence to older and younger cohorts by each other is a typical case of the eternal conflict between "fathers and sons".

The implications of these findings can be related to ways to improve media competence. Understanding the social representations of different generations regarding media information and reliability can help create a system for increasing media competence in a country, thereby preventing people from believing false facts and making decisions that harm themselves and society. Prevention and informational prophylaxis regarding fake news is more effective than dealing with the consequences after the fact (van Der Linden, Roosenbeek, Compton, 2020).

Limitations

The collected data is based on self-report, so as stated, this research involved the study of representations, not actual behavior. The gender imbalance of the sample can be a possible limitation of our study (women prevail — 68% in the focus groups, 74.2% in the survey). This limitation was partially offset by the sample size at the survey stage (400 people). However, it is worthwhile to equalize the sample by gender in the future. Though the survey involved participants from different cities and regions

of Russia (34 categories), participants from Moscow, the Moscow region and St. Petersburg made up the majority. The disproportion should be taken into account when interpreting the results, and in the future, we will increase the number of respondents from other regions of Russia, including small cities. These additions will allow us to extend the conclusions to the whole of Russia, and not only to the populations of large cities. We have also encountered the issue of distinguishing between age and generational features. This limitation can be overcome by conducting a longitudinal study.

Ethics Statement

All subjects gave their informed consent for inclusion before they participated in the study. The protocol was approved by the Ethics Committee of Lomonosov Moscow State University (project identification code 3-h dated 22.12.2020).

Informed Consent from the Participants' Legal Guardians (if the participants were minors)

All subjects who participated in the study were older than 16 years old. All subjects gave their informed consent for inclusion before they participated in the study.

Author Contributions

The conceptualization and methodology of the study were carried out by A.T. and A.R. Research methods, data curation, and analyses were done by M.V. and A.R, with feedback from A.T. Original draft preparation, review and editing were done by M.V. and A.R. Funding acquisition was done by A.T. All authors have read and agreed to the published version of the manuscript (M.V., A.R. and A.T.).

Conflict of Interest

The authors declare no conflict of interest.

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Trends in the Study of Cultural-Historical Phenomena on the Internet (based on a study of Russians' attitudes towards money)

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Background. The development of information technologies has led to the intensification of sociocultural interaction, allowed the creation of new systems for storing and processing information, and provided space for users to share their opinions, ideas, and standpoints. Thus, the Internet has become a major social-humanitarian scientific space. In this modern scientific space, one can single out a wide range of studies in psychology that show which topics are most popular and most widely discussed, or which moral grounds the participants of radical political movements share. Such studies show, for example, that U.S. working people experience psycho-physiological strain, and that infectious diseases spread more easily under modern conditions.

Objective. This study focused on the attitude that users of the Twitter social network hold towards money.

Design. It was carried out by analyzing the texts of messages posted by Russian and Japanese users (background research) which contained the word "money." The research methods included program tools for word frequency analysis, semantic grouping of content, and analyzing the emotional nature of informal short messages. To interpret the results, the authors used expert analysis, theoretical justification, and content analysis.

Results. We found that Russians' attitudes toward money can be divided into eight main categories: people, time, country, expenses, economy, philosophical speculations, power, and income. The main economic concerns were centered on the expenses and income coming from salaried jobs. Russians' major expenses were mainly associated with everyday financial problems. A comparison of Russian and Japanese messages revealed a number of clear-cut psychological differences.

Keywords:
Attitude toward money, social networks, information technologies, ideas about income and expenses, attitude toward time, expert analysis.

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Conclusion. In conclusion, we point out that analyzing "digital traces" helps uncover a variety of psychological factors influencing human life and behavior. Within the framework of this kind of study, it seems very promising to single out the interconnection between the population's overall psychological features and a given society's existing social-economic circumstances.

Introduction

The development of information technologies is becoming a crucial factor for transforming modern society. It determines the arrival of new forms of interaction between authorities, social institutions, business, and the population. From the *social-psychological* standpoint, such a development leads to transformations of group values, norms of behavior, and social roles. Among the typical characteristics of this process are the considerable widening of sociocultural interaction, the large-scale accumulation of varied interests among different cultures and ethnic groups, and the emergence of new spaces for young people's socialization. The existing systemic autonomy of the Internet space, and the absence of rigid external control and regulation of it, allows one to consider it a new, developing, and relatively independent *cultural subsystem*.

The importance of the Internet is determined not only by its procedural ability to change the communicative milieu and form a new social space, but also by involving huge numbers of people in this process. By the year 2021 4.66 billion people were Internet users (All Internet statistics …, 2020). In this respect it is also important to note that the child audience of the Internet is constantly growing, which has immediate consequences for how human culture is evolving; its mentality is "directly affected" (Pelipenko, 2015, p. 163). For example, it has been shown that, on average, *pre-school* (!) children use various types of electronic gadgets and spend 13.42 hours a week in virtual space (Funk et al., 2009).

From the standpoint of *information*, the integration of means of communication with computer networks helps to build powerful systems for storing huge amounts of data (and processing these data), while the fact of being connected to the Internet's international network provides additional opportunities for getting into the world-wide community's information space. Thus, one gains access to information sources in almost every part of the world.

The existing informational milieu provides people with new platforms for communication: sites, forums, blogs, online diaries, thematic communities, and so on. Among other platforms, the most popular ones are social networks: their audience by 2021 has surpassed the 4.2 billion mark, which is 53.6% of the world population (All Internet statistics …, 2020). The Internet creates new opportunities for people's activity by allowing users to generate their own information and spread their worldview without any special preparation.

From the *scientific* point of view, the Internet reflects the on-going process of broadcasting opinions, ideas, standpoints, attitudes, and worldviews typical of both

individuals and social groups. The networks also collect personal data in both their subjective form (opinions expressed, for instance) and their objective format (login coordinates, contacts, profiles, statuses, etc.) The information obtained in this way provides broad opportunities for studying innumerable objective and subjective *characteristics* of people and social groups functioning on the Internet, which makes it a big social-humanitarian field for study (digital trace studies are no exception). By way of example, according to E.R. Agadullina's survey, the connections between certain psychological characteristics (like the Big Five factors) and "digital traces" are most reliably established when the latter are collected directly from people's profiles, and not from what the respondents answer in a questionnaire (Agadullina, 2015).

State of the research using information technologies

In the modern study space, the technologies used for analyzing "digital traces" are connected with processing the users' objective characteristics (gender, age, geography, frequency of use of information resources, and so forth), as well as with singling out people's subjective features (groups, societies). This kind of information cannot be obtained *directly* (for example, simply by counting certain positions and their subsequent statistical processing), and to extract it, one needs complex *program products* and well-founded *theoretical grounds* (one needs to address the already proven, conventional scientific conceptions, laws, or facts) that would constitute the basis to explain it. Below we provide a review of such research, in order to analyze the state of affairs within this trend in modern psychological studies.

One can identify quite a number of studies within different *branches of psychological science*:

- *the psychology of economics*: a complex analysis of articles (João et al., 2016) on the problem of C-RM marketing (the research analyzed 246 articles in 40 journals dating from 1988 to 2013) revealed the topics which were most widely discussed ("brand compliance," "law and ethics," "corporate and social identification"), as well as those topics which were rapidly gaining popularity ("social taboo," "moral debate");
- *legal psychology*: A study of the moral attractiveness of extremism in the United States, performed by analyzing 5000 messages by representatives of far-right political movements (alt-right) and 5000 ones by representatives of the extreme left wing (Antifa), revealed differences only as to the principle of internal group loyalty, while no evidence of high moral grounds was found in either of the groups (Alizadeh, et al., 2019);
- *the psychology of management*: An analysis of the dynamics of Americans' emotional state during the week was performed in order to study the "effect of recovery from work" on weekends. It showed that work-related elements have well-pronounced *negative* load throughout the week, but also on the weekends: the results obviously point to the "cumulative" strained psycho-physiological state of U.S. working people (Wang, et al., 2016);

- *the psychology of professional communities*: A comparative analysis of messages from readers of journals on psychology and political sciences was carried out by studying articles from Web of Science and Altmetric.com and discussion of them on the Twitter social network. The study analyzed 91,826 tweets on psychology-related problems and 29,958 ones on political science issues. It showed that the messages concerning the publications in psychological journals gave rise to a much greater number of discussions on a wider range of subjects than those on political sciences (Zhou & Na, 2016);
- *the psychology of mass media*: A study of changes in the perception of AIDS, performed on the basis of 446 articles in two Italian newspapers (*La Repubblica* and *Corriere della Sera*) published between 1985 and 1990, and between 2005 and 2010, singled out five thematic clusters of opinion (medical help, support from family, science and religion discourse, social avoidance/ isolation, and health policy) and showed that in the latter period, the attitude toward this illness was more tolerant (Caputo, et al., 2016);
- *the psychology of art*: a study of the impressions and psychological effects that people with different cultural backgrounds experience while watching stage performances and dances of Japan, China, and South Korea showed that traditional arts are perceived differently, depending on the ethnic and cultural background of the spectators (the study was performed by way of automatic analysis of responses to an open-question survey (Zheng, et al., 2020).

Theoretical-methodological approaches and study methods

From the theoretical-methodological point of view, people's attitudes towards social phenomena are highly abstract concepts that reveal both the *social* context of the issue (dependance on historical and cultural features of the milieu one lives in, etc.) and one's *individual personality* traits in relation to one's life circumstances. Another feature of the phenomenon of "attitude" is the ability to concretize it by specifying its *structural* and *semantic*, as well as *cognitive*, *emotional*, and *motivational-behavioral*, components.

From the practical point of view, the phenomenon of attitude also has specific features and advantages. Firstly, an attitude forms the basis for people's *views of the world*, *activity,* and *behavior* and largely determines them. Secondly, an attitude can be easily identified through studying an individual's speech according to the following scheme: content — structure — cognition — emotions — motivation. Thirdly, it is also interesting to try to identify a person's general *emotional* attitude toward various phenomena of external life and toward himself through analyzing his psychological evaluations of an activity (Zhuravlev & Kitova, 2020b). All these aspects are related to the fact that the phenomenon of attitude is an extremely *popular and widespread* object of research in various branches of psychology.

The object of the present study — *attitude toward money* — represents research in both the field of *attitude phenomena* and in that of *economic phenomena*, generally. Bearing in mind all the above-mentioned aspects of the problem, it comes as *no* surprise that the analysis of the population's attitude toward money can reveal certain psychological features characteristic of a great number of people, features that can be

seen as *elements* of the Russian *mentality*[1]. This is our first theoretical assumption. The second one is related to the fact that a person's attitude toward money is viewed as a "conscientious and subjective-selective idea of money" (Deineka, 2000, p. 79), manifesting itself both in the person's handling of money and his ideas about it.

Thus, the *objective* of our research was to study the macroeconomic (that is, relevant to the society on the whole) features of Russians' attitudes toward money.

Method

The *object* of the research was a group of users of the Twitter social network, and its *material* consisted of the content of text messages that included the word "money," and had to do with all kinds of life situations in which the users founnd themselves, without any exceptions or limitations. The messages were collected using the continuous sampling method during the month between June 11 and July 11, 2021. They were processed after eliminating advertisements and recurrent text material/bots; the material was then automatically divided into tokens (morphological stemming was performed with the help of user vocabularies); then the tokens were grouped and subsequently analyzed from the viewpoint of semantics, frequency, and the emotional load of words and messages.

A total of 3984 messages were collected and processed. In line with the background study, it was suggested that we use the corresponding (identical) methods to reveal the specific features in the attitude towards money of the Japanese, as Japan is a country with a very specific ethnocultural history of economy and its development, which differs greatly from that of Russia.

Procedure

The *automatic* methods used within the study included program instruments for assessing *word frequency*, grouping *contents* by *semantic* criteria, and analyzing the *emotional* tone of informal short messages; these instruments were elaborated by M. Kitov (for more information on the methods used, see *Psychological studies in the Internet space* …, 2020). To *interpret* the results obtained, we used supplementary methods such as *expert analysis*, method of *theoretical justification*, and *content analysis*. All the clarifications concerning the use of concrete techniques of *qualitative* analysis were made along with discussion of the research results.

Results

Empirical analysis of the Twitter users' attitude towards money

Our *first step* was to semantically segregate all the text messages, which allowed us to single out eight main subgroups. They are presented in *Table 1*, ordered from the most cited ones (the most recurrent in the whole bulk of messages) to the least. The *leading* position was occupied by *earning money* to provide for oneself, which

[1] Mentality is regarded here as a way of thinking typical of a certain ethnic or other social group. This way of thinking manifests itself in emotional, value-related, and intellectual features of an ethnic group's view of the world and distinguishes it from other communities (Kitova, & Kitov, 2020).

connects money and the social world. The dominant social category with which the idea of earning money was most often connected was that of *children* (a family's income is mostly spent on children, and it is for children that the state is supposed to care to a greater extent) and their parents, for whom much public empathy is reserved, given the heavy expenses they carry while raising children and providing for their care.

The interconnection between money and *time* was the second most frequently cited subgroup. This was not connected with the necessity to earn money (and fill one's time with activities aimed at improving one's standard of living): it rather consisted of the fact that as time passed, the users' financial situation did not improve correspondingly, thus leaving the users' income expectations unrealized.

The third category in importance was the *state* (not the population itself), which was still expected to provide a high level of income and use all the resources at its disposal to guarantee the overall (financial included) well-being of the people.

Expenses (the fourth most important group) were discussed by the users in the context of individuals' daily routines. This category intersected the first one (people —children — parents), since all the expenses discussed by the users were connected with the need to support the family financially, bring up the children, and maintain the family's home. A separate point was the need to pay for the housing and communal services that the users considered too expensive (this issue becomes more pressing as gas supply prices for households grow).

By way of illustration, we cite a message that, while not typical or common to many users, was still quite indicative of people's attitude toward communal services and their costs: "… I feel sad because now the financial situation of our family is really bad, and, most likely, I'll have to spend all my money on paying the bills: four of the five members of my family do not earn any money at all." The only category that was not connected with *everyday* expenses was holidays, which were connected with a category such as "tickets." This category was usually associated with visiting mass cultural events and travelling for recreation or pleasure.

The fifth most cited category — *economy* — was represented in the messages through discussions of the state's financial, credit, and fiscal systems; the texts said little about production or the private sector of the economy. The same outlook was evident in how the users analyzed economic policies *philosophically*: their statements concerned the external circumstances and conditions they lived in, rather than the need to undertake something themselves and change their lives. This subject was in the sixth position.

The external locus of control in assessing financial problems was most visible in statements about power (position seven). In these statements the users most frequently criticized civil servants who, in their opinion, are to *blame* for the Russians' poor living conditions by inhibiting the development of the economy (the most recurrent word in this context was "to rob"), failing to perform their direct duties, and being unable to fulfill the commands of the higher authorities (among which were the President's stated mission).

The ideas concerning *income* (position eight) in the users' messages were most frequently related to salaried jobs, and were mainly limited to waiting for a salary,

disbursements, or payouts, rather than connected in any way with individual personal strategies of earning money or with the level/nature of economic activity. As an extreme case of such an attitude, we can cite the following message, although reservations should be made given the author's sarcastic and ironical tone: "… Why can't I just stay at home, get *money* for it, and spend it on BTS merch? Life is pain…"

Table 1

Frequency characteristics of words in generalized semantic categories

Semantic categories	Frequency of words from different categories
PEOPLE Example: … *money* is not the most important thing; it is much more important that you have your nearest and dearest by your side, that you feel support, positive vibes and have memorable moments in your life.	people — 165, children — 108, person — 63, mothers — 46, parents — 34, school children — 34, etc.
TIME Example: This year it's time for me to go to university but I have no idea which one to choose. I am mortally afraid of choosing the wrong one and just throwing away time and *money*.	year — 79, month — 67, time — 67, years — 54, day — 45, moment — 28, week — 26, hour — 23, etc.
COUNTRY Example: A country must invest *money* in its people.	Russia — 83, country — 56, (state) budget — 41, people — 93, development — 30, roads — 28, (national) projects — 28, etc.
EXPENSES Example: … if you decide to take a mortgage on your flat, you need to have enough *money* for the initial payment plus 20-25 thousand rubles for other deal-related expenses.	home — 59, family — 51, flat — 45, things — 33, renovation — 25, debts — 30, gas — 24, shop — 24, ticket (travelling and leisure) — 26, etc.
ECONOMY Example: The Russian economy is like this: bankers take out loans at low interest rates in the West and process this *money* in Russia, lending it to the local people on high rates.	rubles — 72, cards — 65, accounts –49, taxes — 46, banks –29, business –26, etc.
PHILOSOPHY OF LIFE Example: Your child must be your pride. You wife must be your honor. Your husband must be your support. Your friends must be loyal. *Money* must be superfluous. Health must be strong. And life must be beautiful!	life — 61, questions — 59, rights — 33, words — 27, sense — 26, USA — 29, problems –26, etc.
POWER Example: Neither *money* nor power nor popularity as such can spoil a person.	civil servants — 31, missive (of the president) — 31, power — 137, elections — 25, etc.
INCOME Example: I believe that people's real income reveals itself in the possibility of spending *money* on holidays.	work — 94, salaries — 30, payments — 24, etc.

The subgroups described above do not comprise all the categories that can be found in the users' statements. Examples of other attitudes are shown in the following low-frequency statements concerning the activities of various groups of people:

- *psychologists* — "a practicing psychologist is a person who gets *money* from people for sorting out all their mess consisting of home, career, and mental problems;"
- *scientists* — "Russian science is a bottomless pit. Almost all the *money* the government invests in it is spent on the astronomical salaries for a whole army of academicians. No other country in the world has as many members of academies as Russia… But there is a very small number of scientists in Russia;"
- *wealthy people* — "How can normal people have loads of *money*? The answer to this question gives rise to the conclusion: the quantity of rich people is like a list of madmen."

It is important to bear in mind that in the semantic groups specified within this study, we do not have singular examples of statements (which are innumerable on the Internet), but the truly widespread concepts shared by a great number of Russians. As an example of a *typical* such attitude, we can provide a phrase demonstrating how the majority of users mistrusts civil servants: "If only the local bureaucrats could be trained to react properly when they have *money* at their disposal: they must use it to the people's benefit, and not to raise their own salaries and remunerations."

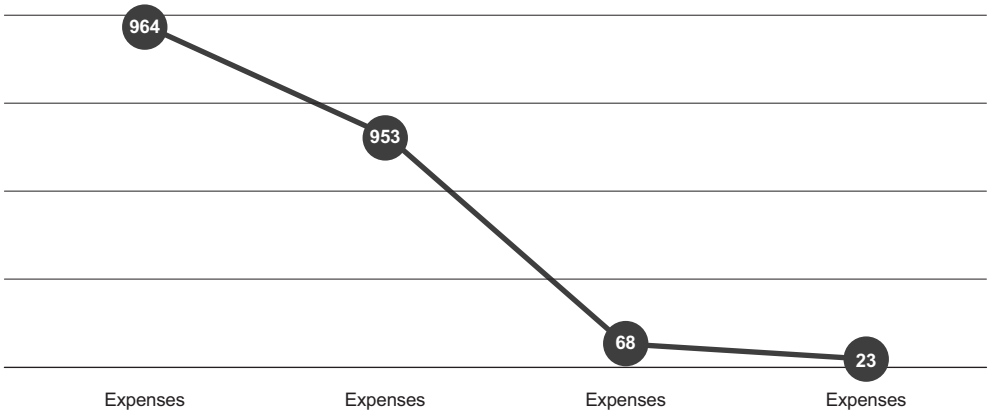
The *second stage* of the study presupposed applying the inductive-deductive strategy to analyze the sample (messages) according to the specific theoretical approaches known from other sources (grounded theory)[2]. We analyzed the messages about the users' financial problems and their *expenses* and *incomes*: their incomes were considered with emphasis on their *sources*, and their expenses were grouped into those connected with *consumption* and *accumulation* (savings and investments). The positions specified according to this principle were coded correspondingly (incomes/expenses), and subsequently counted.

As *Figure 1a* shows, the messages dealing with expenses outnumbered those discussing incomes, while savings and investments were rarely discussed or considered by the users.

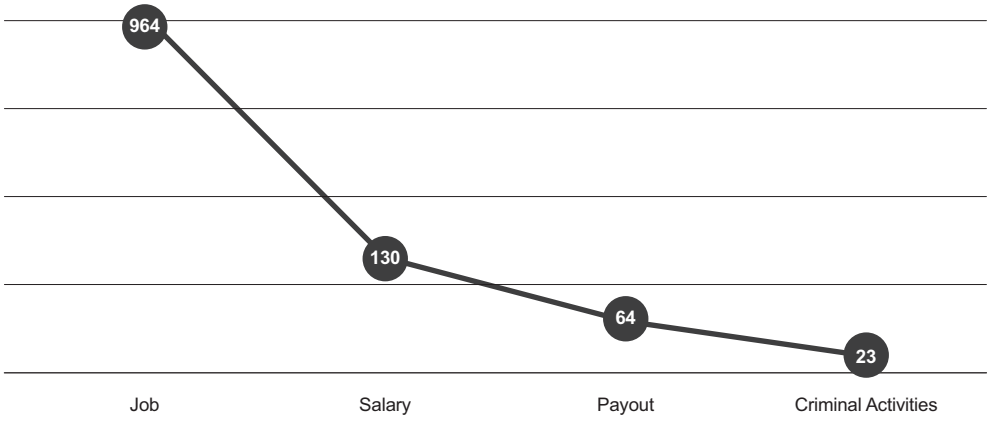
The next stage of coding involved analyzing the messages on income sources (*Figure 1b*). As became evident, the structure of incomes most often allowed us to identify their source as the public sector (job, salary, or payout), while really high incomes were associated with criminal activities, which are regarded as the most efficient way of becoming rich. This last idea needs more detailed analysis if we want to learn on what grounds such assumptions are made.

If we take into account the psychological characteristics of the attitudes toward money represented in the users' messages, we find that people mostly mentioned the function of *social exchange* (communication, mutual help, and support); they also understood that earning money required a certain *intellectual background* and com-

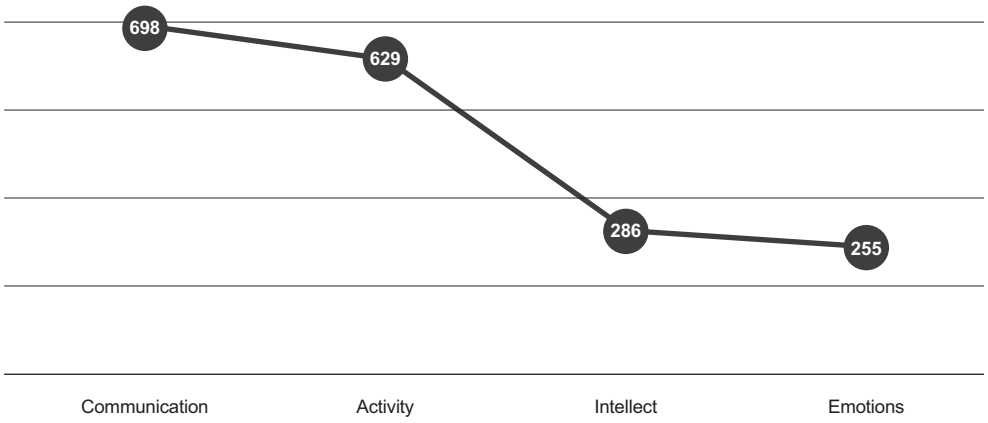
[2] The specific feature of analysis applying grounded theory is that the theories are elaborated on the basis of quality data chosen for the purpose, and not on the basis of the whole bulk of empirical material.



a: The main topics raised when money is discussed



b. The main sources of income in the users' messages



c. Psychological aspects in the users' messages mentioning money

Figure 1. The Twitter users' attitudes toward money: specific features (number)

petences, as well as concrete skills and abilities making oneself suitable for a particular kind of activity (labor, job qualifications, etc.) — see *Figure 1c*. In their messages the users also mentioned their emotional states connected with having or not having money.

If we rely on the trend we have identified, — namely, that the users regarded the circulation of money in the light of mutual help and social exchange — then it would be interesting to take a closer look at the intention of some users to give up this position (probably because of its "counterproductive" nature). One of the messages went as follows: "One shouldn't spend his life on other people and thus throw away *money* and resources. It is necessary to become an EGOIST!" This position, although it sounds like a praise of egoism as a philosophy of life, rather reflects the opposite values of the author: *special efforts* are needed to reject them. Thus, being socially oriented can be regarded as the leading *psychological factor* of Russian users' attitudes toward money.

At the *third stage* of the study, we analyzed the *emotional* tone of the messages. Our analysis revealed that the emotional character of the Russians' attitude towards money was unipolar and exclusively negative: no positive or even neutral emotional evaluations related to money were found in the users' messages. Below there are a few examples that illustrate this point: the intensity of negative evaluation grows from one sentence to another (*Table 2*).

Table 2

Examples of messages with negative emotional background

Emotional tone	Example of messages (tweets)
Examples of messages with *negative* emotional background	… It's quite an ordinary job for which quite ordinary *money* is paid. … God, I do need *money* but I don't have the least idea of how to earn it. … Auction means very big *money* and a very shadowy kind of business. … Make children's sport and hobby clubs free of charge so that all the children could benefit, not only those whose parents have *money*. … Why does a child have no mention of a father in his documents? The answer is, to get payouts! They don't work, they don't pay taxes, they just spend the children's *money* on booze…

For convenience purposes, we divided the characteristic features of the emotional spectrum expressed revealed within the study into 20 parts (*Figure 2*). The figure shows that the most widespread modalities were: slightly negative (1543); moderately negative (1363); expressly negative (586); sharply negative (277); extremely negative (133); expressive vocabulary (48); and obscene vocabulary (29).

If our starting point is the idea shared by many researchers who have studied attitudes towards money, — namely, that this attitude as an economic-psychological phenomenon "accompanies social exchange and is able to produce a compensatory therapeutic effect" (Deineka, 2000, p. 79) — then the Russians' general psychological state with respect to money can be defined as *unsatisfied*, which means that the state of society as a whole can be characterized as tense.

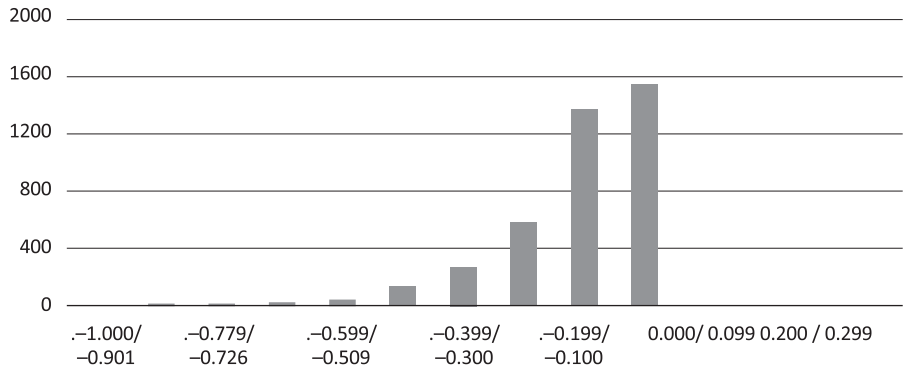


Figure 2. Distribution of emotional tone in the users' messages (June-July 2021) (thousands).

The *fourth stage* of the study involved frequency analysis of the words used in the whole sample, and subsequent comparison of the results with the corresponding data from the Japanese users. To give an overall picture, we specified the 50 most popular words, which are presented below as a weighted list (*Figure 3*). The words are represented by singular categories (without linking elements) and the frequency of each word corresponds to font size: the bigger the font, the more popular the word was.

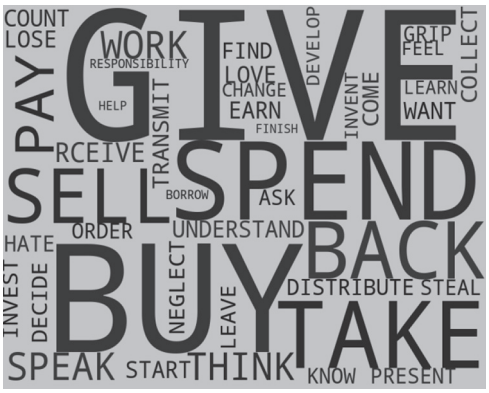
As *Figure 3a* suggests, in the Russian tweets there were three leading words: "*people — bureaucrats — children.*" The second most frequent group was "*job — Russia — country.*" The third was "*years — rubles — month.*" It is important to note that this list of words echoed the attitudes revealed above: *money* was most often associated with people, civil servants, and *expenses* for bringing up children, while *incomes* were related to jobs and to the general situation in the country; the interrelation between *time* and money that has been discussed above is also visible.

In the Japanese sample, the 50 leading words were distributed differently (*Figure 3c*). The top position was occupied by the following three words: "*time — day — month;*" the second level of frequency by the group "*subject — direction — advantage;*" and the third one "*all — question — year.*" Thus, for the Japanese users, money was primarily associated with "time;" then came "subject," "direction" of activity, and the "advantages" that money can give. The third position was represented by connections with the social determination of the problem (all), with questions related to the function of money, and with such categories as "year." Here it is important to highlight the frequency of the calendar periods' distribution: the distribution ranged from a smaller period of time to a larger one; money was regarded as a common value, daily, monthly, and yearly. Such distribution gives an idea of how the Japanese regard money matters: they move from the urgent tasks to the more distant ones, or, at any rate, current affairs have preference over future ones.

If we consider the verbs the tweeters used to represent money-related activities, it becomes evident that the most popular items denoting the Russians' attitude to money were "pay," "spend," and "buy," while the Japanese showed a different set of emphases: "do," "finish," and "be" (*Figure 3b*). Continuing the comparative analysis, we find out that in the Russian sample there were words that were absent in the Japa-

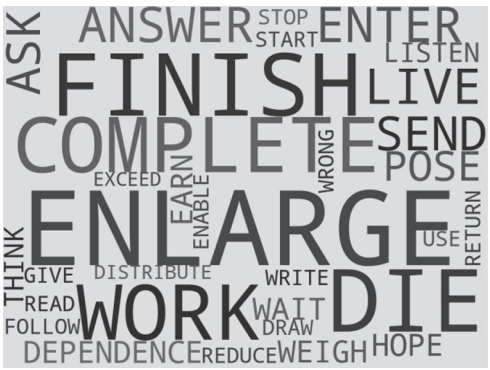
nese one (*3d*), namely, "collect," "distribute," "steal," "provide," "borrow," "seize," etc.). Correspondingly, there were words that were not found in the Russians' messages but were used by the Japanese sample ("be responsible for," "weigh," "hope," "augment," "multiply," "lower," "control," "depend," etc.). In the totality of the Russian words there were also less frequent ones that have not been included in the top 50: "put together," "launder," "embezzle," "racket," "gamble," "beg," etc. In both samples there were words like "earn," "work," "pay back," etc.

a. **Nouns** (Russia)



b. **Verbs** (Russia)

c. **Nouns** (Japan)



d. **Verbs** (Japan)

Figure 3. Psychological features of attitude towards money in Russia and in Japan

Another category of words contained items that the Twitter users from both countries used but with a notable difference in frequency. Thus, words denoting various kinds of money-related activities made up the top 10 in the Japanese sample ("augment," "lower," "multiply," "spread," "weigh," etc.), while in the Russians' messages, they were also used ("invent," "create," "augment," "manage," etc.) but were not even in the top 100.

Quite specific differences also emerged from the messages of Japanese users, whose interests and view of life do not match the substantial features of the Russian mentality. Below are three examples of how the Japanese tackled certain problems that found little or no correspondence in the discussions between the Russian users:

- "Will cod roe *pay off*?" — the Russians did not discuss cost prices in their messages;
- "The pandemic makes many people *lose* money" — in the Russians' messages, it was not common to discuss the correlation between the pandemic and lower standards of living; and
- "The fact that he lied to another person for his benefit does not mean he is a bad man; it is the *country* in which one can easily deceive people that is bad" — this way of reasoning about the country's government system was not found in the Russians' messages.

Conclusion

1. The informational-analytical study of Internet texts according to their psychological content — a kind of study which cannot be performed in the individual, "manual" way due to the huge volume of material — is becoming more and more *popular* with researchers who use program products to conduct automatic analysis and provide psychological interpretation of the information obtained.

2. The statements that reveal Russians' characteristic attitudes towards money can be grouped into eight main categories (people, time, country, expenses, economy, philosophic speculations, power, and incomes). These statements include both individually (buy, earn, spend, etc.) and socially oriented positions (help, borrow, put together, etc.)

3. The main economic operations with money, in the Russian Twitter users' views, were centered on expenses and incomes that came from *paid jobs*; they gave little or no attention to entrepreneurial activities. The economic operations that were long-term or that implied accumulating money (savings and investments) were not among the topics most widely discussed; the users seemed not to be profoundly interested in them.

4. The structure of the Russians' incomes throughout all the texts we studied was represented by such references as "job," "salary," and "payout," which led us to conclude that paid jobs and social disbursements from the state were the *main* (most common) sources of income for this Russian population. Similarly, when the Russian users discussed and planned their future incomes, the 50 most common verbs denoting current and prospective activity had little to do with technologies and ways of enrichment outside paid jobs (for example, business, housekeeping, creative work, etc.) These results show the entrepreneurial inactivity of the users and the prevalence of expecting financial support from the state.

5. The word frequency analysis we performed revealed that the Russians' main expenses were concentrated on the financial support of their families and solving their current financial problems; a rare — if not the only — case of spending money not connected with everyday life expenditures was putting aside a certain amount of money supplies for family *holidays*.

6. A comparative analysis of word frequency between the Russian and Japanese tweets, confirmed the existence of very specific features typical of these two ethnic groups o; the differences concerned both incomes/ expenses structure and patterns

of financial planning. The differences also became evident when money-related economic issues were discussed. These results clearly denote that there are *important typological* features that are probably determined by the mental characteristics of different ethnic groups; these characteristics, in their turn, are determined by centuries-long cultural and historical processes in the countries in question.

7. When it comes to attitudes toward money, it became clear that there were a number of distinctive features shared by the majority of users from Russia and Japan, which were revealed through comparative analysis of their messages. This implies that it is necessary to perform detailed economic-psychological research on the attitude toward money that members of these ethno-cultural communities hold, and to find out which psychological factors determine the differences. This can be regarded as a *worthwhile objective* for further research.

Final considerations

The present paper is illustrative of how research based on automatized analysis of texts for psychological science purposes is being carried out today. Among other things, it demonstrates the main methodological approaches currently being applied for such purposes, such as frequency analysis of words and word-combinations, assessment of the emotional background of short informal texts, bibliographic analysis of scientific literature, and scientometric analysis of trends in psychological studies. As a result, one can conclude that studying "digital traces" for psychological science purposes, despite all reservations, could be characterized as a "paradigm shift" in the empirical study of social phenomena. Although using program tools and outcomes of automatic analysis to describe psychological regularities in people's behavior and activity is not yet suitable for creating a coherent picture of modern people's social life, nonetheless it is a good way to assess numerous psychological elements of human life in an adequate way.

Within this type of study, it seems most important to uncover regular correlations between the overall psychological characteristics of a population and the existing social-economic state in which the society finds itself. The elaboration of this study trend is connected with the fact that "the long-lasting evolution of production, and the breakthrough development of technologies and techniques make it necessary to adjust the objectives of civilizational development, and thus human beings come to the fore, both as factors and as objectives of further social development" (Dobrokhleb, 2018, p. 144).

Method limitations

While assessing the use of information methods for analyzing psychological phenomena, one can note a number of advantages: the speed of scientific research grows; the information base widens; scientific production becomes cheaper; accumulations of digital information are used more and more efficiently; conditions are created for studying general phenomena relevant to the society as a whole; and there is the opportunity to develop systems of monitoring the social-psychological climate in small social groups, in the workplace, and in society generally.

Along with the advantages that "digital" research technologies give, one should also mention their drawbacks: the need for innovative systems which will allow us to analyze and standardize primary data; the lack of specialists with interdisciplinary competences; the difficulties in dealing with the conceptual and terminological framework in the situation of cultural diversity; and so forth. Among the particular problems related to automatized text analysis, one can mention: the fact that certain words, concepts, and terms have a range of synonyms; the interpretation difficulties that arise when even full recognition of all the elements of a certain lexical item cannot guarantee its correct interpretation outside the context of the message; the information limits that a given library or archive has; the limited foreign language competences of the specialists; the limits that the research base has due to its being rooted in a particular language environment; and so forth.

In spite of all the drawbacks, it seems evident that the theoretical and methodological approaches and methods of this kind of research will continue to evolve, thus creating the necessary conditions for obtaining new scientific results.

Ethics Statement

Messages from social network users were extracted from open sources on the Internet and presented in accordance with the requirements of the Federal Law "On Personal Data".

Author Contributions

The concept of the study, structure and meaningful execution were conceived and implemented with the joint participation of all the authors of the article, as well as the final conclusions of the study. The developer of software tools for the collection and automated analysis of data (texts) is M.A. Kitov.

Conflict of Interest

The authors declare that they have no conflicts of interest.

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PSYCHOMETRICS

New Psychometric Evidence of a Bifactor Structure of the Emotional Regulation Questionnaire (ERQ) in Ecuadorian College Students

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Background. Emotion Regulation comprises a set of strategies (cognitive, emotional, and physiological) that allow individuals faced with internal or external stimuli to manage their emotional response, to adapt to the environment, and to achieve goals. The Emotion Regulation Questionnaire (ERQ) is used to assess Emotion Regulation. It has been translated into several languages (including Spanish) and has been adapted around the world, but its psychometric properties have not been tested in Ecuador.

Objective. To confirm the bifactor structure of the Emotion Regulation Questionnaire and its reliability in a sample of Ecuadorian college students.

Design. A quantitative and instrumental study using Confirmatory Factor Analysis with Robust Maximum Likelihood estimation. The sample consisted of 400 participants (62.5% women), aged 18 to 25 (M = 21.1; SD = 1.95) from two universities in Ecuador and seven different undergraduate courses.

Keywords:
Confirmatory Factor Analysis, emotion regulation, reliability, students, validity

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Results. The bifactor model of the test is confirmed with an adequate adjustment $\chi^2 = 35.99$; $p > .001$; $\chi^2/df = 1.43$; CFI = .98; TLI = .96; SRMR = .034; and RMSEA = .033 $CI_{95\%}$: [.033–.052]; $\omega_H = .70$; $\omega_{Hs1} = .23$; $\omega_{Hs2} = .35$. Reliability is high with $\omega = .86$ $CI_{95\%}$: [.81–.88]. **Conclusion.** The bifactor model of the ERQ is an adequate and reliable test to assess Emotion Regulation among Ecuadorian college students.

Introduction

Emotion Regulation (ER) comprises a set of strategies (cognitive, emotional, and physiological) that allow individuals faced with internal or external stimuli to manage their emotional response, to adapt to the environment, and to achieve goals (Gross, 1999; Gross & John, 2003). Research in ER has grown exponentially due to the important role it plays in social adaptation and the development of certain psychopathologies (Aldao et al., 2010; Zumba-Tello & Moreta-Herrera, 2022), but also in the integral development of a person (Momeñe et al., 2017).

The Emotion Regulation Questionnaire (ERQ) (Gross & John, 2003) is used to evaluate ER; it is composed of 10 items and assesses two independent regulation strategies:

1. Cognitive Reappraisal (CR), an anticipatory strategy that allows reinterpretation and evaluation of context before the emotional response to modulate behavior when faced with triggering stimuli. Cognitive reappraisal is measured by six questions, such as: "When I want to feel a more positive emotion (such as joy or amusement), I change what I'm thinking about" or "When I want to feel a less negative emotion (such as sadness or anger), I change what I'm thinking about".
2. Emotion Suppression (ES), which allows the modulation of emotions while the individual experiences them, is measured by four questions, such as: "I keep my emotions to myself" or "When I am feeling positive emotions, I am careful not to express them" (Aldao et al., 2010; Balzarotti et al., 2010; Gross, 2007). The ERQ shows a Likert-type structure with seven response options, where 1 corresponds to "strongly disagree" and 7 corresponds to "strongly agree".

The ERQ has been translated into several languages and validated around the world. Evidence of a two-factor orthogonal model (CR and ES without correlation) was presented in Italy (Balzarotti et al., 2010); Germany (Abler & Kessler, 2009); Spain (Cabello et al., 2013; Rodríguez-Carvajal et al., 2006); Portugal (Teixeira et al., 2015); Australia and the United Kingdom (Spaapen et al., 2014), and the USA (Preece et al., 2021); while studies showed evidence of a two-factor oblique model (CR and ES correlated) in Sweden (Enebrink et al., 2013); Peru (Gargurevich & Matos, 2010); Ecuador (Moreta-Herrera et al., 2018; Moreta-Herrera et al., 2021a), and Australia (Preece et al., 2020). Both two-factor adjustment models (orthogonal and oblique), present adequate internal consistency reliability as well as convergent validity when

compared with other tests (health, well-being, emotional intelligence, among others). In the case of Ecuador, no studies on the factorial structure of the ERQ have been found in the scientific literature, which raises the importance of the present research.

Methodological Implications of the Validation of Tests

Having tests translated, adjusted, and adapted to the context in which the ERQ or any other test is applied is one of the challenges of evidence-based instrumental research. Contemporary empirical research has focused more on social and psychic phenomena than on the development and validation of assessment tools. The use of assessment tools without proper instrumental validation can compromise results from the beginning, due to the absence of calibration (Moreta-Herrera et al., 2019), which leads to measurement errors and biases (Elosua, 2003). This can also cause errors in decision making, testing hypotheses, and diagnosis (Rönkkö et al., 2015).

Many researchers do not report the proper nature of the test items (commonly a Likert-type scale), which is problematic, since depending on the number of options, they may assume an ordinal (five options or less) or continuous (more than five options) nature. This is relevant because multivariate normality is usually less likely in the former. In addition, the absence of multivariate normality is very common in social science research (Jin & Cao, 2018; Li, 2016). This results in the incorrect use of statistical tests during the validation processes, which do not correspond to the nature of the items or the assumption of multivariate normal distribution (Sullivan & Artino, 2013). These errors are observed in different statistical validation and reliability processes such as Exploratory Factor Analysis (EFA) with Principal Components Analysis (PCA), Confirmatory Factor Analysis (CFA) with Maximum Likelihood (ML), internal consistency reliability with Cronbach's alpha (α), among others.

Considerations in Confirmatory Factor Analysis and Reliability

CFA is a statistical method widely used as evidence for the construct validity of a measure (Ferrando & Anguiano-Carrasco, 2010). It requires a considerable sample size (Brown, 2015), the confirmation of multivariate normality (Cain et al., 2017), and the nature of the variables (categorical, ordinal, or interval) (Hair et al., 2004). The treatment of data and the decision whether to employ normal or robust estimators will depend on whether these criteria are met.

CFA is generally calculated with the Maximum Likelihood Estimation method (ML) (Li, 2016), which assumes that the observed indicators (items) follow a continuous and multivariate normal distribution (Myung, 2003). In the case of psychological tests, this is not the most suitable method, as items usually have an ordinal nature (Gitta & Bengt, 2009) and continuous multivariate normal distribution is unlikely (Holtmann et al., 2016). Therefore, CFA requires estimators appropriate to these characteristics such as the Diagonally Weighted Least Squares (DWLS) method or robust estimations such as Robust Maximum Likelihood (MLR) or Weighted Least Squares with Adjusted Mean and Variance (WLSMV) (Jin & Cao, 2018). These methods, especially MLR, are recommended, as they reduce biases compared to ML. This helps to obtain stronger evidence of validity, regardless of the number of categories of

the item and without multivariate normal distribution as long as a large sample size is analyzed ($n > 200$) (Li, 2016).

Previous studies confirm an orthogonal two-factor model (Abler & Kessler, 2009; Balzarotti et al., 2010; Cabello et al., 2013; Preece et al., 2021; Rodríguez-Carvajal et al., 2006; Spaapen et al., 2014; Teixeira et al., 2015) of the ERQ (Gross & Jhon, 2003), although an alternative configuration of an oblique two-factor model is also proposed (Enebrink et al., 2013; Gargurevich & Matos, 2010; Moreta-Herrera et al., 2018; Preece et al., 2020). The different configurations of the models in these studies are probably due to particular characteristics of the reference samples, differences in language, and the estimators used in factor analysis (ML estimation is predominant in validation studies, which induces a greater measurement bias) (Caycho-Rodríguez et al., 2021; Jonason et al., 2020; Moreta-Herrera et al., 2021b).

Due to the presence of moderate factor correlations in preliminary studies, there is likely to be a third latent factor that groups all the items of the scale into a single factor; this would be explained through a bifactor model composed of a general factor (GF) and two specific factors (SF). This model best represents the multidimensionality of the construct and recognizes the uniqueness of the factors that compose it, but also the binding capacity of the items in a general factor (Stefansson et al., 2016), allowing a better interpretation of the factors as well as a global reading of the construct, so its use is becoming more common in validation studies. In the case of the ERQ, there is no preliminary evidence of a bifactor adjustment model.

Something similar occurs when determining the internal consistency reliability of the ERQ through Cronbach's alpha coefficient (α) (Sijtsma, 2009), a test that requires a significant number of cases for its analysis, as well as a continuous multivariate normal distribution. However, evidence suggests that using Cronbach's alpha is not ideal for this purpose (Trizano-Hermosilla & Alvarado, 2016), due to the ordinal nature of the items; Cronbach's alpha does not consider this aspect, and its use is recommended only when the measurement scale has six or more options and the normal distribution assumption is met (Elosua Oliden & Zumbo, 2008). As a result, researchers underestimate or overestimate the true reliability of the measure; therefore, its use is not recommended (Ventura-León & Caycho-Rodríguez, 2017). Given this situation, it is methodologically correct to use reliability estimators according to the nature of the items, such as the omega coefficient (McDonald, 1999), which shows less bias in the assessment of reliability (Dunn et al., 2014), or the ordinal coefficient alpha (Elosua Oliden & Zumbo, 2008).

Given these antecedents, there are still doubts that still need to be clarified about the best factorial fit of the ERQ, as well as other psychometric properties such as reliability, for their correct use in social research and intervention, especially in the Latin American and Spanish-speaking population.

Objectives and Hypotheses

Based on the analysis contained in this text, the objectives of this study are a) to confirm the bifactor structure of the Emotion Regulation Questionnaire, comparing an orthogonal and an oblique two-factor model as well as a bifactor model with a general factor (see Figure 1) in a sample of Ecuadorian college students. It is hypoth-

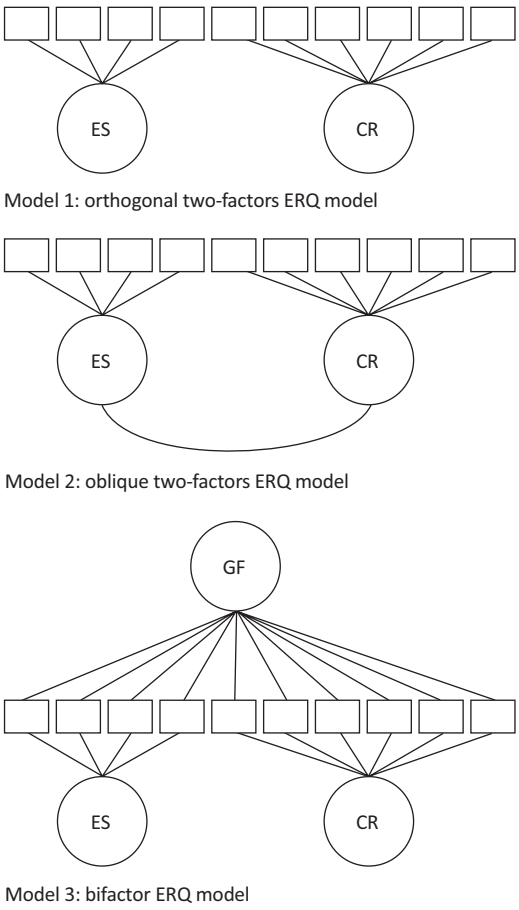


Figure 1. Different Models of the Emotion Regulation Questionnaire Evaluated in the Study

esized that the bifactor model is the model with the best fit; b) to estimate the internal consistency reliability of the ERQ model with the best fit. It is hypothesized that the ERQ has an optimal and adequate adjustment for Ecuadorian college students.

Method

This study applied a quantitative and instrumental descriptive design (Ato et al., 2013) to confirm the model of two correlated factors of the ERQ in a sample of Ecuadorian college students through appropriate statistical tests for ordinal variables.

Participants

Our sample included 400 college students, aged 18 to 25 years (M = 21.1 years; SD = 1.95), where 62.5% are women and 37.5% are men. In terms of ethnicity, most identified as mestizos (97.8%), while a few identified as white or indigenous (2.3%).

In addition, 86% are located in urban areas and 14% in rural areas. Participants are students from two universities in Ambato, Ecuador; one public (62.5%) and one co-financed (37.5%), and from seven different undergraduate courses. Finally, 36.8% of the sample receive financial aid, and 3.1% present academic risk due to poor performance.

Participants were selected through a non-probabilistic convenience sampling with the following inclusion criteria: a) voluntary participation through a signed consent letter; b) enrollment and regular class attendance; and c) adequate mental health to carry out the psychological evaluation process.

Procedure

After permission was given by the authorities of the participating universities, the psychological evaluation began. All students interested in the research project were summoned to receive information about the objectives of the study and the activities they would perform. Before the general evaluation, a pilot test was carried out with 30 participants to learn details about the evaluation time and language adaptations that could be necessary for the items of the test.

Once in the global evaluation, participants signed a letter of consent before beginning the psychological assessment. After the evaluation, data was refined and digitized for subsequent statistical analysis and hypothesis verification. With the results achieved, the written report was prepared and approved.

Instrument

Emotion Regulation Questionnaire (ERQ; Gross & John, 2003) in its Spanish version (Rodríguez-Carvajal et al., 2006) and adapted to Ecuadorian college students (Moreta-Herrera et al., 2018). It has 10 items measured on a five-point Likert scale, ranging from strongly disagree (1) to strongly agree (7), in which Cognitive Reappraisal and Emotion Suppression strategies are measured.

Data Analysis

Data analysis was divided into three blocks. The first block corresponded to preliminary analysis, to learn the behavior of the variables using measures of central tendency, dispersion, and distribution. The univariate normality assumption was verified due to the values of skewness and kurtosis being within the parameter ±1.5 (Ferrando & Anguiano-Carrasco, 2010). Finally, the assumption of multivariate normality was checked through the Mardia test, where skewness and kurtosis were found to be not significant ($p > .05$) (Cain et al., 2017; Mardia, 1970).

The second block corresponded to the CFA with the RML estimator, which is reported as the most appropriate estimator considering the continuous nature of the variables and the absence of multivariate normality (Holtmann et al., 2016; Jin & Cao, 2018). Three models have been tested: a) an oblique two-factor model; b) an orthogonal two-factor model; and c) a bifactor model with two specific factors (SF) and a general factor (GF). The analysis verified that standardized factor loadings were

$\lambda > 0.5$, which positively contributes to the explained variance (Hair et al., 2004). Different adjustment levels were also analyzed: a) absolute fit indices through the Chi-squared test (X^2), normed Chi-square (X^2/df), and the Standardized Root Mean Square Residual (SRMR); b) relative fit indices such as the Comparative Fit Index (CFI) and the Tucker-Lewis Index (TLI); and c) a non-centrality-based index through the Mean Square Error of Approximation (RMSEA). A model has an adequate adjustment when χ^2 is not significant ($p > .05$) or χ^2/df is less than 4, CFI and TLI are greater than 0.9, and SRMR together with RMSEA are less than 0.08 (Brown, 2015; Byrne, 2008; Ferrando & Anguiano-Carrasco, 2010; Mueller & Hancock, 2018; Wolf et al., 2013). For the bifactor model, the Hierarchical Omega adjustments for the general factor (ω_H), the specific factors (ω_{Hs}), and the Common Explained Variance (ECV) were also tested. The bifactor model presented an adequate adjustment with $\omega_H >= .70$, ECV $>= .70$, and the $\omega_{Hs} >= .30$ (Reise et al., 2013; Rodríguez-Lara & Rodríguez, 2017; Rodriguez et al., 2016).

The third block included analysis of internal consistency of the ERQ using the omega coefficient (ω, McDonald, 1999; Ventura-León & Caycho-Rodríguez, 2017), together with the confidence intervals that ensure a better estimate of internal consistency (Domínguez-Lara & Merino-Soto, 2015). All data analyses were performed using R software (R Core Team, 2019), an open-access program.

Results

Preliminary Analysis

Table 1 shows that the item scores are generally concentrated in the middle of the response scale, displaying a moderate distribution. Univariate normality analysis shows that this assumption is fulfilled based on the fact that both skewness and kurtosis scores are within the normal range (±1.5); while the assumption of multivariate normality is not met since the Mardia test shows significance for both skewness and kurtosis.

Table 1

Preliminary Analysis of the ERQ Items

Item		*M*	*SD*	Skew	Kurt
Cuando quiero incrementar mis emociones positivas (p.ej. alegría, diversión), cambio el tema sobre el que estoy pensando.	When I want to feel more positive emotion (such as joy or amusement), I change what I'm thinking about	4.84	1.65	–0.79	–0.14
Guardo mis emociones para mí mismo	I keep my emotions to myself	4.71	1.69	–0.61	–0.46
Cuando quiero reducir mis emociones negativas (p.ej. tristeza, enfado), cambio el tema sobre el que estoy pensando	When I want to feel less negative emotion (such as sadness or anger), I change what I'm thinking about	5.05	1.56	–0.74	–0.21

Cuando estoy sintiendo emociones positivas, tengo cuidado de no expresarlas	When I am feeling positive emotions, I am careful not to express them	3.58	1.71	0.12	–1.03
Cuando me enfrento a una situación estresante, intento pensar en ella de un modo que me ayude a mantener la calma	When I'm faced with a stressful situation, I make myself think about it in a way that helps me stay calm	4.85	1.67	–0.70	–0.40
Controlo mis emociones no expresándolas	I control my emotions by not expressing them	4.04	1.71	–0.12	–0.85
Cuando quiero incrementar mis emociones positivas, cambio mi manera de pensar sobre la situación	When I want to feel more positive emotion, I change the way I'm thinking about the situation	4.68	1.60	–0.65	–0.21
Controlo mis emociones cambiando mi forma de pensar sobre la situación en la que me encuentro	I control my emotions by changing the way I think about the situation I'm in	4.79	1.45	–0.52	–0.09
Cuando estoy sintiendo emociones negativas, me aseguro de no expresarlas	When I am feeling negative emotions, I make sure not to express them	4.39	1.62	–0.30	–0.60
Cuando quiero reducir mis emociones negativas, cambio mi manera de pensar sobre la situación	When I want to feel less negative emotion, I change the way I'm thinking about the situation	4.86	1.56	–0.67	–0.13
				Mardia	**951.8*** **	**29.2***

*Note. * p < .05; *** p < .001; M: sample mean; SD: standard deviation; Skew: skewness; Kurt: kurtosis*

Confirmatory Factor Analysis

Table 2 shows the results of the fit indices of the three models of the ERQ evaluated in this study. The first model is the original one proposed by Gross & Jhon (2003); the second one is the oblique two-factor model; and the third corresponds to the bifactor model. Applying the MLR estimator, the oblique two-factor model (with a moderate latent correlation of ρ = .56) and the bifactor model of the ERQ presents an adequate adjustment as shown by absolute fit indices (χ^2, χ^2/df, SRMR), relative fit indices (CFI, TLI), and non-centrality-based index (RMSEA). The fit values for the bifactor model are better than those of the oblique two-factor model. The ANOVA function for SEM carried out by the Satorra-Bentler scaled Chi-square difference test (Satorra & Bentler, 2001) identifies the differences of adjustment of the Chi-squared and presents significant differences ($p < .05$) between the models, with $\chi^2_{\text{(bifactor – oblique two-factor)}} = 59.26$; $df_{\text{(bifactor – oblique two-factor)}} = 9$; $p < .001$, so the bifactor model is a better fit than the oblique two-factor model.

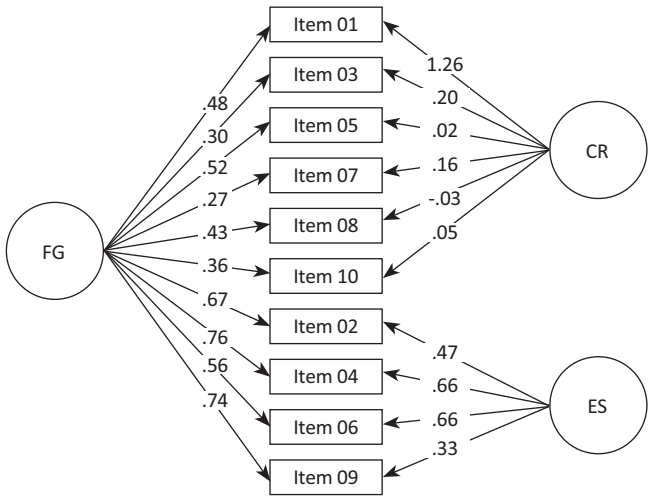
Table 2

Confirmatory Factor Analysis of the ERQ with MLR Estimation

Models	χ^2	*df*	χ^2/df	CFI	TLI	SRMR	RMSEA
Orthogonal two factors	154.12***	35	4.40	.83	.79	.17	.09 [.08–.11]
Oblique two factors	99.45***	34	2.93	.91	.90	.06	.07 [.06–.08]
Bifactor	35.99	25	1.43	.98	.96	.03	.03 [.01–.05]

Note. χ^2*: Chi-squared test; df = degrees of freedom;* χ^2/df*: normed Chi-square; CFI: Comparative Fit Index; TLI: Tucker-Lewis Index; SRMR: Standardized Mean Square Residue; RMSEA: Mean Square Error of Approximation*

Regarding the CFA of the ERQ, factor loadings of the bifactor model were tested. Figure 2 shows that the behavior of standardized factor loadings (λ) through the general factor is more consistent than through the specific factors of the ERQ; therefore, the general factor presents a better explained variance than the specific factors. This is confirmed with better adjustment of the ω_H and moderate adjustment of the ECV and PUC for the general factor when compared to the specific factors.



ω_H = .70; ω_{Hs1} = .23; ω_{Hs2} = .35; ECV = .50; PUC = .53

Figure 2. Bifactor Model of the Emotion Regulation Questionnaire

Note: Circles represent the latent variables that comprise errors and factors (Cognitive Reappraisal and Emotion Suppression), while rectangles represent the observed variables that are the test items.

Reliability Analysis

Table 3 presents the omega coefficient (ω) values with their respective confidence interval of each of the ERQ factors, which report an acceptable degree of internal consistency; this is evidence that the ERQ is a reliable instrument for Ecuadorian college students. Furthermore, the intercorrelations of the ERQ factors with their

overall score show that the factors have moderate and high levels of correlation, so it is estimated that they contribute significantly to the model.

Table 3

Analysis of Reliability and Intercorrelations of the ERQ

Factor	ω CI 95%	CR	ES	ERQ
Cognitive Reappraisal	.85 [.83–.87]	1	.303**	.713**
Emotion Suppression	.75 [.71–.79]		1	.624**
Global	.86 [.84–.88]			1

Note. ** *p < .01; ω: McDonald´s omega coefficient; CR: Cognitive Reappraisal; ES: Emotion Suppression; ERQ: Emotion Regulation Questionnaire*

Discussion

The objectives of this study were to identify the best adjust model of the ERQ, as well as its reliability in a sample of Ecuadorian college students. Regarding the CFA procedure, given the absence of multivariate normality and the continuous distribution of the observed variables (see Table 1), the use of a robust estimator was necessary (Gitta & Bengt, 2009; Holtmann et al., 2016). Robust Maximum Likelihood estimation (MLR) was chosen, since this method presents the best results in the cases indicated for its use (Li, 2016). In addition, the use of MLR is justified not only in the preliminary criteria to the CFA, but also due to its recent use in similar validation processes of the ERQ (Preece et al., 2020).

CFA with MLR estimation found that the oblique two-factor and the bifactor models are optimum and consistent. Absolute Fit Indices (χ^2, χ^2/df and SRMR), Relative Fit Indices (CFI, TLI), and the non-centrality-based index (RMSEA) (Brown, 2015; Byrne, 2008; Ferrando & Anguiano-Carrasco, 2010; Mueller & Hancock, 2018; Wolf et al., 2013) reflect adequate values. This confirms the good fit of the ERQ for Ecuadorian college students. The results presented in this study are consistent with those presented previously (Enebrink et al., 2013; Gargurevich & Matos, 2010; Moreta-Herrera et al., 2018; Preece et al., 2020), and differ from the orthogonal two-factor model proposed by Gross & Jhon (2003) and from other similar validation studies (Abler & Kessler, 2009; Balzarotti et al., 2010; Cabello et al., 2013; Preece et al., 2021; Rodríguez-Carvajal et al., 2006; Spaapen et al., 2014; Teixeira et al., 2015), since the orthogonal two-factor model did not present a relevant fit.

Likewise, there is a latent interfactorial correlation in the oblique model (ρ), which allows exploring a new multidimensional model through a bifactor model, which encompasses all its items in a general factor, while respecting the uniqueness of the specific factors (Stefansson et al., 2016). This model has better factorial configuration settings (Reise et al., 2013; Rodriguez et al., 2016; Rodríguez-Lara & Rodríguez, 2017) and differs significantly from the previous model ($X^2_{\text{(bifactor – oblique two-factors)}} = 59.26$; $df_{\text{(bifactor – oblique two-factors)}} = 9$; $p < .001$); consequently, its use is recommended. This is relevant in psychometric research because it proposes a multidi-

mensional model of which there are no previous reports. This will allow in the future new processes of normalization of the scores considering the global result of the test, which was previously inadequate, and reveals an unexplored composition of this assessment tool that maximizes the interpretation of the construct Emotion Regulation. However, since these findings do not yet have supporting evidence, they should be viewed with caution pending future confirmatory studies.

Regarding reliability, it was found that both McDonald's coefficient scores and their confidence intervals (CI) are within accepted parameters (Domínguez-Lara & Merino-Soto, 2015; Ventura-León & Caycho-Rodríguez, 2017), with both of the internal components (Cognitive Reappraisal and Emotion Suppression) and with the global assessment. In the context of Ecuador, these results (CFA and reliability) share similar conclusions to those of previous research of Moreta-Herrera et al. (2018) with psychology students. However, due to the modification of the methodology, it is necessary to be cautious with future comparisons because there are no similar studies that serve as a reference.

Conclusion

Both CFA with RML estimation and reliability through McDonald's coefficient (1999) of the ERQ bifactor model show adequate validation results. Thus, there is sufficient evidence of validity (Elosua, 2003) for the use of the ERQ in research and diagnosis in samples of Ecuadorian college students. Given the methodological variants used at the time of this analysis, new confirmatory studies are required to verify the factorial structure of the ERQ in other contexts.

Within the implications of the present study for instrumental research, the gate is open for the strengthening of this line of research in Ecuador and the region. An updated methodological framework is offered, and its use is recommended for validation processes of psychological tests. Three innovations are presented: a) CFA with a robust method (MLR); b) the omega coefficient (ω) for internal consistency with the confidence intervals; and c) a new factor configuration of the scale. The first two are recommended for an adequate analysis for continuous variables that do not present normal distribution, and the third one to improve the assessment of the real reliability of a test. Finally, the results obtained in the ERQ analysis allow us to confirm that it shows good validity in terms of factorial structure and high reliability.

Limitations

One of the main limitations of this study is related to the lack of other validation processes such as convergent and discriminant validity, which were not carried out due to limitations inherent to the study, since no information was collected that would allow this process. For future research, it is recommended to take this aspect into account for more in-depth studies. This study only analyzes the factorial validity of the ERQ test, but not the measurement invariance for multigroup studies (culture, sex, age groups, and others). Therefore, this should be considered and confirmed in advance as a preliminary step for comparative studies. Finally, only students from two

universities in Ecuador were considered; therefore, we recommend replicating this study with other types of populations such as adolescents, the general population, and others.

Acknowledgments

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Ethics Statement

All procedures performed in studies involving human participants followed the ethical standards of the Pontificia Universidad Católica del Ecuador Sede Ambato research committee and the 1964 Helsinki Declaration and its later amendments, or comparable ethical standards.

Author Contributions

Rodrigo Moreta-Herrera, Mónica Perdomo-Pérez, and Diego Vaca-Quintana oversaw the bibliographic search and the formulation of the introduction; Hernán Sánchez-Vélez, Pamela Camacho-Bonilla, and Fabricio Vásquez de la Bandera performed the data collection and introduction and methodology; Rodrigo Moreta-Herrera, Sergio Domínguez-Lara, and Tomás Caycho-Rodríguez performed the statistical management, the results, and the formulation of the discussion. All authors reviewed the final version of the text and gave their consent and approval.

Conflict of Interest

The authors declare no conflict of interest.

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Translation, Adaptation, and Validation of a Multitasking Instrument in the Context of Collectivist Asian Culture

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Background. Multitasking is a rapidly evolving construct and we are in dire need of a sound tool for measuring multitasking behaviors and abilities across socio-cultural contexts. To this end, this study has put forward a cultural adaptation (through back translation) of an already developed (Kushniryk, 2008) measure i.e., Communication Specific Multitasking Measurement Instrument.

Objective. This study is intended to translate, adapt, and validate a multitasking measure i.e., Communication Specific Multitasking Measurement Instrument (CSMMI; Kushniryk, 2008) in the context of collectivist culture in Pakistan.

Design. The study was composed of two parts. The first part was completed in two phases. Phase I employed back and forward translation methods to translate the multitasking measure into an indigenous language. Phase II provided empirical validity of the translated and adapted instrument (CSMMI) using exploratory factor analysis (EFA) on data collected from a sample of 230 married individuals. The second part of the study was designed to establish construct validity of the translated instrument using confirmatory factor analysis (CFA) on a larger data set of married individuals.

Results. EFA using a varimax rotation on all 19 items of CSMMI showed that the instrument is a three-dimensional measure. CFA confirmed that the translated and adapted instrument is also a three-dimensional measure on the larger data set. Analysis of the intraclass correlation and alpha coefficient provided sound evidence for validity and reliability of the measure (CSMMI).

Conclusion. The findings of this study indicate that the translated and adapted multitasking measure (CSMMI) is reliable and valid when applied to the culturally collectivist population of Pakistan. This also pertains to any other populations where the translation is adequately applicable.

Keywords: Multitasking measure, empirical validity, construct validity, perceived multitasking ability, adaptation and validation

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Introduction

The act of carrying out any two or more activities simultaneously is referred to as multitasking. The most common forms include watching television while eating, walking while eating, driving while talking on the phone, and typing while listening to music (Widyahastuti & Anwar, 2017). Some people believe that accomplishing several activities at once (multitasking) is a good thing and can increase productivity. In order to reach an adequate performance and achieve a certain goal, these people accept that multitasking is essentially required and may develop a preference for multitasking (Sanbonmatsu et al., 2013). Though multitasking is described as a behavior in which an individual is engaged in several tasks at the same time, it also refers to an ability to handle these tasks and to switch quickly between tasks if that is required for successful performance. Jarmon (2008) explained that multitasking can manifest in three ways. A person is either able to work on two or more tasks simultaneously, such as reading while watching television, switch between tasks repeatedly, such as alternating between answering e-mails and listening to discussions during class, or complete two or more tasks with speed and accuracy. Similarly, Kushniryk (2008) defined multitasking as completing a set of jobs within a certain time period, either simultaneously or with frequent and swift transitions between one task and another. Kushniryk (2008) also proposed multitasking as a multi-faceted construct. Namely, there are four facets to multitasking: general multitasking abilities, multitasking on a computer, the ability to perform two primary tasks simultaneously, and the ability to perform primary and secondary tasks simultaneously.

Organizations treat an ability to multitask as an essential element of any job description and a central demand in almost every job. Many researchers have stressed that an employee's multitasking ability is entirely necessary for effective performance and productivity (Buhner et al., 2006; Sanderson et al., 2013). An inclination to multitasking is collective and thereby also individualistic (Hall, 1959: 1976). This inclination has been studied as both a cultural and individual phenomenon, touching on monochronicity and polychronicity within one culture (Lindquist & Kaufman, 2007; Poposki et al., 2009a). Multitasking is of normative value for many American organizations, where work schedule coordination has become custom in organizational culture, more so than within organizations in India (Hall, 1983; Lasane & O'Donnell, 1993; Palmer & Schoorman, 1999), which is a culturally similar to Pakistan. One Pakistani published study (Sehrish & Zubair, 2013) explored polychronicity, time management, and work-related quality of life among bank employees. Sehrish & Zubair explained that people are becoming more interested in performing multiple tasks simultaneously, tending towards multitasking. This was found to have a positive impact on their daily life, hence the need to explore multitasking in socio-organizational backgrounds across cultural contexts.

Multitasking encompasses aspects of communication, such as frequently talking on the phone while driving or surfing the web while listening to a lecture (Kushniryk, 2008). As multitasking is a complex and evolving construct, this study involves the translation and adaptation of an instrument, which is based on the degree of perceived multitasking ability concerning communication, for use in the cultural

context of Pakistan. This instrument was developed (Kushniryk, 2008) based on the aforementioned definition: to accomplish multiple tasks/goals in the same general time period, either simultaneously or by engaging in frequent switches between individual tasks (Poposki & Oswald, 2010) alongside minimum communication based tasks. This instrument has also been translated and adapted into Chinees (Luo et al., 2018). Widyahastuti and Anwar (2017) used this instrument to study links between the Big Five personality dimensions and multitasking. The results of this study demonstrated that the dimensions, such as extraversion, conscientiousness, openness and neuroticism, do not significantly effect ones predisposition to multitasking. However, the results of another study (Kalsoom & Kamal, 2020) showed that CSMMI is correlated with Pakistani multitasking preferences, gender role attitudes, and marital adjustment.

Gender differences in the propensity towards multitasking is a very important contemporary aspect to investigate. Various studies (Bianchi, et al., 2006; Bianchi & Wight 2010; Galinsky at al., 2005; Offer & Schneider, 2011) have classed gender as an important variable while studying multitasking and have consistently found differences between men and women (Floro & Miles, 2003; Kushniryk, 2008; Mantyla, 2013) on multitasking measures. In their investigations, Mäntylä (2013), Offer & Schneider (2011), Ruiz (2013), and Stoet et al. (2013) reported women as having greater multitasking abilities than men in both work and home spheres. On the other hand, Buser & Peter (2012) suggested minimal gender differences with regards to multitasking ability and preferences. Offer and Schneider's 2011 review presented a comprehensive and qualitative view of multitasking with respect to gender and gender roles in terms of both paid and unpaid work distribution. The results of another study revealed insignificant gender differences and rejected the common stereotype that women are better at multitasking (due to an ability to juggle various roles at work and in the home) than men, at least in the typical consecutive and concurrent/simultaneous multitasking settings (Hirsch et al., 2019). In a recent empirical investigation, Lui et al. (2020) noted a smaller concurrent multitasking (dual-task) cost for men than women, and no gender difference when it came to sequential multitasking (task-switching) cost. Men had more experience engaging in multitasking that involved video games, whereas women were more experienced engaging in multitasking that involved instant messaging, music, and web surfing. The results can be interpreted as stemming from individual cognitive differences. Taking into account these studies, the current study also intends to establish contrasted group validity (through gender differences) of the measure, after completing the translation and adaptation process. This would be an important addition to the existing knowledge-base and a step towards understanding the construct of multitasking and the ways in which married men and women with children perceive and use their time, while occupying paid and unpaid roles simultaneously.

In a technology driven world, the nature of paid and unpaid work has become very diverse and complex. In this context, multitasking is considered an essential ingredient of our daily juggling of multiple roles. Therefore, multitasking is indispensable in every culture and setting, especially at work. This has created a need

for an appropriate indigenous measure of multitasking that is applicable in collectivist Asian cultures such as that of Pakistan. The construct of multitasking was initially derived from computer science and has become an increasingly common human behavioral attribute. It is considered a skill and an essential ability, especially for working individuals. As Lindbeck & Snower (2000) and Milgrom & Roberts (1990) explained, individuals who like working in multitasking organizations are able to thrive in such environments and find positive meaning in their work. In addition to juggling multiple activities and tasks in the workplace, employees are engaged in family domains and both work and non-work related interactions occur (Greenhaus & Powell, 2006; Gutek et al., 1991). These work-family interactions may require even higher multitasking ability. In Pakistan, however, this aspect of time orientation has not yet been considered for empirical investigation. Therefore, this study focuses on first addressing this unmet need of measurement tool, as this is required to empirically investigate the multitasking abilities of the individuals from a collectivist cultural perspective as opposed to a western individualist perspective.

Pakistani society is collectivist in nature — a nature rooted in its cultural traditions, values and customs. However, globalization, technological advancement, the expansion of education, and exposure to the media have caused these aspects of Pakistani culture to rapidly evolve. One of the ways in which this has manifested is in a growing need for multitasking. Increased urbanization has led to an increase in the number of women in work and in the demand for multiplicity of roles. Moreover, economic instability and inflation have increased, as have working hours, and it has become a necessity for most people in Asia, particularly in Pakistan, to have more than one source of income. People are balancing two or more paid roles, alongside personal and familial responsibilities, and this has created a need to study multitasking behavior and attitudes among married men and women, with children. The evolving construct of multitasking is relatively new in the Asian literature, specifically in context of Pakistan. Only one published study (Sehrish & Zubair, 2013) is available that discusses polychronicity and time management by using the 4-item scale, the Polychronic Attitude Index (PAI) in English. Hence there exists a need to translate, adapt, and validate a recently developed and applicable measure, in order to provide a comprehensive multitasking measure for socially and culturally collectivist populations. To meet this need, two studies were devised to target the translation, adaptation, and validity (both empirical and construct) of the Communication Specific Multitasking Measurement Instrument (CSMMI) developed by Kushniryk (2008).

Method

The current study was completed into two parts. Study I tackled translation, adaption, and empirical validation through exploratory factor analysis (EFA) of the multitasking instrument. Study II was concerned with construct validation though confirmatory factor analysis (CFA), contrasted group validity, and reliability of the translated and adapted measure.

Study I

The main objectives of this study were twofold. First, to translate and adapt the Communication Specific Multitasking Measurement Instrument (CSMMI) into Urdu, the national language of Pakistan, from its original English. Second, to empirically validate (through EFA) the translated and adapted version of CSMMI. These two objectives were achieved into two phases, respectively.

Phase I: Translation and Adaptation of Multitasking Instrument

In order to achieve the first objectives of Study I, the translation and adaptation of CSMMI was completed following the guidelines given by Brislin (1976; 1980), Hambleton (1994), and Sousa & Rojjanasrirat (2011). Forward and back translation methods were employed by five bilingual expert translators for the translation of of all the 19 items of CSMMI. Subject matter expert method (SME) was used for the sorting of translated items. Two slight modifications were made in two items of CSMMI. To the phrase in item 1, "I like talking on the phone while I am driving my car", were added *bicycle* and *any vehicle*, so the phrase became: "I like talking on the phone while I am driving my car/bicycle/any vehicle", making it more general. Similarly, the phrase *during class lecture* was removed from the phase in item 4, "I can easily understand and comprehend material presented while I am doing something unrelated." These changes were made in view of the consideration that the data of this study was to be collected from married men and women not university students. Therefore, it was optimal make the questionnaire more general for the intended target population. No item was excluded from the original measure and, upon completion of the translation and adaptation, all 19 items of the translated scale were used to collect the data for empirical validation.

Phase II: Empirical validation

Participants

To achieve the second objective of Study I, a sample (230) of married men (n = 126) and women, both working (n = 61) and housewives (n = 43), were selected to evaluate the Urdu CSMMI. The ages of these individuals ranged from 20-62 years (M = 35.53 & SD = 8.40). All the participants of this study were selected from the twin cities i.e., Rawalpindi and Islamabad. Working individuals were approached one-by-one at their respective institutes and organizations in these two cities. Written permission from the concerned authorities of these organizations was also taken. Purposive and convenience sampling techniques were employed to select the sample for cross sectional data collection. Informed consent was taken, and confidentiality and anonymity were ensured.

Procedure

CSMMI is a five-point Likert type scale with the following response options: 1: *Strongly disagree*; 2: *Disagree*; 3: *Neither agree nor disagree*; 4: *Agree*; 5: *Strongly agree*. The scale originally consisted of 19 items and three facets i.e., general multitasking abilities, ability to perform two/ more than two primary tasks simultaneously, and

the ability to perform primary and secondary tasks simultaneously. Seven items are reverse coded. The score range is 19-95, whereby a high scores indicated high perceived multitasking abilities and low scores indicate low perceived multitasking abilities. The alpha reliability reported by the original author is .82 (Kushniryk, 2008). Another study (Widyahastuti & Anwar, 2017) reported a similar value (.81) for alpha reliability, indicating that the measure is valid and reliable to use. To collect the data on the translated CSMMI, a separate demographic sheet was prepared to acquire information regarding gender, age, and work status of the participants. Willing participants were provided with the translated instrument, demographic information sheet, and informed consent. The data was collected individually through one-to-one interaction. Verbal and written informed consent of all the participants was taken. Participants were further assured that the confidentiality and anonymity of their data would be upheld.

Results

Empirical Validity through Exploration of Factor Structure

Factorial validity of translated and adapted measures is as crucial as for newly developed measures. In a recent study, Hair et al. (2019) put forward factorial validity as essential for proof of validity when using EFA to validate an attitude measure. Similarly, Püsküllüoğlu et al. (2014) followed the same approach (EFA & CFA) for establishing the psychometric properties of the translated measure. EFA provides sufficient empirical and construct validation for any measure to verify the findings across populations and cultures. McMurtry & Torres (2002) and Titlestad et al. (2017) suggested to use EFA followed by CFA to validate the factor structure of the translated instruments. The need and justification to explore the factor structure of the Pakistani CSMMI is based upon the logical ground of individual differences across socio-cultural contexts. Moreover, the original version of CSMMI was developed and validated based on a sample of potential incumbents, whereas the current study has collected data from a sample of employed and married individuals, which is significant when considering the cross-language construct validation. In order to determine the suitability of the original factor structure of CSMMI on the Pakistani sample, CFA was performed to replicate the original factor structure on the data collected for this study. The results of the CFA testing revealed that the original factor structure is not suitable in this case, as the model fit indices suggest a poor model fit for the adjusted scale. Hence, it was decided to explore the factorial structures of the Pakistani CSMMI theoretically. To achieve the second objective of Study I, factor structure of the translated and adapted versions of multitasking measure (CSMMI) was run by first employing EFA on the small data set of Study I and then CFA on the larger data set collected for Study II.

Exploratory Factor Analysis (EFA)

The Kaiser-Meyer-Olkin (KMO) test was used to determine the suitability of the data for EFA. A KMO value of .75 sample adequacy indicated that the data was appropriate for factor analysis, based on the recommendation by Field (2009) that values

between .7 and .8 are sufficient to carry out EFA. Bartlett's Test of Sphericity was also conducted on the data and it was found that $p = .000$ which is below the .05 criteria. Therefore, EFA was performed to explore the factor structure for the translated items of CSMMI on the data of married individuals.

The scree plot suggested that factors I, II, and II are the predominent factors, showing eigenvalues of greater than 3, 2 and 1, respectively. In view of this, the three factors with eigenvalues greater than 1 were retained for the EFA. Factor I displayed an eigenvalue of 3.25 and represented 14.49% of the total variance, the highest among the three factors. Factor II had an eigenvalue of 2.47, representing 12.97% of variance, and factor III displayed an eigenvalue of 1.53 and represented 11.77% of the variance. Overall, these three factors accounted for 39.24% of the variance in the model.

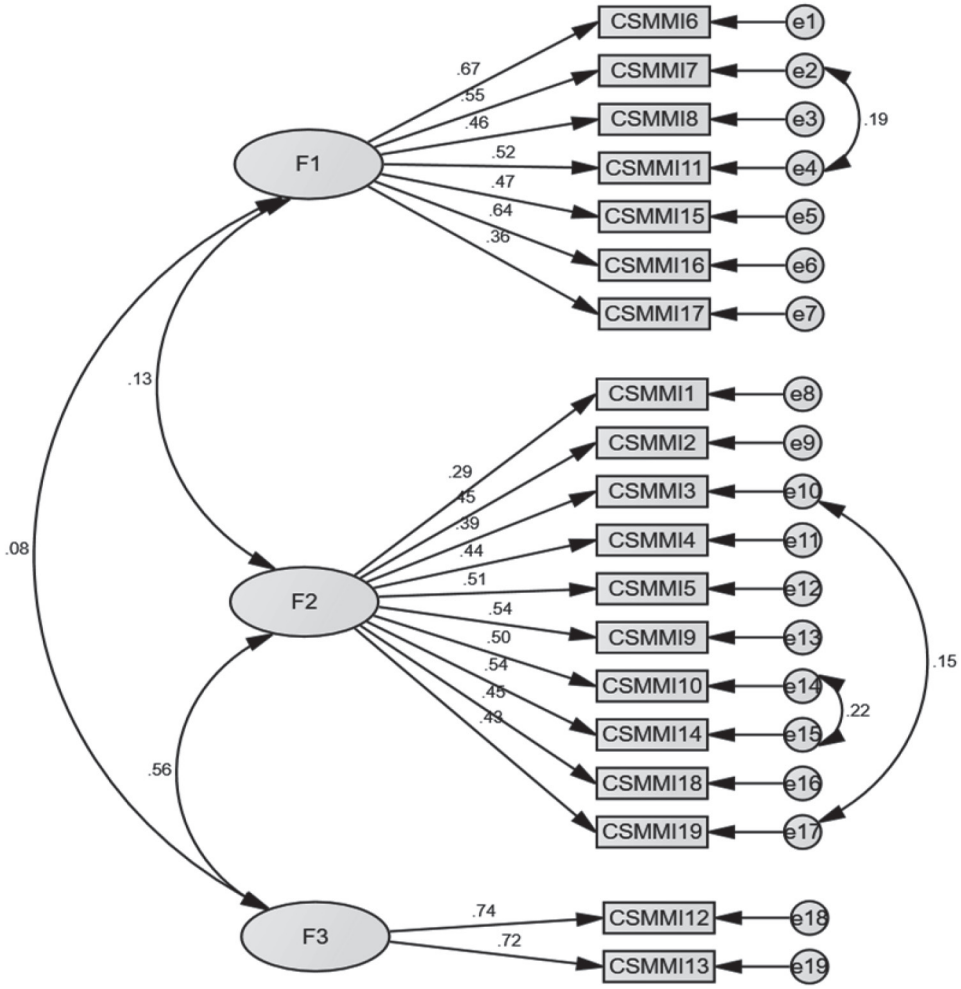

Figure 1. Measurement model and factor loading for the EFA/CFA on the 19 items of CSMMI ($N = 850$).

Table 1

Factor Loading of the Communication Specific Multitasking Measurement Instrument (CSMMI) through Principal Axis Factoring using the Maximum Likelihood Method (N = 230)

Serial No.	Item No.	GMA[a]	APTMTPTS[b]	APPSTS[c]	h2
1	16	**.53**	–.09	–.07	.68
2	6	**.70**	.05	.09	.73
3	7	**.44**	–.07	.03	.70
4	15	**.45**	–.01	–.04	.72
5	11	**.44**	.00	.25	.66
6	8	**.50**	.04	–.03	.76
7	17	**.51**	–.13	–.20	.56
8	3	–.16	**.47**	–.15	.54
9	5	–.05	**.44**	.08	.62
10	9	–.08	**.43**	.31	.61
11	2	–.08	**.58**	.18	.59
12	10	.23	**.48**	.25	.66
13	4	.15	**.41**	.16	.59
14	18	–.03	**.50**	–.05	.58
15	14	.17	**.45**	.20	.70
16	19	–.21	**.44**	.19	.61
17	1	.04	**.40**	.28	.58
18	12	.01	.05	**.74**	.70
19	13	–.12	.04	**.87**	.71

Note. Factor Loading > .40 is reported for each factor; [a]GMA = General Multitasking Ability; [b]APTMTPTS= Ability to Perform Two/More Than Two Primary Tasks Simultaneously; [c]APPSTS = Ability to Perform Primary and Secondary Tasks Simultaneously.

The results in *Table 1* display factor loadings of all the 19 items of CSMMI on the basis of their being greater than .40 (Field, 2013; Tabachnick & Fidell, 2013). *Figure 1* provides a visual representation of the measurement model. These factor loadings were obtained using the maximum likelihood method (ML) and Varimax rotation to determine the factor structure of the measures. Three factors were considered as three submeasures of CSMMI. The newly emerged factors are as follows:

1. General Multitasking Ability
2. The Ability to Perform two/more than two Primary Tasks/Activities Simultaneously
3. The ability to Perform Primary and Secondary Tasks Simultaneously

The original measure contained four factors, whereas EFA on this study led to the emergence of three factors. The fourth factor was previously referred to (Kushniryk, 2008) as "computer multitasking ability". Originally, this factor was comprised

of two items. However, in the factor structure revealed in this study, these two items were loaded under the second factor i.e., the ability to perform two/more than two primary tasks simultaneously. Therefore, these two items were accounted for by the second factor and there was no need for a fourth factor to account for them.

The third factor in this factor sucture is estimated to have only two items out of a total 19. Conventionally, measures comprise multiple items and the maximum number of items per scale depends on the complexity of the variable being measured (Robinson, 2018). A researcher may be able to construct their own version, for example by selecting only a few items, but those with the highest factor loadings for that scale. In the same vein, the factor loadings for the two third factor items of CSMMI particularly signficiant within the 19-item measure. They contribute 7.50% variance to the overall model, and this should be noted. Moreover, these two items are comparable to factors suggested in the original measure. As this should not be ignored, the factor was retained as a submeasure. Neverthless, the original factor structure was determined (Kushniryk, 2008) from the data of undergraduate students rather than employed individuals. Item number 5 was originally loaded under the "ability to perform primary and secondary task simultaneously", while in the translated and adapted version, this item was loaded under "general multitasking ability". The three factors that emerged from the EFA were named similarly to the original measure. *Table 1* also shows that the commonalities of all the items are above than .50, which is an indication of less specific variance among these variables. Furthermore, as Robinson (2018) suggested, the reliability of the shorter scale should be checked carefully to validate the instrument. Proof of validity was carried out by estimating the internal consistency of factor 3 beside the overall measure, while treating the other two factors as a separate dimension in the overall scale.

Table 2

Descriptive Statistics and Alpha Reliability for all the scores on Scales, Subscales, and Sub Facets of the Study Variables (N=230)

Variables	No of item	Alpha	*M*	*SD*	Range Potential	Range Actual	Skew	Kurtosis
CSMMI[a]	19	.75	55.22	8.99	19–95	30–80	–.04	.39
GMA[b]	7	.73	21.66	4.79	7–35	8–35	–.18	.01
APTMTPTS[c]	10	.72	28.81	5.99	10–50	10–47	–.02	–.16
APPSTS[d]	2	.80	4.74	2.19	2–10	2–10	.56	–.55

Note. [a]*CSMMI = Communication Specific Multitasking Measurement Instrument;* [b]*GMT = General Multitasking Ability;* [c]*APTMTPTS= Ability to Perform Two/More Than Two Primary Tasks Simultaneously;* [d]*APPSTS = Ability to Perform Primary and Secondary Task Simultaneously.*

From *Table 2* we can say that the mean and standard deviations suggest a moderate spread of data. The coefficients of skewness and kurtosis are also in the acceptable range of –1 to +1. The reliability of CSMMI, both overall and on the subscales, was

determined by employing Cronbach alpha coefficients. Alpha values are in the acceptable range (Murphy & Davidshofer, 2001; Nunnally, 1978; Salvia, Ysseldyke, & Bolt, 2010). These results have provided evidence for reliability and validity of the translated instrument.

Study II

The main objectives of Study II were to confirm the measurement model through confirmatory factor analysis (CFA) on the factor structure explored in Study I through EFA, both on a larger data of married men and women and according to gender and work status, and also to validate the measure by developing the indices of internal consistency and validity estimates through intra-scale correlation for the translated instrument on the complete data set. The final objective was to investigate gender differences (contrasted group validity) on the translated version of CSMMI by comparing the scores of married men and women.

Participants and Procedure

To achieve the above-mentioned objectives, data from a larger data set (N= 850) of married individuals was collected. The age range of the participants was 23-60 years (M = 36.47 & SD = 8.83). The sample was comprised of married men and women having children as follows: married working men (n = 328), married working women (n = 300), and housewives (n = 222). The procedural details are like those mentioned under Study I. Data collection procedure also followed that of Study I. Duplication of participation was avoided and it was made sure that all the participants had not taken part in Study I. Informed consent was taken from all participants and they were ensured that confidentiality and anonymity would be upheld.

Results

Factorial Validity Through Confirmatory Factor Analysis

A substantial prerequisite for producing high quality data is to create a sound translation and adaptation testing process. This process should acknowledge that measures are sensitive to local background disparities, while remaining equivalent across groups (Swami & Barron, 2019). An EFA-to-CFA approach can be used to estimate the extent to which scores on translated measures are truly invariant across groups. It is important to establish the extent of invariance before comparing latent scores (mean comparisons) across groups. Therefore, to examine the degree to which a measure is invariant across groups (where invariance corresponds to individual items being able to be explained by the same latent factors), CFA should be used as a multigroup invariance method at the configural level (Chen, 2008).

Configural invariance concludes that the number of latent variables and the pattern of loadings of latent variables on indicators are similar across groups, meaning the unconstrained latent model should fit the data well in all groups (Marsh et al., 2009; Swami & Barron, 2019). In the present study, CFA models across different groups of married individuals were estimated to test the variance across groups for

the latent construct of multitasking. The aforementioned gender variations in multitasking contributed to the need to assess invariance and to test the functionality of CSMMI items across groups. To achieve the first objective of Study II, CFA was performed to confirm the factor structure explored through EFA in Study I. Factor loading is shown in *Figure 1*.

Table 3

Model Fit Indices for Confirmatory Factor Analysis on CSMMI for the overall sample and across three sample groups (N=850)

	χ^{2a}	*df*[b]	χ^2/df	CFI[c]	RMSEA[d]	IFI[e]	TLI[f]	GFI[g]
M1	476.83	146	2.70	.94	.04	.95	.94	.95
M2 (Men *n* = 328)	273.54	148	1.84	.92	.05	.93	.94	.94
M3 (Women n = 522)	415.63	149	1.72	.93	.04	.93	.93	.93
M4 (Housewives n= 222)	215.63	145	2.77	.91	.05	.91	.91	.92
M5 (Working Women n =300)	250.57	149	1.72	.92	.04	.92	.91	.92

Note. [a]*χ2 = chi-square,* [b]*df = degree of freedom,* [c]*CFI = Comparative Fit Index,* [d]*RMSEA = Root Mean Square Error of Approximation,* [e]*IFI = Incremental Fit Index,* [f]*TLI = Tucker Lewis index,* [g]*GFI = Goodness of Fit Index.*

Table 3 shows an estimation of the fit indexes for CSMMI for three models tested on the overall sample and across gender. The results showed model fit indices are above the criteria of .90 the acceptable range given by Kline (2005), as tested against M1 (the overall sample). Using the traditional criteria (Byrne, 2013), chi- square, GFI and RMSEA values indicate good fit of the model to the data (Pearl, 2012). IFI and TLI as goodness of fit indices are also reasonable. This confirms the instrument as a three-dimensional, three-factor construct, as proposed in Study I through EFA on the separate sample of 230 individuals. M2 was assessed to see the variation in the model with respect to gender and the associated indices align with the given criteria of good model fit. The fit indices, chi-square, GFI and RMSEA values are all within the acceptable ranges. This suggests that the translated measure is also valid across the sample of married working men. M3 was estimated and assessed using the data of married women, both working and housewives. Whereas models M4 and M5 examined the invariance across working women and housewives separately. The results showed that these two models fit adequately across the two sample groups of married women. All the fit indices are in the acceptable range, as are the values of chi-square and RMSEA. These results have provided proof of construct validity for the measure of multitasking on the overall data set of married men and women, working and housewives collectively and across separate groups. This measure is also equally valid across gender. In order to estimate reliability and descriptive statistics, the data was analyzed and values of alpha coefficients, mean, standard deviations, skewness, and kurtosis are presented below in *Table 4* below.

Table 4

Descriptive Statistics and Alpha Reliability for all the scores on Scales, Subscales, and Sub Facets of the Study Variables (N=850).

Variables	No of items	Alpha	*M*	*SD*	Range Potential	Range Actual	Skew	Kurtosis
CSMMI[a]	19	.86	55.15	9.49	19–95	19–83	–.29	.27
GMA/ATM[b]	7	.77	20.81	4.99	7–35	8–35	.01	–.29
APTMTPTS[c]	10	.76	29.11	6.38	10–50	10–47	–.23	–.17
APPSTS[d]	2	.73	5.23	2.15	2–10	2–10	.32	–.72

Note. [a]*CSMMI = Communication Specific Multitasking Measurement Instrument;* [b]*GMA/ATM = General Multitasking Ability/Attitudes Towards Multitasking;* [c]*APMTPTS= Ability to Perform Two/More than Two Primary Tasks Simultaneously;* [d]*APPSTS = Ability to Perform Primary and Secondary Tasks Simultaneously.*

The results of the descriptive statistics in *Table 4* show that the data is normally distributed. Values of alpha coefficients are acceptable as reliability estimates of the translated and adapted version of CSMMI on the large data set of married men and women.

Table 5

Construct validity of CSMMI through Intra-scale Correlations between CSMMI and its subscales and between the subscales themselves (N = 850).

Variables	CSMMI[a]	GMA[b]	ATPMTPTS[c]	APPSTS[d]
CSMMI[a]	–			
GMA[b]	.62**	–		
APTMTPTS[c]	.83**	.13**	–	
APPSTS[d]	.52**	.06	.40**	–

Note. [a]*CSMMI = Communication Specific Multitasking Measurement Instrument;* [b]*GMA = General Multitasking Ability;* [c]*APTMTPTS= Ability to Perform Two/More than Two Primary Tasks Simultaneously;* [d]*APPSTS = Ability to Perform Primary and Secondary Tasks Simultaneously. **p < .01.*

Further construct validity was established through intra-scale correlation i.e., the correlation of total scores between the measure and its three factors and between the factors themselves. *Table 5* shows significant positive correlation between total scores and each factor. A correlation also exists between factors two and three. This pattern of relationship provides evidence for the significane of these factors or subscales within the measure. General Multitasking Ability (GMA) was found to be less significant and did not correlate with the Ability to Perform Primary and Secondary Tasks Simultaneously.

Contrasted Group Validity

In order to examine contrasted group validity as a proof of measurement invariance, many researchers (Jørgensen et a., 2018; Picconi et a., 2018) have employed the following approach in validation studies of samples of various groups and across gender. Chen et al. (2019) also assessed the mean differences across two groups of gender (men and women) when looking at levels of education among students to develop a self-efficacy measure. Considering this approach, t-test analysis was carried out to establish the validity of the translated and adapted measure for married men and women separately.

Table 6

Mean, Standard Deviation, t and d Values for Gender Differences on CSMMI (N =850).

	Married Men (*n* = 328)		**Married Women (*n* = 522)**				**95%CI**		
Variables	*M*	*SD*	*M*	*SD*	*T*	*p*	*LL*[e]	*UL*[f]	Cohen's *d*
CSMMI[a]	55.29	9.33	55.06	9.60	.34	.73	–1.08	1.54	.02
GMA[b]	21.25	5.25	20.53	4.80	2.05	.04	.03	1.40	.14
APMTPTS[c]	29.05	6.57	29.14	6.26	–.20	.84	–.97	.79	.01
APPSTS[d]	4.98	2.17	5.38	2.13	–2.65	.00	–.69	–.10	.19

Note. [a]CSMMI = Communication Specific Multitasking Measurement Instrument; [b]GMA = General Multitasking Ability; [c]APTMTPTS= Ability to Perform Two/More Than Two Primary Tasks Simultaneously; [d]APPSTS = Ability to Perform Primary and Secondary Task Simultaneously; [e]LL = lower limit; [f]UL = upper limit.

The results of t-test analysis in *Table 6* demonstrates that the differences between the overall scores of men and women on the perceived multitasking ability are insignificant. Whereas significant differences were observed between the factors GMA and APPSTS. The mean values revealed that male participants scored higher on GMA than the female participants, while female participants scored higher on APPSTS than male participants. Overall, mean values were slightly higher among women than among men. Group differences through Analysis of Variance (ANOVA) among the three groups of married individuals (married working men, married working women, and married female housewives) were found to be significant and these results are under review for publication.

Discussion

In order to achieve the objectives of the present study, two separate studies were conducted. Study I was completed into two phases. In phase I, translation and adaptation of CSMMI into Urdu was completed. Independent bilingual and subject matter experts were involved in the forward and back translation processes. Phase II dealt with the empirical validation (through EFA) of the translated and adapted instrument. The data was checked for appropriateness by the Kaiser-Meyer-Olkin

Measure of Sampling Adequacy and Bartlett's Test of Sphericity. The results provided evidence for the adequacy of the data as per the criteria (Tabachnick & Fidell, 2013). The results of Bartlett's Test of Sphericity advocated for an EFA procedure as per Field (2009) criteria. Varimax rotation was used (Kahan, 2006), as it explained the maximum amount of variance (Tabachnik & Fidell, 2007). This method gave 3 factors with eigenvalues greater than 1. These three factors were considered as the three dimensions and subscales of the translated measure, explaining 40% of the variance.

CFA was applied after EFA as the stand-alone CFA model showed poor and unidentified model fitness for CSMMI on the data of married working individuals. Swami and Barron's (2019) approach of applying a EFA-to-CFA method to estimate the extent to which scores on translated measures are truly invariant across groups was then followed. This was done by comparison of latent scores (mean comparisons) for the construct of multitasking across groups. The results of EFA were confirmed through CFA. The factor structure explored in Study I was confirmed by the results derived from the larger data set in Study II. The results of Study II showed three factor model as reliable, valid, and applicable for married individuals including men and women (both working & housewives). Hence, this has fulfilled the need for a sound and stable measure of multitasking.

The results provide strong proof of empirical and construct validity for a Pakistani version of CSMMI. The original author, Kushniryk (2008), of the instrument also suggested to establish the validity of the measure across different cultures. The findings of this study have made this a reality and have thereby extended the validity of the measure across different populations and cultural contexts.

Researchers often equate differences in groups with psychological variances. For an effective cross-cultural comparison, it is necessary to translate measures and adapt them appropriately so that they can be administered to another culture or group of people. When using this strategy, researchers often assume that the instrument examines the same psychological construct in all groups. They run CFA models with sample data collected from a population to test that the items of a scale are good indicators of a given latent construct (Milfont & Fischer, 2010) for the overall sample data or across groups. In comparing groups, an assumption is made that the measure studies the same psychological construct in all groups. When testing for invariance in cross-cultural research, member of different groups (e.g. men and women) attribute similar meanings to the given instrument (Fischer et al., 2009; Gouveia, et al., 2009; Milfont et al., 2006; Milfont & Fischer, 2010). In the present study, testing of the model across gender and working status of married individuals showed that all the model fit indices were in the acceptable ranges. This suggested that the translated and adapted version of CSMMI is equally valid for married working men, married working women and female housewives. From these results, it is concluded that the number of latent variables and the pattern of loadings of these latent variables on indicators is similar across groups, meaning that the unconstrained latent models provide a good fit for the data in all groups (Marsh et al., 2009; Swami & Barron, 2019), before comparing these groups through further statistical techniques such as mean differences across these groups.

To establish the contrasted group validity, group differences across gender were investigated. Although the results indicated insignificant gender differences over-

all, differences were observed between subscales i.e., General Multitasking Ability (GMA), on which men scored higher than women, and the Ability to Perform Primary and Secondary Tasks Simultaneously (APPSTS), in which women scored higher than men. The findings are consistent with past literature (Bianchi, John, & Milkie, 2006; Bianchi & Wight 2010; Floro & Miles, 2003; Galinsky at al. 2005; Kushniryk, 2008; Mantyla, 2013; Offer & Schneider 2011). While regarding the dynamic construct of multitasking, Mantyla (2013) suggested that gender differences with regards to multitasking should be interpreted carefully and thoughtfully. The empirical evidence for disparities between genders suggests invariance in multitasking in terms of gender differences (Strayer et al., 2013), wherein differences in executive attention most likely influence multitasking abilities (Strayer & Watson, 2012). A possible reason for the insignificant gender differences may be the inequivalent sample sizes of men and women. However, it might be important here to share that the results of ANOVA conducted on the three sample groups of married individuals showed significant mean differences. These results are reported in another manuscript under evaluation for publication.

The results of Study I in Table 2 provided evidence for the normality of the data and the reliability of the translated and adapted measure of multitasking for Pakistan as a representative of collectivist Asian culture. These results are consistent with the previous studies using this instrument (Kalsoom & Kamal, 2018; Kalsoom & Kamal, 2020), which have also reported high levels of reliability and validity for this measure. In this study, proof of validity and reliability is also reported in relation to gender roles, multitasking preferences and marital adjustment, along with perceived multitasking ability (by using the translated and adapted version of CSMMI). This level of reliability and validity was also reported for the translated and adopted version of CSMMI into Chinese language (Widyahastuti & Anwar, 2017). This study further deepened the validity of this measure by considering reliability coefficients and intrascale correlations. These results sufficiently provided evidence for internal consistency and association of the construct with its subscales on the sample of married men and women (working and housewives). This is also consistent with previous studies (Kalsoom & Kamal, 2018; Kalsoom & Kamal, 2020). The instrument has also been validated using the Big Five Personality Dimensions i.e., extraversion, conscientiousness, openness and neuroticism (Widyahastuti & Anwar, 2017). Such validations of CSMMI are important for the generalizability and applicability of this measure across populations and other cultural contexts. More specifically, they are important with respect to the collectivist Asian culture of Pakistan and others like India, Bangladesh, Afghanistan, and Iran, where the language and context is adequately applicable.

Conclusion

These findings are important in extending the validity of the CSMMI that was originally developed in English and herein translated and adapted into Urdu. The newly established factor structures provide a modified model of CSMMI for future research, not only in Pakistan but in other similar countries where the English language is a barrier (e.g. India and Bangladesh). The results of this study have provided empirical evidence for all the items in the original measure, as well as providing empirical support for bridging the gap in the literature between the psychology of multitasking,

gender differences and collectivist cultures. Theoretically, the findings of this study have provided further evidence for perceived multitasking ability as a multifactorial construct in relation to communication. This provides pragmatic grounds for the utility and adequacy of the measure across different language and cultural contexts. Therefore, the adapted measure is a useful addition to the evolving study of the construct of multitasking, and has provided good reason to believe that the use of this measure in future research studies across different groups and cultures will be equally as reliable and valid.

Limitations and Suggestions

This study is an adding to the understanding and validation of the construct of multitasking in relation to the working population of Pakistan as a representative of collectivist Asian cultures. The data was collected from married men and women with children from the two biggest cities in Pakistan. This may be a generalizing limitation. However, data was collected from a real-life work setting, and this may be a strength for validating the measure of multitasking, whereas in the original study, a sample of university students was selected to develop and validate the measure.

In this study, multitasking was considered a self-perceived ability by employing the self-reported data of married men and women. However, future studies should use this measure alongside other data collection methods, such as in-depth interviews, as this may yield more distinct and discrete features of multitasking that can be incorporated into the measure.

Overall, the results of the study provided the strong evidence for empirical and construct validity and reliability of the measure. This could be extended by establishing evidence for convergent and discriminant validity.

Ethics Statement

This study was approved by the ethical protocols and policy of the National Institute of Psychology (NIP), Quaid-i-Azam University, Islamabad, Pakistan. Willingness and informed consent of the participants of this study was applied and administered with the booklet of questionnaires at the time of data collection. Confidentiality and anonymity of the data was also ensured.

Author Contributions

Kalsoom Saima, as first author, conducted this study, prepared, and made all the revision in this article and Kamal Anila, as second author, contributed her intellectual and conceptual input as PhD supervisor for this empirical endeavor.

Conflict of Interest

The authors declare no conflict of interest.

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COGNITIVE PSYCHOLOGY

Sleep Modulates Emotional Effect on False Memory

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Background. Whereas sleep and emotion are important factors affecting false memory, there is a lack of empirical research on the interaction effect of sleep and emotion on false memory. Moreover, it should be investigated further that how the effects of emotion on false memory varies from presenting emotional content to eliciting emotional state.

Objective. To examine how sleep and varying emotional context influence false memories. We predicted that sleep and emotion would interactively affect false memory when participants are presented with negative words in a learning session (Experiment 1) or when their emotional state is induced before a learning session (Experiment 2).

Design. We used the Deese-Roediger-McDermott (DRM) task. Emotional words were used to elicit emotion during learning in Experiment 1 and video clips were used to induce a particular mood state before learning in Experiment 2. Participants were divided into a "sleep group" and a "wake group" and completed an initial learning session either in the evening or in the morning respectively. After a learning session, participants in the sleep group slept at night as usual and completed a recognition test in the morning, while participants in the wake group stayed awake during the daytime and completed their recognition test in the evening. All participants completed a recognition test after the same period of time.

Results. In Experiment 1, the wake group falsely recognized more negative critical lure words than neutral ones, but no such difference existed in the sleep group, suggesting that sleep modulated the emotional effect on false memory. In Experiment 2, participants in either a positive or negative mood state showed more false recognition than those in a neutral state. There was no such difference in the wake group. We conclude that sleep and emotion interactively affect false memory.

Keywords:
False memory, sleep, emotion, mood, DRM

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Introduction

Human memory is prone to distortions and is easily influenced by a multitude of factors such as sleep (e.g., Diekelmann et al., 2009; Payne et al., 2009) and emotional valence (e.g., Bookbinder & Brainerd, 2017; McKeon et al., 2012). Memory distortion in such cases is often referred to as false memory. Many situations in everyday life can produce false memory. For example, people can falsely recall childhood events, and through effective suggestions, they can even create new false memories. In the laboratory, the Deese-Roediger-McDermott (DRM) paradigm (Deese, 1959; Roediger & McDermott, 1995) has been widely used to induce false memory (e.g., Huan et al., 2021; McKeon et al., 2012; Roediger, Watson et al., 2001). In this paradigm, participants study lists of words (e.g., winter, snow) that are semantically associated with a non-presented critical lure word (e.g., cold). In the test session, participants consistently recall or recognize the non-presented lure with the same level of confidence as the correctly remembered studied words (Roediger & McDermott, 1995; Roediger, Watson et al., 2001).

According to fuzzy-trace theory (FTT; Reyna & Brainerd, 1995), when an event is experienced, two parallel traces are stored: a verbatim trace, which preserves item-specific and contextual information, and a persistent gist trace, which is based on the extraction of the general meaning of the encoded information. High false acceptances of critical lures in the DRM paradigm are explained as resulting from the similarity of gist traces between the list-items and the critical lure (e.g., Brainerd & Reyna, 2002). An alternative theory that has been proposed to explain the DRM illusion is activation/monitoring theory (AMT; Roediger, Balota et al., 2001). This theory poses two complementary processes that lead to false memories: automatic activation of critical lures and a breakdown in source monitoring. A key difference between these two theories is that, in the first case, gist extraction is due to semantic attributes emerging from the list structure. In the latter case, associative activation is caused by the statistical co-occurrence of items in the mental lexicon. In general, these theories make similar predictions for DRM research. However, there is some evidence that semantically related items that have no associative relation (e.g., butter) can induce lure false alarms (e.g., salt; Brainerd et al., 2008), suggesting that the manipulation of semantically related items could reliably and easily produce false memory, though such semantic manipulation would be controversial.

What factors affect the emergence of false memory? The key role of sleep in memory processing has recently drawn the interest of a growing number of researchers (e.g., Calvillo et al., 2016; Chatburn et al., 2017; Lo et al., 2016; Pardilla-Delgado & Payne, 2017). However, results from previous studies in the field are inconclusive. While some studies showed that sleep had an enhanced impact on the generation of gist memories, others found that sleep had no effect on or even reduced the storage of such memories in comparison to wakefulness. For example, Darsaud et al. (2011) found an enhanced recognition of false memories following sleep as compared to sleep deprivation, whereas Diekelmann et al. (2008) reported the opposite: reduced false memories after sleep as compared to sleep deprivation.

Emotion is another important factor assumed to play an active role in memory consolidation. The relationship between emotion and memory has been extensively

studied in the context of eyewitness testimony (e.g., Kaplan et al., 2016), and the general conclusion is that emotion can either support or impair memory. On the one hand, previous research found that high-arousal emotional states or learning materials evoked more false memories regardless of valence characteristics (e.g., Corson & Verrier, 2007), mainly because the highly evoked emotional information during coding narrows the attention span, causing people to focus only on the main idea clues and to ignore the peripheral details (e.g., Bookbinder & Brainerd, 2017; Kaplan et al., 2016). On the other hand, some studies found that emotions tend to capture attention, thereby prioritizing processing, leading to better encoding and enhanced memory (e.g., Dolcos & Denkova, 2014; Pourtois et al., 2013).

Such inconsistent results from previous studies on sleep and emotion show that more evidence is needed. Additionally, many prior studies have confirmed that sleep and emotion are strongly associated. With respect to the influence of sleep on emotion, the emotional regulation theories of sleep suggest that sleep is an important mechanism affecting emotional responses to stressors (e.g., Deliens et al., 2014; Goldstein & Walker, 2014). Neuroimaging studies have shown that individuals exhibit an exaggerated amygdala response to negative emotional stimuli after one night of sleep deprivation (Yoo et al., 2007). Similarly, Motomura and Mishima (2014) noted that poor sleep conditions increase vulnerability to negative emotions. It was found that emotional problems may affect one's quality and duration of sleep (Vandekerckhove et al., 2011). Negative mood states are associated with insomnia symptoms and sleep disturbance (Vargas et al., 2020), and ruminating over an experience of failure and bedtime worries about expected difficulties the next day negatively affected slow-wave sleep and its latency (Vandekerckhove et al., 2011). Thus, the relationship between sleep and emotion is bidirectional.

Obviously, sleep and emotion are important factors affecting false memory (Brainerd et al., 2008; Huan et al., 2021; Kersten et al., 2021; Newbury & Monaghan, 2019; Pardilla-Delgado & Payne, 2017). However, there is a lack of empirical research on the interaction effect of sleep and emotion on false memory. Most studies focused on the interaction effect of sleep and emotion on veridical memory. For example, Hu et al. (2006) investigated the consolidation of emotional episodic memory across 12 hours periods containing either a night of sleep or an equivalent period of time awake, and demonstrated that emotional memory is enhanced during sleep. Those who slept through the night remembered negative emotional images much better than those who had not slept during the day. But no such consolidation effect was found in the memory of neutral images. Gui and colleagues (2019) found that sleep helped consolidate positive emotional memories in healthy older adults, and this beneficial effect lasted for at least three days. Other studies also showed that sleep may preserve the emotional component of an experience during the consolidation of its content (e.g., Cellini et al., 2016; Werner et al., 2015). Such conservation of the emotional content after a sleeping period supports the hypothesis of the emotional salience view that the positive and negative memories are more susceptible to strengthening by sleep, as the specific neural network that is important for emotional processing and memory consolidation (the hippocampus-medial prefrontal cortex network) is more active during non-REM sleep (Genzel et al., 2015).

Evidence suggests that sleep and emotion interact to influence veridical memories, but precisely how these factors interact to affect false memory remains unresolved. Sleep is known to be critical for consolidating newly encoded situational events in both veridical memories (Weber et al., 2014) and false memories (Payne et al., 2009). However, McKeon et al. (2012) found that sleep would seem to consolidate these two types of memories in different ways when combined with the modulation of emotion. The study by McKeon et al. (2012) was to our knowledge the only work that focused on investigating the mechanism by which sleep–emotion affects false memory. They found increased false recall after sleep (compared to a waking group), regardless of whether the DRM word lists were emotionally negative or neutral. They argued that sleep did not simply reinforce memories, but rather supported their abstraction from the concrete learning context. However, McKeon et al. (2012) did not show significant differences between negative and neutral false memory after sleep. These results can be attributed to the use of emotional words in the study and their ability to trigger participants' emotions. Therefore, more studies are needed to investigate the impact of sleep and emotion on false memory when precisely eliciting the emotional state of the participants, not just presenting emotional content.

To address the question of how sleep and varying the emotional context influence false memories, this study employs the DRM paradigm. For each experiment, we grouped words in the word lists by theme such that all words in each list were associated with a non-presented critical lure. Additionally, we used emotional words to elicit emotion during learning in Experiment 1 and video clips to induce a particular mood state before learning in Experiment 2. Previous studies had shown that negative emotions were difficult to manage, leading to the depletion of psychological resources (e.g., Vandekerckhove et al., 2011) and the increase of their cognitive load (e.g., Nabi, 1999). It was argued that sleep could consolidate the verbatim trace of the studied words including sensory details, therefore reducing false memory (Fenn et al., 2009). Taken together, negative emotion itself would occupy psychological resources, and thus would attenuate the effect of sleep on false memory. Therefore, we predicted that sleep and emotion would interactively affect false memory when participants are presented with negative words in the learning session (Experiment 1) or when their emotional state was induced before the learning session (Experiment 2).

Experiment 1

Participants

Twenty-four college students (10 males; mean age = 19.38 ± 1.44 years) were recruited and randomly assigned to the wake group or the sleep group. Potential participants were screened using an online survey to assess eligibility. After initial eligibility was established, the participants came to the psychology laboratory at South China Normal University to complete the sleep questionnaires and a DRM task. All participants had normal or corrected-to-normal vision, with no history of sleep disorder, neurological disease or head injury, and were not taking any medications affecting sleep. They provided informed written consent and received payment for participation.

Materials

Sleep Questionnaires

Two scales were used to access the sleep characteristics of participants, the Morningness-Eveningness Questionnaire (MEQ; Horne & Ostberg, 1976) and the Pittsburgh Sleep Quality Index (PSQI; Buysse et al., 1989).

The MEQ consisted of 19 items and assessed chronotype. Most questions in the MEQ are designed in a preferential manner, whereby respondents are asked to indicate their preferred time of rising and bedtime, as well as physical and mental performance and alertness after rising and after different activities. This questionnaire includes five behavioral types: definitive morning (score = 70–86), moderate morning (score = 59–69), neither type (score = 42–58), moderate evening (score = 31–41), and definitive evening (score = 16–30).

The PSQI was used to measure subjective sleep quality. The measure includes 19 items related to the experience of sleep quality during the past 30 days. In all, 15 questions were rated on a four-point (0–3) Likert scale. The remaining four questions had open-ended response alternatives, which were rated on the same four-point (0–3) Likert scale based on the options. A global composite score was calculated based on the participant's answers ranging from 0 (good sleep quality) to 21 (poor sleep quality).

DRM Task

The paradigm was based on the DRM word recognition task used by Roediger and McDermott (1995) to induce false memory. We selected 14 DRM word lists of 12 words from Cheng (2006), Huang (2010), Roediger and McDermott (1995), Stadler et al. (1999), and Zhang et al. (2012), which include seven negative word lists and seven neutral word lists. In each list, 11 words were to be the studied words and one was a critical lure (a word that semantically connects the words in each list). Ten lists served as learning materials in the learning phase, and the remaining four lists served as new items in the test phase. The learning phase contained five negative DRM word lists and five neutral DRM word lists except the critical lures (55 words in total). The test phase included 20 studied words, which were selected from the learning phase with two words from each DRM word list, 10 critical lures, and 20 unstudied words (serving as new items) from the extra four DRM word lists which did not appear in the learning phase, with five words from each word list. All the words were two-character Chinese words.

Sixteen extra subjects were asked to evaluate all the words according to the following four criteria: (a) emotional valence status: neutral or negative words; (b) emotional arousal: very low to very high arousal (1–9 scale); (c) familiarity: least to most familiar (1–9 scale); and (d) backward association strength (BAS; the subjects were asked to rate the tendency of associating the present word with the critical lure in each DRM word list): very low BAS to very high BAS (1–9 scale).

The proportion of negative studied words that were rated as negative valence was 92.62%, the negative critical lures were 100%, and the negative unstudied words were

91.83%. Additionally, the proportion of neutral studied words rated as neutral valence was 95.45%, the neutral critical lures were 98.75%, and the neutral unstudied words were 88.70%. Such results confirm the manipulation of negative and neutral words in the current study.

The arousal analysis showed that the arousal of negative words (5.09) was significantly higher than neutral words (2.95; $F(1, 15) = 23.98$, $p < .001$). However, there was no significant difference in arousal among negative studied words, negative critical lure, and negative unstudied words ($F(2, 30) = 1.30$, $p = .29$), nor among neutral studied words, neutral critical lure, and neutral unstudied words ($F(2, 30) = .41$, $p = .67$). The familiarity analysis showed that there was no significant difference between negative words (7.01) and neutral words (7.09; $F(1, 15) = .03$, $p = .56$). However, there was a significant difference among the familiarity of critical lures (7.61), studied words (7.03) and unstudied words (7.01). Fisher's Least Significant Difference (LSD) post-hoc test showed higher familiarity for critical lures than for studied words ($p = .003$) and unstudied words ($p = .02$), with studied words and unstudied words being comparable ($p = .94$). The BAS analysis showed that there was no significant difference between negative (7.50) and neutral (7.66) words, $F(1, 15) = .95$, $p = .35$.

Procedure

Before the start of the DRM experiment, participants signed the consent form and answered the sleep questionnaires. They then proceeded with the next step to complete the DRM experiment, which included a learning phase and a test phase. In the learning phase, participants completed the word learning task. Trials in the word learning task were completed in 10 blocks, with each block involving 11 words from one DRM word list. That is, participants studied negative words in five negative blocks (items in each block were from one of five negative DRM word lists) and neutral words in five neutral blocks (items in each block were from one of five neutral DRM word lists). Each trial started with a central cross displayed on the screen for 500 ms. After the presentation of the fixation point, each word was shown onscreen for 3,000 ms followed by a blank screen for 500 ms (see Figure 1a). In order to avoid the potential interference of emotion on the learning of neutral words, participants learned neutral word lists first and then learned negative word lists. Participants learned all 10 lists of words and then completed the recognition task 12 hours later (see Figure 1b). Words were presented to participants one at a time. Participants responded "yes" or "no" with a key press, to indicate whether each item had been presented by the computer in the learning phase.

Participants in the wake group completed the word learning task at around 9:00 a.m. and the recognition task at 9:00 p.m. on the same day. They were asked to avoid daytime napping during the retention interval. Participants in the sleep group completed the word learning task at around 9:00 p.m. and the recognition task at 9:00 a.m. on the next day. They were asked to get enough sleep during the night.

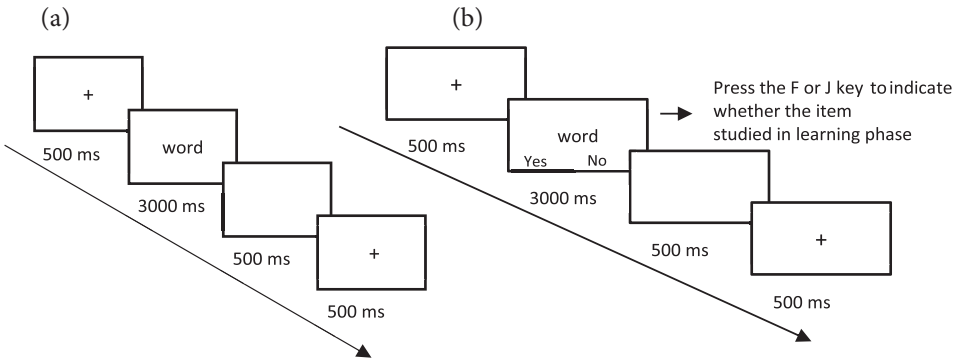

Figure 1. (a) Trial schematic for the word learning session; (b) Trial schematic for the recognition task

Results of Experiment 1

Sleep Characteristics

There were no significant difference in PSQI scores ($F(1, 22) = 1.57$, $p = .22$) between wake and sleep groups, nor in MEQ scores ($F(1, 22) = .02$, $p = .88$).

Recognition Performance

The recognition rate of studied words was the proportion of correctly judged studied words; the false alarm rate of critical lures referred to the proportion of lures judged as studied words; and the false alarm rate of unstudied words referred to the proportion of unstudied words judged as studied words. False alarm rates of critical lures and unstudied words were misidentification rates. Table 1 shows the recognition rates and false alarm rates in the wake and sleep groups.

Table 1

Mean Recognition Rates of Studied Words and False Alarm Rates of Critical Lures and Unstudied Words in Experiment 1 (M ± SD)

		studied words	critical lures	unstudied words
Wake Group (N = 12)	negative	.75 ± .17	.85 ± .17	.23 ± .27
	neutral	.70 ± .18	.65 ± .12	.07 ± .13
Sleep Group (N = 12)	negative	.65 ± .23	.68 ± .16	.13 ± .18
	neutral	.63 ± .18	.68 ± .16	.03 ± .08

The rates at which words were recognized as studied words (i.e., recognition rates of studied words and false alarm rates of critical lures and unstudied words) were submitted to a 2 (Group: wake vs. sleep) × 2 (Word Affect Type: negative vs. neutral) × 3 (Word Type: studied words vs. critical lures vs. unstudied words) repeated-measures ANOVA, with Group as a between-subjects factor and Word Affect Type and Word Type as within-subjects factors. There was a significant main effect of Word Affect

Type ($F(1, 22) = 9.80$, $p = .01$, $\eta^2_p = .31$), with the rate of recognition as studied words of negative words (.55) being higher than that of neutral words (.46). The main effect of Word Type was also significant ($F(2, 44) = 169.65$, $p < .001$, $\eta^2_p = .89$). Fisher's Least Significant Difference (LSD) post-hoc test showed that the recognition rate of studied words (.68) and false alarm rate of critical lures (.72) were higher than the false alarm rate of unstudied words (.12; *ps* < .001), respectively, while there was no significant difference between critical lures and studied words ($p = .35$). However, the main effect of Group ($F(1, 22) = 3.8$, $p = .06$, $\eta^2_p = .15$), Group × Word Type interaction ($F(2, 44) = .04$, $p = .97$, $\eta^2_p = .002$), Group × Word Affect Type_interaction ($F(1, 22) = 3.10$, $p = .09$, $\eta^2_p = .12$), Word Type × Word Affect Type interaction ($F(2, 44) = 1.49$, $p = .24$, $\eta^2_p = .06$), and Group × Word Type × Word Affect Type interaction ($F(2, 44) = 1.12$, $p = .34$, $\eta^2_p = .05$) were not significant.

To further explore the effect of Group and Emotional Valence, a 2 (Group: Wake vs. Sleep) × 2 (Word Affect Type: negative vs. neutral) repeated measures ANOVA was performed to analyze the recognition rate of studied words, false alarm rate of critical lures and unstudied words, with Group as a between-subject factor and Word Affect Type as a within-subject factor. For studied words, the main effects of Word Affect Type and Group, and the interaction effect between Group and Word Affect Type were not significant ($F(1, 22) = .63$, $p = .44$, $\eta^2_p = .03$; $F(1, 22) = 1.60$, $p = .22$, $\eta^2_p = .07$; $F(1, 22) = .16$, $p = .70$, $\eta^2_p = .01$) respectively.

For critical lures, the main effect of Word Affect Type was significant ($F(1, 22) = 5.50$, $p = .03$, $\eta^2_p = .20$) with a significantly higher false alarm rate for negative critical lures (.77) compared with neutral critical lures (.67). However, the main effect of Group was not significant ($F(1, 22) = 2.05$, $p = .17$, $\eta^2_p = .09$). Importantly, there was a significant interaction effect of Group and Word Affect Type ($F(1, 22) = 5.50$, $p = .03$, $\eta^2_p = .20$). The false alarm rate of the wake group (.65) was comparable to the sleep group (.68) for neutral critical lures, $F(1, 22) = .33$, $p = .57$, $\eta^2_p = .02$, but significantly higher than the sleep group for negative critical lures (.85 vs. .68), $F(1, 22) = 6.04$, $p = .02$, $\eta^2_p = .22$. Additionally, the false alarm rate of negative critical lures (.85) was higher than that for neutral ones (.65) in wake group, $F(1, 11) = 9.43$, $p = .01$, $\eta^2_p = .46$, while no such difference was found in the sleep group (.68 vs. .68).

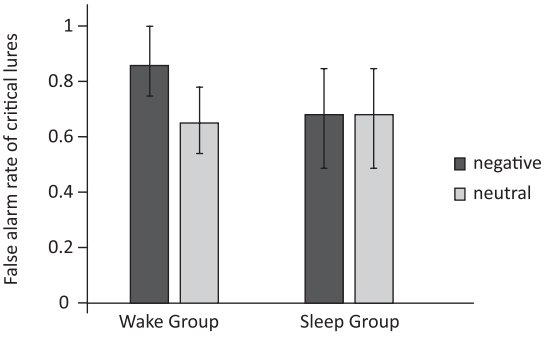

Figure 2. False alarm rate of critical lures for the Wake and Sleep Groups. Error bars represent standard error of the mean value.

For unstudied words, the main effect of Word Affect Type was significant, $F(1, 22) = 7.65$, $p = .01$, $\eta^2_p = .26$, with a higher rate for the false alarm of negative unstudied words (.18) than that for neutral unstudied words (.05). However, the main effect of Group and the interaction of Group and Emotional Type were non-significant, respectively ($F(1, 22) = 1.52$, $p = .23$, $\eta^2_p = .07$; $F(1, 22) = .48$, $p = .50$, $\eta^2_p = .02$).

Discussion

Consistent with previous studies (e.g., Gallo & Roediger, 2002), our results showed that participants produced more false memories for critical lures than for unstudied words, indicating that the manipulation of false memory was successful. Compared with the sleep group, the wake group showed more false memories of the negative lures than for the neutral lures. That is, sleep and emotion have important impacts on false memory. The interpretation of these results will be discussed in the general discussion section. It should be noted that like the overwhelming majority of previous studies, Experiment 1 linked valence state with emotions using words. That is, Experiment 1 assessed selectively the emotional impact elicited by the affective words on false memory. Thus, it is difficult to differentiate whether the observed emotional effect stems from the affective word itself, or from the emotional states of participants when encoding the words. Experiment 2 reexamined the roles of sleep and emotion in false memory when a participant's emotional state was directly elicited in the study phase.

Experiment 2

Participants

Eighty-eight college students were recruited and were randomly assigned to six groups (crossing two sleep conditions with three mood states). All participants had normal or corrected-to-normal vision with no history of sleep disorder, neurological disease or head injury. They were not taking sleep-affecting medications. Sixteen students were excluded for failing to complete the whole experiment. Finally, 12 participants participated in the sleep-positive condition, 11 in the sleep-negative condition, 12 in the sleep-neutral condition, 13 in the wake-positive condition, 12 in the wake-negative condition, and 12 in the wake-neutral condition. Thus, data analysis was performed on 72 participants (31 males; mean age = 19.78 ± 1.33 years).

Materials

Sleep Questionnaires

Sleep quality was measured by the same scales as in Experiment 1.

DRM Task

Fourteen neutral word lists were used in Experiment 2. Each list was composed of 12 semantically related words, among which 11 words were used to be studied words and one as a critical lure (a word that semantically connects the words in each list). All the words were two-character Chinese words.

The same extra 16 subjects from Experiment 1 were asked to evaluate all the words for their emotional valence status, emotional arousal, familiarity, and BAS. The proportion of neutral studied words, neutral critical lures, and unstudied words being rated as neutral valence were 92.78%, 94.38%, and 94.11%. The arousal analysis showed that there was no significant difference in arousal among studied words (2.52), critical lures (2.56), and unstudied words (2.87), $F(2, 30) = 3.18$, $p = .06$. The familiarity analysis showed that there was significant difference among the critical lure, studied words, and unstudied words ($F(2, 30) = 14.68$, $p < .001$). Post-hoc tests showed greater familiarity for critical lures (7.72) than studied words (6.89, $p < .001$) and unstudied words (6.78; $p = .001$), with studied words and unstudied words being comparable ($p = .56$). The BAS analysis showed that there was no significant difference between studied words (7.72) and unstudied words (7.58; $F(1, 15) = 1.23$, $p = .29$).

Mood Induction Videos

Three videos were created to induce negative, positive and neutral states: a tragedy clip, a comedy clip, and a landscape clip. Twenty-seven additional college students were recruited to rate the emotional valence and arousal of the videos (nine participants for each video). Participants rated the emotional valence of the videos by judging whether it is negative, neutral or positive, and rated emotional arousal based on a nine-point Likert scale (1 for very low and 9 for very high).

For emotional valence, the negative video was judged as "negative" with the proportion of 100%, the positive video as "positive" with 100%, and the neutral video as "neutral" with 100%. The results indicated that the emotional valence among these videos was distinguishable.

A one-way ANOVA was performed to analyze emotional arousal. The results revealed that there was a significant difference among three videos in emotional arousal, $F(2, 24) = 23.02$, $p < .001$. Specifically, a post-hoc test showed that emotional arousal of the neutral video (4.67) was lower than the negative video (7.44; $p < .001$) and the positive video (7.67; $p < .001$), but there was no difference between the negative and the positive video (7.38 vs. 7.67; $p = .58$).

Mood Measure

Ten emotional words with five positives (interested, excited, enthusiastic, proud, active) and five negatives (distressed, scared, hostile, irritable, jittery) were adopted from the Positive and Negative Affect Scale (PANAS; Watson et al., 1988) to measure the participants' mood states. For each item (e.g., happy) participants rated to what extent they felt this way at this moment on a five-point scale (from very slightly or not at all to extremely). A higher score indicated more of a corresponding affect.

Procedure

The procedure was the same as in Experiment 1, with the exception of mood induction and measurement. Before the learning session, participants were instructed to watch a video (one third of the wake group and of the sleep group watched the positive video, another one third of the wake group and of the sleep group watched the

neutral video, and the rest of the wake group and the sleep group watched the negative video). After watching the video, participants began the learning session and finished the PANAS scale as soon as they had completed learning the words. The test session was the same as in Experiment 1.

Results of Experiment 2

Sleep Characteristics and Mood Manipulation Check

PSQI scores ($F(5, 66) = 1.00$, $p = .14$) and MEQ scores ($F(5, 66) = 1.16$, $p = .52$) did not differ across the six groups. Thus, the six groups showed similar sleep characteristics.

For the positive mood state, there was a significant difference among three mood state groups ($F(2, 69) = 25.83$, $p < .001$). A post-hoc test showed that participants who watched the positive video (positive group; 15.92) had higher ratings of positive mood state than those who had watched the neutral video (neutral group; 12.58; $p < .001$) and those who watched the negative video (negative group; 9.50; $p < .001$. And the neutral group got higher scores than the negative group ($p = .001$).

For the negative mood state, there was a significant difference among the three mood state groups ($F(2, 69) = 54.49$, $p < .001$). A post-hoc test showed that participants in the negative group (15.00) had higher ratings of negative mood state than those of the neutral group (6.29; $p < .001$) and those of the positive group (5.96; $p < .001$). But there was no significant difference between the negative group and the neutral group, $p = .73$. The results indicated that the participants' emotional states were successfully manipulated.

Recognition Performance

Table 2 shows the recognition rate of the three types of words in each group.

Table 2

Mean Recognition Rates of Studied Words and False Alarm Rates of Critical Lures and Unstudied Words in Experiment 2 (M ± SD)

		studied words	critical lures	unstudied words
Wake Group	negative mood (N = 12)	.74 ± .12	.85 ± .10	.22 ± .20
	positive mood (N = 13)	.69 ± .18	.77 ± .11	.20 ± .17
	neutral mood (N = 12)	.68 ± .19	.78 ± .16	.18 ± .13
Sleep Group	negative mood (N = 11)	.69 ± .16	.71 ± .17	.16 ± .14
	positive mood (N = 12)	.81 ± .20	.61 ± .23	.11 ±.10
	neutral mood (N = 12)	.73 ± .09	.81 ± .16	.21 ± .14

A 2 (Group: Wake vs. Sleep) × 3 (Mood State: positive vs. neutral vs. negative) × 3 (Word Type: studied words vs. critical lures vs. unstudied words) ANOVA was conducted to analyze recognition rate, with Group and Mood State as between-subject factors and Word Type as a within-subject factor. The results revealed that neither the main effect of Group ($F(1, 66) = 1.266$, $p = .27$, $\eta^2_p = .02$), nor the main effect of Mood State ($F(2, 66) = .60$, $p = .55$, $\eta^2_p = .02$) was significant.

The main effect of Word Type was significant ($F(2, 132) = 496.85$, $p < .001$, $\eta^2_p = .88$). Specifically, the post-hoc test showed that the false alarm rate of critical lures (.75) and the recognition rate of studied words (.72) were higher than the false alarm rate of unstudied words (.18) (*ps* < .001), while there was no significant difference between critical lures and studied words ($p = .13$).

The Group × Mood interaction effect was not significant ($F(2, 66) = 1.36$, $p = .26$, $\eta^2_p = .04$). However, the Group × Word Type interaction effect was significant ($F(2, 132) = 5.17$, $p = .01$, $\eta^2_p = .07$). There was no significant difference between the wake group and the sleep group for the studied words (.70 vs. .74; $F(1, 70) = 1.12$, $p = .29$, $\eta^2_p = .02$), nor for unstudied words (.20 vs. .16; $F(1, 70) = 1.45$, $p = .23$, $\eta^2_p = .02$). For critical lures, the wake group had a higher false alarm rate (.80) than the sleep group (.71; $F(1, 70) = 5.28$, $p = .03$, $\eta^2_p = .07$).

Further, the interaction between Word Type and Mood State was significant ($F(4, 132) = 2.83$, $p = .03$, $\eta^2_p = .08$). There was no significant difference among neutral mood condition (.71), positive mood condition (.75), and negative mood condition for the studied words (.71; $F(2, 69) = .51$, $p = .60$, $\eta^2_p = .02$), nor for unstudied words (.20 vs. .15 vs. .19; $F(2, 69) = .59$, $p = .56$, $\eta^2_p = .02$). For critical lures, the main effect of Mood State was marginally significant ($F(2, 69) = 2.76$, $p = .07$, $\eta^2_p = .07$). Post-hoc tests showed that the false alarm rate in the positive state condition (.69) was lower than that in the neutral state condition (.80; $p = .03$). No other difference was found between the positive and negative state conditions (.69 vs. .78; $p = .07$), nor between the neutral and negative state conditions (.80 vs. .78; $p = .76$).

More importantly, the Group × Mood State × Word Type interaction was marginally significant, $F(4, 132) = 2.18$, $p = .08$, $\eta^2_p = .06$. For the studied words, the main

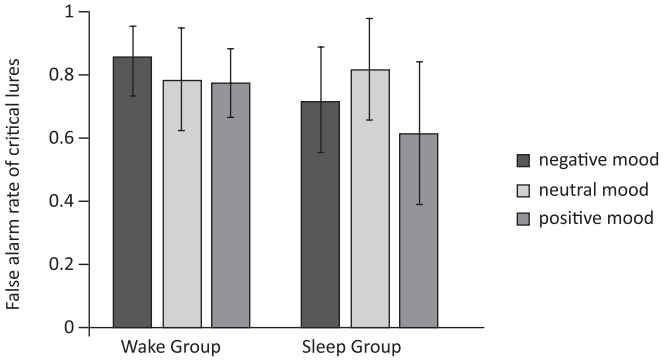

Figure 3. False alarm rate of critical lures in Experiment 2.
Error bars represent standard error of the mean value.

effects of Mood State and Group, and the interaction effect between Mood State and Group were not significant ($F(2, 66) = .59$, $p = .56$, $\eta^2_p = .02$; $F(1,66) = 1.02$, $p = .32$, $\eta^2_p = .02$; $F(2,66) = 1.6$, $p = .22$, $\eta^2_p = .05$). Similar results were found for unstudied words ($F(2, 66) = .63$, $p = .54$, $\eta^2_p = .02$; $F(1, 66) = 1.44$, $p = .24$, $\eta^2_p = .02$; $F(2, 66) = .89$, $p = .41$, $\eta^2_p = .03$). For critical lures, the false alarm rate in the wake group was higher than that of the sleep group in the positive state condition (.77 vs. .61; $F(1, 23) = 5.11$, $p = .03$, $\eta^2_p = .18$) and the negative state condition (.85 vs. .71; $F(1, 21) = 5.92$, $p = .02$, $\eta^2_p = .22$). However, there was no significant difference between the sleep group (.81) and the wake group (.78; $F(1, 22) = .17$, $p = .68$, $\eta^2_p = .01$) in the neutral state condition.

Discussion of Experiment 2

Similar to Experiment 1, the false alarm rate was higher for the critical lures compared to the unstudied words in all groups, suggesting successful induction of false memory in the current experiment, which is consistent with previous research (e.g., Gallo & Roediger, 2002). There was a significant difference in the false alarm rate of critical lures between the sleep and wake groups in the positive and negative mood state conditions, indicating that sleep and mood state would impact false memory. These will be discussed in more detail below.

General Discussion

Given the discrepancies in earlier findings on the effects of emotion and sleep on memory formation (Ashton et al., 2020; Bookbinder, & Brainerd, 2017; Pourtois et al., 2013), the present study addressed the question whether sleep and emotion would have an interactive effect on the formation of false memory, using emotional words and mood state induction. The results of Experiment 1 showed that the wake group produced more false memory (a higher false alarm rate of critical lures) than the sleep group when words expressed a negative meaning, but no such significant difference between the wake and sleep groups for neutral words. This increase of false memory in the wake group was again present when participants were experiencing a positive or negative emotional state in Experiment 2.

Our finding that participants in the wake group showed significantly greater false memory of negative words is in line with previous studies (e.g., Brainerd et al., 2008; Sharkawy et al., 2008). When participants were presented with negative words, information about valence was evoked (Gianotti et al., 2008). The false memory of negative words or when participants were experiencing negative emotion is greater than that of neutral words, which may be because of the influence of emotion delivery (i.e., negative emotion was stronger than neutral emotion). This seemingly supported fuzzy-trace theory, which suggested that gist retrieval may trigger false memory vulnerability in items that shared meanings. The emotional valence would strengthen the connection among words, which in turn enhanced gist trace of memory and thus led to more false memory (Howe et al., 2010; Zhang et al., 2017).

However, such a difference was only exhibited in the wake group, but not in the sleep group in the current study, which seems inconsistent with some previous studies. Previous evidence showed that false memory of critical lures increased after a

period of sleep compared with being awake (e.g., Calvillo et al., 2016; Diekelmann et al., 2010; McKeon et al., 2012), or relative to being deprived of sleep (e.g., Chatburn et al., 2017). Those researchers argued that sleep could facilitate the generalization of related information, and thus gist memory could be more easily extracted. However, there were other studies showing no effects or even a reduction of the generation of gist memories after sleep compared to wakefulness (e.g., Fenn et al., 2009; Lo, Sim, & Chee, 2014). It was claimed that these mixed results using the DRM paradigm were partly due to differences between recognition versus recall tests, but also possibly due to the particular semantic properties of the DRM lists used (Monaghan et al., 2017). Thus, the effect of sleep on susceptibility to false memories was still unclear.

The findings of the current study suggest that the effect exerted by sleep on false memory was moderated by emotion. That is, the mechanism to account for observations of decreased false memories in the sleep group could be related to the emotional words that we chose or to our emotion induction design. When the words expressed a negative emotion, the subjects more likely retrieved the previous memory trace and encoded the words expressing the same negative affect type together, or even spread activation in semantic memory. On the one hand, evidence suggests that sleep could affect participants' ability to generalize their knowledge of multiple items (Darsaud et al., 2011); on the other, it was found that sleep could consolidate item-specific details associated with veridical information, thereby enhancing source monitoring processes (Fenn et al., 2009). Following this line, sleep would decrease participants' ability to spread the semantic knowledge of negative items by consolidating these learned items. It is also possible that sleep between exposure to DRM lists and testing could decrease the acceptance of negative lure words more than staying awake between sessions.

It is also possible that daytime wakefulness, while assisting episodic memory consolidation, might promote semantic processing. For recognition of both list and gist words, participants who remained awake during the daytime after encoding, compared to night sleep, relied on a broader, more distributed cortical network, suggesting that daytime wakefulness shifts the brain to more effortful strategies to retrieve information. Similarly, Diekelmann et al. (2008) deprived some participants of sleep before testing their memory and found an increase in false recognition of critical lures. We suspect that remaining wakeful (even in the daytime) helps extract the overall idea, or "gist," of a task, from which the brain can identify common features of new waking experiences and incorporate them into a new schema.

Researchers have shown that different negative emotions (e.g., sadness, anger, fear) have different effects on cognitive processes such as attention and memory processing (e.g., Kaplan et al., 2016; Van Damme et al., 2017). Emotion has two distinct dimensions, arousal and valence, both of which influence memory (Brainerd et al., 2010). According to fuzzy-trace theory, the valence of critical distractors should have different effects on false memory, relying on the relation between critical lures and list words. For semantic lists, list words and critical lures are both valenced, so that emotional valence facilitates the extraction of the meaning relationship across list words (e.g., Bookbinder & Brainerd, 2017) by deflecting processing from the surface details of item presentations (e.g., Bookbinder & Brainerd, 2017).

Studies have also found that high arousal emotion states or learning materials can elicit more false memory regardless of their valence features (Corson & Verrier, 2007). This may be due to the high arousal content or states during encoding, which narrow the scope of attention and lead to concentrating on gist trace and neglecting peripheral details (e.g., Bookbinder & Brainerd, 2017; Kaplan et al., 2016). However, Bayer et al. (2010) showed that the Late Positive Component (LPC) was unaffected by arousal when valence was controlled. Though the available results seem mixed, most studies indicate the possibility that the ambiguity of emotional content (valence), as well as its intensity (arousal), determine how memory is influenced. As the arousal levels between negative and neutral words or across all three mood-induction groups were not well controlled in the present study, the mood effect that we found may have been due to valence-arousal effects rather than to a valence effect per se.

Emotion regulation theories of sleep argue that sleep is an important mechanism impacting emotional responses to stressors (Deliens et al., 2014; Goldstein & Walker, 2014). Motomura and Mishima (2014) suggested that poor sleep conditions could increase the vulnerability of negative emotions. Similarly, Baglioni et al. (2010) found that the sleep deprivation group displayed enhanced activity in the amygdala and reduced functional connectivity between the amygdala and the medial prefrontal cortex (PFC). That is, there was an increased neurobiological response to emotional stimuli and a reduced inhibitory influence of the PFC on emotional reactivity after sleep deprivation. Other neuroimaging studies also indicated that following a night of sleep deprivation, individuals showed an exaggerated amygdala response to negative emotional stimuli (e.g., Yoo et al., 2007). Other studies also showed that sleep is an important and modifiable factor that can influence emotion regulation (Tamanna et al., 2014). In the reverse direction, it is possible that emotion regulation can impact sleep. For example, poor emotion regulation can lead to mental health issues, which could worsen sleep quality (Gross & John, 2003). Based on previous literature showing that sleep and emotion affect each other mutually, the current study further extends these findings in that such sleep–emotion interaction could have long-term effects on false memory. Future work will be needed to confirm the current finding and further determine the extent that these two different factors might contribute to this process.

Conclusion

This study provides further support for findings that sleep is an important mechanism impacting emotional responses (e.g., Goldstein & Walker, 2014). The main and novel finding of the study is that such sleep–emotion interaction affects false memory. The strength of the effect is reflected in the intended negative emotion elicited by the negative words during learning and the mood state (negative or positive) induced by video clips before learning. To our knowledge, this study is the first to reveal the roles of sleep and emotion in the formation of false memories by manipulating emotion during learning and before learning.

Limitations

Two main limitations of this study are the marginal significance for the three-term interaction and the use of a statistical significance level of $p < 0.05$ (uncorrected).

We used the LSD post-hoc test to slightly control type I error. For full consideration of multiple comparisons, more stringent correction such as Bonferroni or false discovery rate correction should be applied. As can be seen from the results, only two of the three "significant" results in Experiment 1 and three of the six "significant" results in Experiment 2 based on the critical multiple comparisons survived this more stringent criterion. Further studies are required to address these considerations by increasing statistical test power with a large sample size.

Ethics Statement

The ethical aspects of the study were approved in the Institutional Review Board of the South China Normal University (No. 2019-1-050). All participants were informed about the purpose of the study, and gave their voluntary consent to participate in it.

Author Contribution

Conceptualization, supervision, project administration, and manuscript revision were done by Aitao Lu. Methodology, review, investigation, data analyses, and writing were carried out by Ruchen Deng. Both authors have read and endorsed the published version of the manuscript.

Conflict of Interest

The authors declare no conflict of interest.

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Appendix 1. DRM Word Lists Used in Experiment 1

Table A1

Negative DRM Lists Used in Experiment 1

DRM Lists	1		2		3		4		5	
critical lures	生气	anger	犯罪	crime	烦闷	worried	仇恨	hostility	畏惧	anger
studied words	狂怒	mad	罪犯	criminal	孤独	lonely	讨厌	hate	胆怯	mad
	害怕	fear	罪恶	evil	哀愁	sad	厌恶	abhorrent	害怕	fear
	憎恨	hate	盗窃	steal	苦闷	agonizing	痛恨	abomination	畏怯	hate
	大怒	rage	骚扰	harass	郁闷	depressed	虚伪	hypocrisy	怯懦	rage
	脾气	temper	绑架	kidnap	恼火	irritated	报复	revenge	恐惧	temper
	暴怒	fury	破坏	destroy	沮丧	dispirited	憎恨	detest	胆小	fury
	忿怒	ire	小偷	thief	失意	frustrated	嫉妒	envy	胆寒	ire
	愤怒	wrath	抢劫	rob	自卑	self-abasement	怨恨	resentment	畏忌	wrath
	争论	fight	凶手	murderer	烦恼	annoyed	战争	war	忌惮	fight
	激怒	enrage	谋杀	murder	抱怨	complaining	愤恨	resentful	后怕	enrage
	暴躁	fiery	拐卖	abduction	烦躁	whiny	冤仇	enmity	畏缩	fiery

Table A2

Neutral DRM Lists Used in Experiment 1

DRM Lists	6		7		8		9		10	
critical lures	音乐	music	双脚	foot	椅子	chair	女孩	girl	国王	king
studied words	音符	note	鞋子	shoe	桌子	table	芭比	dolls	王后	queen
	声音	sound	双手	hand	桌腿	legs	女性	female	王冠	crown
	钢琴	piano	脚趾	toe	座位	seat	年轻	young	王子	prince
	唱歌	sing	凉鞋	sandals	卧榻	couch	女装	dress	女王	empress
	广播	radio	足球	soccer	睡椅	recliner	漂亮	pretty	权利	right
	乐队	band	鞋码	yard	沙发	sofa	头发	hair	宫殿	palace
	旋律	melody	走路	walk	木头	wood	侄女	niece	王位	throne
	乐器	instrument	脚踝	ankle	坐垫	cushion	舞蹈	dance	统治	rule
	和声	harmony	靴子	boot	凳子	stool	可爱	cute	臣民	subjects
	爵士	jazz	短袜	sock	摇椅	rocking	阿姨	aunt	君王	monarch
	韵律	rhythm	趾甲	nail	长椅	bench	姐妹	sister	王室	royal

Table A3

Negative and Neutral Unstudied DRM Lists Used in Experiment 1

DRM Lists	11		12		13		14	
	negative unstudied words				neutral unstudied words			
	苦闷	agonizing	愚蠢	silly	眼睛	eye	文具	stationery
	忧郁	melancholy	笨拙	stupid	眼镜	glasses	钢笔	pen
	愧疚	guilty	愚昧	ignorance	视觉	vision	学习	learning
	苦恼	agonizing	愚钝	crass	近视	myopia	墨水	ink
	抑郁	despondent	愚笨	foolish	镜片	lens	铅笔	pencil
	忧愁	woebegone	蠢笨	clumsy	视线	sight	橡皮	eraser
	愧恨	ashamed	拙笨	unskillful	眼球	eyeball	笔袋	bag
	愁苦	anxiety	智障	amentia	眼科	ophthalmology	书包	schoolbag
	忧闷	gloomy	迟钝	dull	眼神	look	直尺	ruler
	忧恼	sorrow	痴呆	oafish	视野	view	毛笔	brush
	歉疚	sorry	呆板	inflexible	光学	opics	胶带	tape
	苦痛	pain	弱智	retarded	散光	astigmatism	书本	book

Appendix 2. DRM Word Lists Used in Experiment 2

Table A4

Neutral DRM Lists Used in Experiment 2

DRM Lists	1		2		3		4		5	
critical lures	箱子	box	双脚	foot	国王	king	文具	stationery	眼睛	eye
studied words	包装	pack	鞋子	shoe	王后	queen	钢笔	pen	眼镜	glasses
	储藏	store	双手	hand	王冠	crown	学习	learning	视觉	vision
	盒子	case	脚趾	toe	王子	prince	墨水	ink	近视	myopia
	纸盒	carton	凉鞋	sandals	女王	empress	铅笔	pencil	镜片	lens
	工具	tool	足球	soccer	权利	right	橡皮	eraser	视线	sight
	衣箱	suitcase	鞋码	yard	宫殿	palace	笔袋	bag	眼球	eyeball
	方形	cube	走路	walk	王位	throne	书包	schoolbag	眼科	ophthalmology
	皮箱	luggage	脚踝	ankle	统治	rule	直尺	ruler	眼神	look
	木匣	affair	靴子	boot	臣民	subjects	毛笔	brush	视野	view
	鞋盒	shoebox	短袜	sock	君王	monarch	胶带	tape	光学	opics
	容器	container	趾甲	nail	王室	royal	书本	book	散光	astigmatism

Table A5

Neutral DRM Lists Used in Experiment 2

DRM Lists	6		7		8		9		10	
Critical lures	河流	river	窗户	window	衣服	clothing	化学	chemistry	房子	house
Studied words	流水	water	门窗	door	时装	fashion	烧杯	beaker	建筑	architecture
	溪流	stream	玻璃	glass	服装	clothes	元素	element	楼层	floor
	长江	Mississippi	窗台	sill	衬衣	shirt	物理	physics	楼房	building
	小船	boat	房间	house	西装	suit	实验	experiment	修建	build
	游泳	swim	窗帘	curtain	风衣	coat	溶液	solution	修筑	construct
	流动	run	窗框	frame	背心	vest	分子	molecule	阁楼	attic
	小溪	creek	视野	view	大衣	overcoat	烧瓶	flask	房舍	premises
	小河	brook	通风	breeze	帽子	cap	有机	organic	楼梯	stairs
	鱼类	fish	纱窗	screen	夹克	jacket	氧化	oxidation	装修	decoration
	桥梁	bridge	窗花	paper-cutting	毛衣	sweater	蒸馏	distill	房产	property
	蜿蜒	winding	橱窗	shop-window	裤子	pants	滴管	dropper	书房	study

Table A6

Neutral DRM Unstudied Lists Used in Experiment 2

DRM Lists	11		12		13		14	
unstudied words	山脉	mountain	时间	time	面包	bread	车辆	vehicle
	丘陵	hill	时刻	moment	黄油	butter	公路	highway
	山谷	valley	时光	days	早餐	breakfast	汽车	automobile
	登山	climb	瞬间	instant	黑麦	rye	卡车	truck
	山顶	summit	世纪	century	果酱	jam	驾驶	drive
	顶峰	top	日期	date	牛奶	milk	轮胎	tire
	山丘	molehill	一刻	quarter	面粉	flour	公车	bus
	山峰	peak	手表	watch	奶酪	cheese	赛车	race
	平原	plain	间隔	interval	面团	dough	货车	van
	雪山	glacier	岁月	years	吐司	toast	吉普	jeep
	陡峭	steep	毫秒	millisecond	奶油	cream	车程	range
	山岗	molehill	钟表	clock	甜点	dessert	车库	garage

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PERSONALITY PSYCHOLOGY

The Role of Valence and Uniqueness of Emotions in the Context of Infrahumanization Theory

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Background. Infrahumanization is a result of group comparison when the ingroup is considered as fully human in comparison to an outgroup that is viewed as lacking humanness and similar to animals. Infrahumanization theory proposed that the attribution of emotions to ingroups and outgroups is based on their uniqueness, regardless of the valence of these emotions. Since the valence of information plays an important role in its processing and perception, it was decided to clarify the role of uniqueness and valence.

Objective. This article aims to explore the role of valence and uniqueness in the perception of emotions within the framework of the infrahumanization theory.

Design. Three studies were conducted. A preliminary study selected emotions with extreme values for uniqueness and valence to create a list for measuring infrahumanization for the Russian socio-cultural context. In Study 1, we tested three alternative models of perception of emotions' uniqueness and valence. In Study 2, we replicate the results from Study 1 and check the robustness of the models obtained.

Results. In a preliminary study (N = 146), twelve emotions with different levels of uniqueness and valence were selected for the Russian socio-cultural context. CFA was used for testing the models in Studies 1 and 2. The results of Study 1 (N = 243) demonstrated the role of valence and uniqueness in the perception of emotions. Study 2 (N = 482) confirmed the results obtained in Study 1.

Conclusion. For the first time, the infrahumanization measure was adapted to the Russian socio-cultural context. Infrahumanization research should control valence for a qualitative discussion of the results.

Keywords: Infrahumanization, emotion, valence, uniqueness

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Introduction

At the turn of the century, Leyens et al. (2001; 2000) described the infrahumanization theory, which proposed a new approach to understanding intergroup relationships, based on the idea of the humanity of different groups. According to Leyens et al., people believe that there is a unique 'human essence', which includes intelligence, language, and sentiments (secondary emotions). Within the framework of the infrahumanization theory, Leyens et al., focused on the analysis of sentiments. They claimed that in contrast to primary emotions (e.g., joy, surprise, fear, anger), which humans share with other animals, secondary emotions (e.g., love, hope, contempt, resentment) are unique to humans. The process through which secondary emotions (regardless of their valence) are attributed to an ingroup more than to an outgroup, and the absence of such differences for primary emotions was called infrahumanization.

Infrahumanization is a result of group comparison that links with positive ingroup bias when the ingroup is seen as fully human in comparison to an outgroup that is viewed as lacking humanness. The main difference between infrahumanization and ingroup favoritism is that infrahumanization is based on the attribution of both positive and negative secondary emotions to groups, since valence does not itself make these emotions more or less human. According to Haslam and Loughnan (2014), the concept 'infrahumanization' makes a significant theoretical advance in intergroup studies because it changes the way ingroup bias is viewed, highlighting the fact that it can be based on the attribution of characteristics regardless of their valence.

Over the 20 years since the infrahumanization theory was formulated, the infrahumanization effect has been studied on ethnic groups (Bain et al., 2009), national groups (Davies et al., 2018), gender groups (Viki & Abrams, 2003), age groups (Boudjemadi et al., 2017), religious group (Enock et al., 2021), and professional groups (Iatridis, 2013). The researchers also analyzed the consequences of the infrahumanization effect on intergroup relationships. In particular, it was found that infrahumanization reduces empathy with outgroup victims (Castano & Giner-Sorolla, 2006), increases the perception of the outgroup as threatening the values of the ingroup (Pereira et al., 2009), and is associated with the approval of violence against the outgroup (Motyl et al., 2010).

But in recent years, questions have accumulated regarding the infrahumanization theory, one of which is associated with the value of the emotions' valence in their perception and attribution.

Scientists have widely described the role of the valence of information in its perception, memorization, and reproduction (for example, the positive-negative asymmetry effect; Baumeister et al., 2001). Today, it is well known that, under certain conditions, positive or negative information can have a large impact on perception. In particular, negative information is more noticeable and memorable since it is, on average, more distinguishable from other negative information. This is why negative emotions are detected faster (Hansen & Hansen, 1988). At the same time, according to the density hypothesis, positive information is, on average, more similar to other positive information and this leads to stronger impact on the formation of impressions (Gräf & Unkelbach, 2016).

Even though the infrahumanization theory suggests that the valence of emotions is not important in attributing secondary emotions, Leyens et al. (2001) recognized the impact of valence in the attribution of primary emotions. The authors emphasized that it is possible that more positive primary emotions would be attributed to an ingroup than to an outgroup because of the ingroup favoritism effect. Over time, a lot of data has accumulated that, in one way or another, demonstrate the role of emotions' valence in attributing the emotions to groups. Researchers began to formulate questions about the role of valence in infrahumanization theory and to assume the parallel occurrence of the effects associated with the valence and uniqueness of emotions (see, for example, Eyssel & Ribas, 2012).

Three patterns can be distinguished from the infrahumanization studies. The first pattern corresponds to the ingroup favoritism and outgroup hostility effects when more positive emotions are attributed to an ingroup and negative emotions to an outgroup. Gaunt (2009) found that Jews (ingroup) attribute more positive emotions to themselves than to Arabs (outgroup) and more negative emotions to outgroup than to the ingroup. Iatridis (2013), in a study of professions with lawyers as an ingroup and shopkeepers as an outgroup, found that the former tend to attribute more secondary and positive emotions to the ingroup than to the outgroup.

In another group of studies, the second pattern—only positive asymmetry—was observed (in general, more positive emotions are attributed regardless of their type). For example, such a result was obtained in Australian and Chinese samples (Bain et al., 2009). Finally, there are studies with the third pattern in which more negative emotions are attributed in general (only negative asymmetry). This effect is observed in the example of lawyers (ingroup) and shopkeepers (outgroup; Iatridis 2013).

Importantly, in many studies it is impossible to draw a conclusion about the role of valence in the attribution of emotions since the authors do not describe the results of such an analysis. Instead, they state that there should be no differences in the attribution of secondary emotions of different valences (Albarello & Rubini, 2012), or they use emotions with only one valence (e.g., Demoulin et al., 2009).

As a result, the question about the role of emotions' valence in their perception and attribution remains open. The main research question of this paper is: 'What role does valence and the perceived uniqueness of emotions play in their perception and attribution?' A well-grounded answer to this question is important for a correct understanding and interpretation of the results obtained in the framework of the infrahumanization theory, as well as for the development of the theoretical assumptions of this theory.

Overview of the studies

The main goal of this paper is to study the role of valence and uniqueness in the perception of emotions. To achieve this goal, three studies were planned and carried out. In a preliminary study (N = 146), we selected emotions with different valence that are perceived as primary and secondary in the Russian socio-cultural context. In Study 1 (N = 243) we tested three alternative models of the perception of emotions' uniqueness and valence. The first model assumed that uniqueness is the dominant

feature in the perception of emotions and, as a result, two factors are formed: primary and secondary emotions. The second model suggested that valence is the dominant feature in the perception of emotions and two factors are formed: positive and negative emotions. The third model (bifactor) assumed that both attributes (uniqueness and valence) could play an important role in perception simultaneously. In Study 2 (N = 482) we re-tested all three models to check the robustness of the results obtained in Study 1.

Preliminary study

One of the features of measuring infrahumanization is that cultural differences may exist in the perception of emotions as primary or secondary. For example, Bain et al. (2012) demonstrated that respondents from individualistic and collectivistic cultures differently perceive emotions as reflecting human essence and uniqueness. It is difficult to isolate patterns of infrahumanization effect across cultures: some studies do not report all comparisons and effects. However, there is a fair amount of research with culture-specific lists of primary and secondary emotions that has been conducted in more individualistic (France and Germany; Boudjemadi et al., 2017; Eyssel & Ribas, 2012), and more collectivistic (Greece and Portugal; Iatridis, 2013; Vala et al., 2009) cultures. There have also been examples that are a blend of individualistic and collectivist cultures (Hofstede et al., 2010): Israel (Gaunt, 2009), Spain (Rodríguez et al., 2016).

Russian culture cannot be unambiguously classified as individualistic or collectivistic (Naumov & Puffer, 2000), which is why the lists of emotions proposed in previous studies may not fully fit the Russian context. Previously, no infrahumanization research has been conducted in Russia and there is no measurement tool. The preliminary study aimed to determine the list of uniquely (secondary) and non-uniquely (primary) emotions that are relevant for the Russian socio-cultural context.

In return for a course credit, 54 students from a large Moscow university (66.7 % women, M_{age} = 17.85, *SD* = .66) rated 146 emotions which were identified in a previous study (Liusin & Sinkevich, 2010). Respondents categorized each emotion from 1 to 3 (1 — this emotion is typical both for humans and animals; 2 — this emotion is unique to humans; 3 — difficult to answer). The emotion was considered primary or secondary and positive or negative when at least 80 percent of the respondents categorized it into a certain group. On this stage, we selected 40 out of 146 emotions based on their categorization as uniquely and non-uniquely human.

At the next stage, 92 respondents (53.0 % women, M_{age} = 32.12, *SD* = 3.04) rated each emotion on a 10-point scale of uniqueness (from 1 = *is not unique to humans: both humans and other living things are able to experience this emotion,* to 10 = *is unique to humans: only humans are able to experience this emotion*) and valence (from 1 = *it is a negative emotion* to 10 = *it is a positive emotion*).

For the next studies, we selected emotions that met the following criteria: the emotion was evaluated as high (*M* + *SD*) or low (*M* – *SD*) on the uniqueness item (M_{unique} = 5.96, *SD* = 1.98; upper thresholds for uniqueness — 7.94, lower – 3.98) and the same emotion was evaluated as high or low on the valence item ($M_{valence}$ = 5.18, *SD* = 2.14; upper thresholds for valence — 7.32, lower — 3.04).

We selected twelve emotions with different valence and perceived uniqueness that met the criteria: three primary positive emotions (joy, *радость*; pleasure, *удовольствие*; calmness, *спокойствие*), three primary negative emotions (pain, *боль*; anger, *злость*; fear, *страх*), three secondary positive emotions (inspiration, *вдохновение*; enthusiasm, *воодушевление*; admiration, *восхищение*), and three secondary negative emotions (gloating, *злорадство*; pessimism, *пессимизм*; emptiness, *опустошенность*)[1].

The highlighted list of primary positive and negative emotions generally coincides with those emotions that are used in other countries (e.g., Greece, Portugal, Israel, and Spain). This result may indicate a cultural universality in the perception of primary emotions. The main differences are related to secondary emotions, especially negative ones. These differences can be associated with the fact that in individualistic cultures, emotions have a greater intrapersonal meaning, confirming the importance of the individual (Suh et al., 1998), while in collectivistic cultures, emotions are important in the context of groups and interpersonal relationships. The list of secondary emotions we have obtained is mostly different from those emotions that were previously used in various cultural contexts, which once again emphasizes the importance of the preliminary selection of emotions that are relevant to a particular culture. Thus, for the first time, we have identified a list of primary and secondary emotions specific to the Russian socio-cultural context.

Study 1

The aim of this study was to test what role the valence and uniqueness of emotions play in their perception. We tested three alternative models of perceiving emotions (see *Figure 1*). According to infrahumanization theory, the uniqueness of emotions can be considered as a dominant feature in how those emotions are perceived, since secondary emotions are attributed regardless of their valence (Leyens et al. 2001; 2000). As a result, Model 1 suggests that in lay perception, the emotions selected in the preliminary study might be combined into two types according to their uniqueness and regardless of their valence: uniquely human and non-uniquely human emotions (Figure 1a).

At the same time, it has been repeatedly shown that the valence of information plays an important role in perception and attribution (Baumeister et al., 2001). Since we selected for analysis those emotions with different valence, we assume that in lay perception, they might be combined into two alternative types — positive and negative — based on their valence and regardless of their uniqueness, which is reflected in Model 2 (*Figure 1b*).

Finally, different information interacts in the process of perception, and the combination of various attributes of an object can lead to the emergence of unique patterns in perception. Such interactions can be observed between the emotional valence and emotional intensity (Mei et al., 2018). Each emotion we study has two attributes (valence and perceived uniqueness). Consequently, we can assume that both might be associated with how exactly this emotion will be perceived. Therefore,

[1] The full descriptive statistics for emotions can be find on OSF

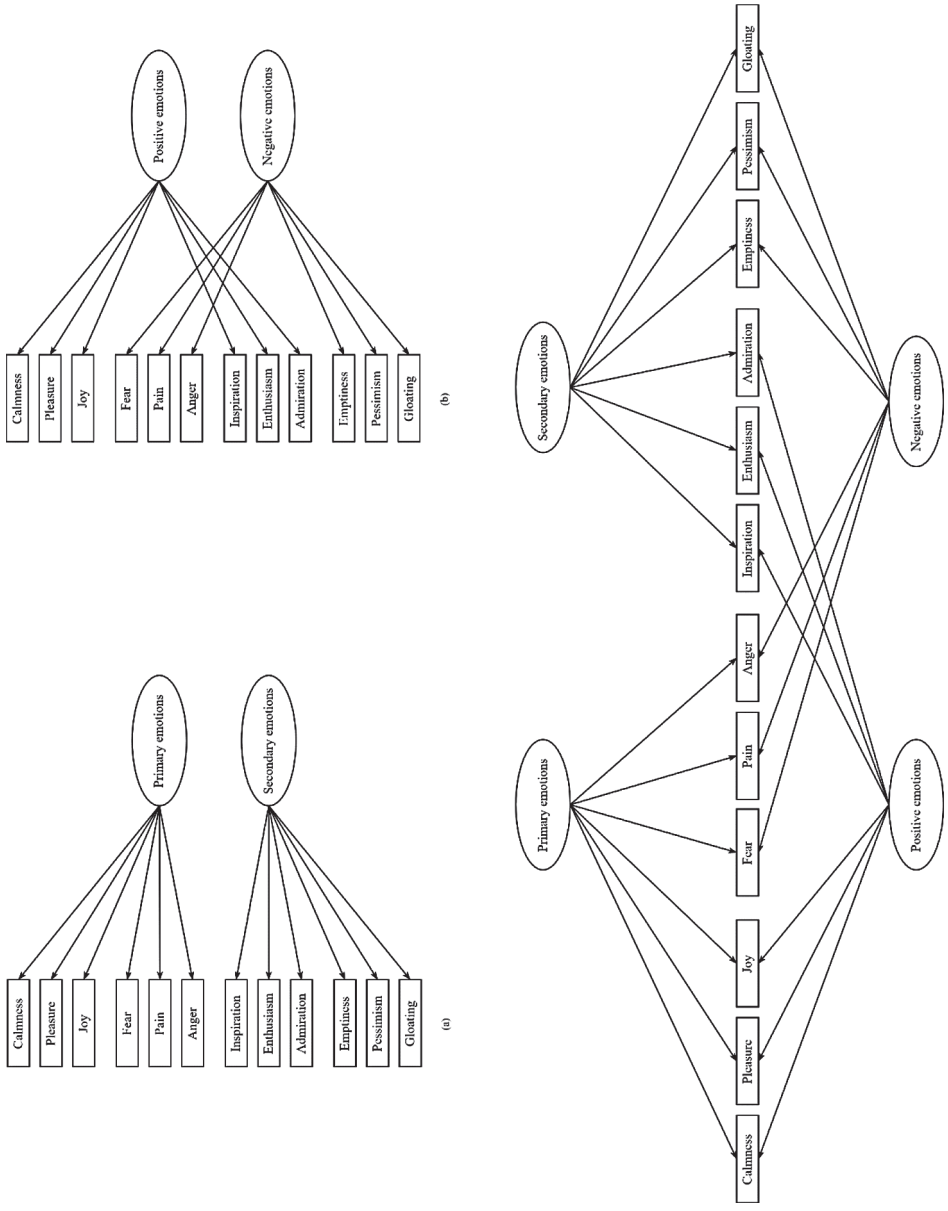

Figure 1. The theoretical models of emotions' perception

a third variant of the lay perception of the selected emotions is possible. Model 3 (bifactor) suggests that both attributes (uniqueness and valence) can interact in the perception, forming two dimensions (valence and uniqueness), so that each emotion simultaneously contributes to each of the dimensions (*Figure 1c*).

To check the proposed models, we used a confirmatory factor analysis (CFA) and the following fit indices to evaluate the fit of a model to the data: the ratio of chi-square to degrees of freedom, the root mean square error of approximation (RMSEA), the comparative fit index (CFI), the Tucker-Lewis index (TLI), and standardized root mean square residual (SRMR). According to Hu and Bentler (1999), values of .08 or below for RMSEA and .09 or below for SRMR indicate the model to be a good fit to the data. For CFI and TLI the values have to be at least .90 to indicate a good fit of a model (Kline, 2011). We also used the robust maximum likelihood (MLR) method since it robust to occurrences of data non-normality (Maydeu-Olivares, 2017). All analyses were made in the software Mplus (Muthen & Muthen, 2013).

Method

Participants

To control the quality of the data, attentiveness questions were used: 49 out of 292 respondents did not pass the attentiveness test and were excluded from the sample. As a result, the final sample included 243 respondents (51.0% women, M_{age} = 37.2, *SD* = 11.2), which were recruited for an online study through Yandex.Toloka (the Russian analog of Amazon's Mechanical Turk) in return for a participation fee (0.7$). Most of the respondents (58.5%) had completed higher education, 29.3% had received secondary special education, and 12.3% were students. Fewer than a half of all respondents lived in cities with a population of more than a million (23.9% were from Moscow or Saint-Petersburg, and 15.2% from other large Russian cities); instead, most (54.3%) lived in cities with a population of fewer than a million people and 6.6% lived in villages.

Procedure

Participants read an informed consent where they were informed that the study was voluntary and anonymous. Next, they answered questions on demographics (age, sex, education, and city of residence). After that, participants were offered a list of 12 emotions, where each emotion had to be rated on a 10-point scale of uniqueness (1 = *is not unique to humans: both humans and other living things are able to experience this emotion* to 10 = *is unique to humans: no one except humans are able to experience this emotion*) and valence (1 = *it is a negative emotion* to 10 = *it is a positive emotion*). On the last page, they were thanked for their participation.

Results

Descriptive analysis

Table 1 presents the descriptive statistics for different emotions. Overall, positive emotions (M = 8.82, *SD* = 1.28) were rated higher on a valence item than negative

Table 1

The descriptive statistics for emotions

Emotions	Study 1								Study 2							
	Uniqueness				Valence				Uniqueness				Valence			
	M	*SD*	Skewness	Kurtosis	M	*SD*	Skewness	Kurtosis	M	*SD*	Skewness	Kurtosis	M	*SD*	Skewness	Kurtosis
Pessimism	8.57	2.25	−1.67	1.95	2.77	1.96	1.13	0.78	7.52	2.73	−0.77	−0.59	2.77	2.05	1.12	0.69
Gloating	8.74	2.34	−1.93	2.64	1.96	1.89	2.57	6.72	7.71	2.85	−0.99	−0.37	2.33	2.09	1.74	2.46
Admiration	8.41	2.33	−1.49	1.25	8.56	1.76	−1.28	1.52	6.98	2.81	−0.75	−0.47	8.65	1.85	−1.52	1.79
Emptiness	8.29	2.32	−1.43	1.21	2.78	2.25	1.49	1.65	6.96	2.78	−0.49	−0.88	2.75	2.01	1.33	1.57
Enthusiasm	8.45	2.25	−1.59	1.84	9.01	1.66	−2.08	4.51	8.19	2.47	−0.73	−0.57	8.73	2.03	−1.40	1.50
Inspiration	9.15	1.76	−2.34	4.97	9.16	1.53	−2.22	4.85	7.19	2.70	−1.37	0.97	8.60	1.79	−1.96	3.54
Pleasure	4.14	2.89	0.48	−1.04	8.67	1.80	−1.27	0.75	4.13	3.10	0.37	−1.26	8.73	1.86	−1.59	1.94
Joy	4.02	2.80	0.43	−1.09	9.27	1.63	−2.95	9.49	4.29	3.07	0.39	−1.19	9.12	1.74	−2.42	6.08
Fear	2.91	2.59	1.22	0.37	3.62	2.27	−0.80	0.26	3.23	2.81	0.94	−0.28	2.77	2.04	1.07	0.52
Calmness	3.71	2.76	0.65	−0.75	8.24	2.03	−1.25	1.19	3.97	2.86	0.42	−1.02	8.31	1.97	−1.13	0.55
Anger	3.97	2.90	0.59	−0.88	2.56	2.01	1.40	1.51	3.76	2.87	0.68	−0.76	2.63	2.17	1.35	1.17
Pain	2.69	2.44	1.35	0.83	2.51	2.03	1.45	1.69	3.24	2.81	0.91	−0.41	2.52	2.21	1.49	1.57

emotions (M = 2.70, *SD* = 1.46), *Z* = –13.41, *p* < .001. On uniqueness item, the secondary emotions (M = 8.60, *SD* = 1.77) were rated higher (M = 3.57, *SD* = 2.11) than the primary ones, *Z* = –13.2, *p* < .001. These results confirm that emotions selected at the preliminary study differ in their perceived uniqueness and valence.

Descriptive analysis

We tested Model 1 based on the uniqueness measure. The results of the CFAs are presented in *Table 2* and clearly show that Model 1 demonstrates a poor fit to the data. Adding to Model 1 the covariances between the estimates of emotions included in one type (admiration and inspiration; joy and anger; joy and fear) somewhat improves its fit, but still does not make it acceptable. This result means that in lay thinking, the uniqueness of emotions is not a main factor in the perception of emotions[2].

Table 2

Closeness of fit indicators for different models

Models		χ2	*df*	RMSEA [90% CI]	SRMR	CFI	TLI	AIC
Model 1	Study 1	167.08***	53	.094 [.078; .110]	.085	.884	.856	12216
	Study 1 (adjusted model)	135.22***	50	.084 [.067; .101]	.082	.913	.886	12175
	Study 2	438.89***	53	.123 [.112; .134]	.105	.832	.790	25486
	Study 2 (adjusted model)	309.18***	49	.105 [.094; .116]	.100	.886	.847	25311
Model 2	Study 1	107.35***	53	.065 [.047; .083]	.054	.917	.896	11006
	Study 1 (adjusted model)	79.51**	51	.048 [.026; .068]	.053	.956	.943	10976
	Study 2	114.16***	53	.049 [.037; .061]	.031	.964	.955	21230
Model 3	Study 1	55.65*	38	.044 [.013; .067]	.025	.982	.969	12108
	Study 2	85.63***	40	.049 [.034; .063]	.026	.980	.967	25053

*Note. df — degree of freedom; RMSEA — root mean square error of approximation; CFI — comparative fit index; TLI — Tucker Lewis index; SRMR — standardized root mean square residual; AIC — Akaike information criterion. *** — p < .001, ** — p < .01, * — p < .05.*

Model 2 was tested based on its valence measure. The results of the CFA for Model 2 also demonstrates a poor fit to data. Adding to Model 2 the covariances between gloating and anger and between joy and enthusiasm makes the model a good fit. This point is important because covariances arise between negative emotions, one of which can be attributed to primary emotions, and another to secondary, indicating that valence can play a more significant role than uniqueness in emotions' perception. The same situation occurs with the covariance between positive emotions.

Model 3 was also tested based on uniqueness measure[3]. In this model, we used two bases for grouping emotions: valence and perceived uniqueness (see Figure 1c).

[2] Factor loadings for each emotion are presented on OSF (Study 1. Figures)

[3] The use of the valence measure as the base for Model 3 does not change the results, and the bifactor model in this version also demonstrates good data fit.

Table 2 shows that, in contrast to previous models, Model 3 fits the data well without adding additional covariances.

Overall, the results of this study show that although emotions are differentiated when they are rated high or low in their uniqueness, this rating is not related to how emotions are grouped in lay perception. In contrast, the perceived differences in the valence of emotions are significant when they are grouped.

It is equally important that if to the division of emotions based on valence we add the second attribute of emotions (in our case, the supposed division of emotions into primary and secondary), then the final model will describe the patterns of lay perception even better. In other words, both emotions' valence and uniqueness can play an important role in their perception.

Study 2

The main aim of this study was to replicate and check the reliability of Study 1 results regarding the role of valence and uniqueness of emotions in the context of the infrahumanization theory. We tested three alternative models of perceiving emotions as in the previous study. We expect confirmation of past conclusions about the role of valence and the uniqueness of emotions in their perception.

Method

Participants

Participants were recruited for an online study through Yandex.Toloka in return for a fee (0.7$). After checking for attentiveness, 128 out of 610 respondents were excluded due to poor quality of the data. The final sample included 482 participants (50.6 % women, M_{age} = 34.89, SD = 11.32). Most respondents (57.7%) had completed higher education, 20.7% had received secondary special education, and 12.0% were students. Most of the participants (78.6%) noted their ethnicity as Russian, 4.7% as Ukrainians, the rest chose other ethnic groups. Fewer than half of the respondents lived in cities with a population of more than a million (17.4% were from Moscow or Saint-Petersburg, and 22.4% from other large Russian cities). Almost half of the respondents (47.7%) lived in cities with a population of fewer than a million people and 7.9% lived in villages.

Procedure

The procedure and measures were the same as in Study 1.

Results

To demonstrate the robustness of our results regarding emotions' perception, we tested three models from Study 1 using data from Study 2. Descriptive statistics for emotions are presented in *Table 1*, and the results of the CFAs are presented in *Table 2*.

The results obtained completely repeated the patterns identified in Study 1. Model 1, describing the separation of emotions based on their perceived uniqueness,

shows the worst fit to the data. Model 2, describing the separation of emotions based on valence, fits well with the data, but the best model is Model 3 (bifactor), which has better indicators than Model 2. These results once again confirm that in the lay perception both the valence and uniqueness of emotions play an important role[4].

Discussion

The goal of this study was to test the role of valence and uniqueness in the perception of emotions. Using the example of primary and secondary emotions of different valence specially selected for the Russian socio-cultural context, two studies were carried out. The studies' results demonstrated the role of valence and its connection with the uniqueness of emotions. In general, the results obtained demonstrate several important points for understanding and measuring infrahumanization.

We found that emotions' valence and uniqueness are important in the perception of these emotions. Other researchers have also highlighted the importance of emotions' valence in the infrahumanization research but based on the attribution of emotions. Bain et al. (2009) highlighted the main effect of valence; Viki and Abrams (2003) confirmed the significance of emotions' valence and interaction between emotions' valence and uniqueness. Based on these results, they proposed that the valence effect can complement the infrahumanization effect in the attribution of emotions to the outgroups.

The repeated confirmation of the role of emotions' valence in their attribution appears justified in the context of knowledge about the characteristics of perception and categorization. It has been repeatedly shown that people are guided by the most accessible feature in perception and attribution, and the valence of information is often just such a feature (Gräf & Unkelbach, 2016). Valence is an explicit feature that is simply accessible when perceiving emotions and can be culturally universal (for example, an emotion such as disgust has a negative valence in most cultures, while happiness has a positive one; An et al., 2017).

In contrast, the situation with the perceived uniqueness of emotions is much more complicated. Our two studies have shown that when respondents are explicitly asked to what extent a certain emotion is unique (experienced only by people) or non-unique (experienced by both people and other animals), they can differentiate emotions, but this does not lead to 'uniqueness' becoming the feature that groups emotions into different factors (as in the case of emotions' valence). Eyssel and Ribas (2012) formulated a similar conclusion about the differentiation of emotions in their study.

As a result, the thesis of the infrahumanization theory – that the uniqueness of emotions dominates over their valence when attributing secondary emotions to the ingroup and outgroup – requires additional study since our conclusions about their perception do not confirm it.

In general, even though our findings generally repeat many of the results obtained previously in the framework of the infrahumanization theory, we propose looking at them from a new angle and carefully evaluating the role of valence in

[4] Factor loadings for each emotion are presented on OSF (Study 2. Figures)

attribution of emotions. Such an assessment has important practical implications for research within the framework of the infrahumanization theory and the correct interpretation of the results obtained. Our results allow us to draw two important conclusions.

The first conclusion is that the valence of emotions is undoubtedly important in their perception and attribution, so controlling the valence effect should be an obligatory part of infrahumanization research. In addition, due to the accumulated findings on the role of valence in the attribution of emotions, some assumptions of the infrahumanization theory should be clarified for example, by clarifying the factors or conditions in which valence may not play a key role in attributing secondary emotions. Since several studies find confirmation of the infrahumanization effect, it would be productive to comprehend the results that do not find such confirmation.

The second conclusion is related to the understanding of the 'uniqueness' of emotions proposed by Leyens et al. (2001). As our results show, in lay perceptions emotions are not grouped on this basis; therefore, it cannot be concluded that uniqueness plays a role in the attribution of emotions. It is likely that some more significant grounds combine certain primary and secondary emotions into new groups, and it is these grounds that can be significant in attributing emotions. In other words, the interpretation of the results obtained in relation to the uniqueness of emotions precisely as a greater or lesser attribution of humanity to groups may raise doubts. Discussion of this problem could lead to the productive development of the infrahumanization theory.

Limitations

This study meets limitation since we tested the models of emotions' perception while the attribution of emotion also has a significant role for Infrahumanization theory. The additional analysis focused on the attribution of selected emotions to various social group can expand our understanding of the role of uniqueness and valence of emotions in interpersonal and intergroup relations.

Ethics Statement

This study was approved by the Committee on Ethical Assessment of Empirical Research, Department of Psychology, HSE University, Moscow, Russia.

Author Contributions

Maria A. Terskova and Elena R. Agadullina conceived of the idea. Maria A. Terskova collected the data and performed the computations. Elena R. Agadullina tested the statistical models and verified the analytical methods. All authors discussed the results and contributed to the final manuscript.

Conflict of Interest

The authors declare no conflict of interest.

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Availability of data and material

The dataset is freely available at Open Science Framework: https://osf.io/m2zaf/?view_only=dcb1827d08c1470ebf7441a9ef4d8797

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