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Academic Stress Factors in Slovak University Students During the Covid-19 Pandemic

Abstract

Aim: To study the in/direct relationship between fear of COVID-19 contraction and academic stress during the first wave of the pandemic. Method: The sample consisted of 835 university students (597 female students, 71.5%, M = 22.71 years of age, SD = 3.69). Data were gathered online by the questionnaire of the international study The COVID-19 International Student Well-being Study (C19 ISWS). Results: An above-average level of academic stress and a below-average gender-related level of fear of contracting the virus were found. The relationship between fear of contracting the virus and academic stress was serially mediated by loneliness and depressive symptoms. Conclusion: The findings stress the importance of monitoring the level of fear of virus contraction and the student-perceived perspective of academic achievement during actions taken by academic authorities to support the quality of teaching and students' mental health.

Keywords: *fear of COVID-19 contraction, academic stress, loneliness, depressive symptoms*

Introduction

On 18th March, 2020, the Ministry of Health of the Slovak Republic issued a measure on declaration of the national state of emergency. At universities, the Covid-19 pandemic led to necessary measures of transition to distance education. The development of a new concern of contracting COVID-19, fear for one's own

health and the health of the loved ones, changes in social aspects of life, coping with new aspects of psychological distress (Son, Hegde, Smith et al., 2020, Wang, Hegde, Son et al., 2020) created a special framework of university studies.

The aim of our study was to examine the relationship between the level of university students' fear of contracting COVID-19 and academic stress, the so-called level of academic workload, fear of being unable to successfully complete the academic year due to COVID-19, stressfulness of the change in teaching methods caused by the COVID-19 pandemic. A direct positive relationship between the level of fear of contraction and academic stress during the pandemic was hypothesized (Hypothesis 1H[1], Picture 1). Results of existing investigations showed adverse effects of the pandemic, lockdown on academic performance (John & John, 2021). The impact of the pandemic has been seen in various academic activities, academic performance and academic progress; the pandemic lead to academic stress, feelings of uncertainty, fear of not being able to cope with assignments, difficulty in concentration; the risk of reduced motivation to learn and tendencies to procrastinate increased (Son, Hegde, Smith et al., 2020, Wang, Hegde, Son et al., 2020).

Social isolation was associated with a number of health-related social consequences (Bartoszek, Walkowiak, Bartoszek et al., 2020). The significant decrease in interactions, worries about a lack of interactions with people, friends, disruption of out-door activities, activities in nature significantly influenced persons' mental health (Son, Hegde, Smith et al., 2020). A relationship was established between the COVID-19 pandemic and depressive symptoms (Al-Dwaikat, Aldalaykeh, & Rababa, 2020, Kapasia, Paul, Roy et al., 2020), with loneliness, insecurity or uncertainty, powerlessness or hopelessness, concerns about academic performance as major contributors to depressive thoughts (Son, Hegde, Smith et al., 2020).

Our study assumed (Picture 1) a single mediation relationship between fear of contraction and academic stress during the COVID-19 pandemic through loneliness (Hypothesis 2H[2]) and through depressive symptoms (Hypothesis 3H[3]). Building on previous research results which have found a relationship between depression and loneliness (Ceyhan, & Ceyhan, 2011) and the increasing feelings of loneliness reported by university students before and during the pandemic (Bu, Steptoe, & Fancourt, 2020, Hysing, Petrie, Bøe et al., 2020), the aim of our research was to study the relationship between university students' fear of contraction and academic stress during the COVID-19 pandemic. It was further hypothesized that this relationship would be serially mediated by loneliness and depressive symptoms (Hypothesis 4H[4]).

DIRECT RELATIONSHIP

INDIRECT RELATIONSHIP
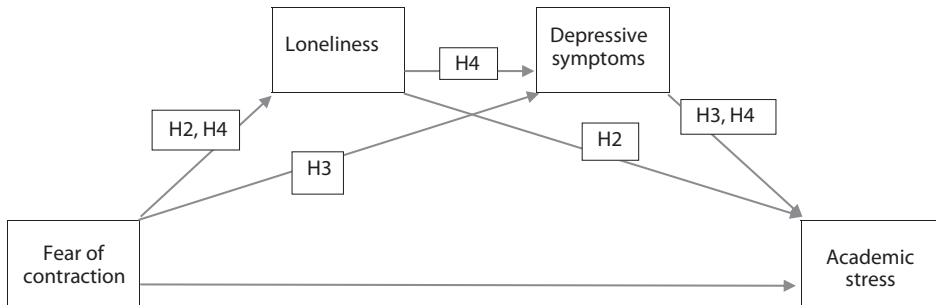
Picture 1. Theoretical serial mediation model
Notes: Included covariate variables: university student's gender and age.

Methodology of Research

General Background of Research
The presented results of Slovak university students are part of the international study C19 ISWS (Van de Velde, Buffel, Bracke et al., 2021).

Sample of Research
The research involved 835 university students (597 female students, 71.5%), average age 22.71 years old, SD = 3.69.

Instrument and Procedures
All 6889 students of the Pavol Jozef Šafárik University in Košice, Slovakia, were invited to participate in the research. The invitation was forwarded to students by official e-mail to their student e-mail addresses. Anonymous data were gathered online during April and May 2020. The research was carried out with the consent of the Ethics Committee of Pavol Jozef Šafárik University in Košice.

Instrument

Fear of contracting the virus causing the disease COVID-19

The question "*How much are you afraid of contracting the virus causing the disease COVID-19?*" was answered on the scale of 0–10-points, I am not afraid at all to I am afraid very much.

Academic stress

Eight specific questions were used in the research, focused on relevant aspects of university study during the 1st wave of the COVID-19 pandemic, answered on a Likert-type scale from 0 to 4 points (higher score indicating a stronger agreement).

An analysis of main factors was performed. Two factors were found out (KMO value was 0.81 and Barlett's test statistically significant). The two-factor result of the analysis of main factors explained 57.3% of variance, with the first factor of 40.69% of academic stress the analyses of this study worked with. The academic stress factor was loaded by 3 items relating to the increase in the academic workload during the COVID-19 pandemic, fear of being unable to complete the academic year successfully due to COVID-19, stressfulness of the change in the teaching method caused by the COVID-19 pandemic. Higher scores indicated a higher level of academic stress (Table 1). Cronbach's Alpha of the scale = 0.69.

CES-D8 Scale (Van de Velde et al., 2010)

An eight-item scale of depressive symptoms with answers on a 4-point scale: "None or almost none of the time" (1) to "All or almost all of the time" (4) (Item example: *"How much of the time during the past week you felt depressed?)*. Higher scores indicated a higher level of depressive symptoms. CES-D8 main factors were analyzed and one factor was confirmed, explaining 52.1% of variance (KMO value was 0.88 and Barlett's test was statistically significant). Cronbach's Alpha = 0.86.

Loneliness

A five-item scale of loneliness with answers on a 4 point-scale "Not at all or almost never"(1) to "Always or almost always" (4). An analysis was performed of main factors of original six items of the international questionnaire of loneliness. One factor was found (KMO value was 0.72 and Barlett's test statistically significant), explaining 46.9% of variance (item examples: "*During the past week you felt frustrated in general; During the past week you felt isolated from others)*. Cronbach's Alpha = 0.78.

Data Analysis

Data were analyzed in the program SPSS 25. Pearson's correlation coefficient was used to analyze relationships between variables. Mann-Whitney's U-test was used to analyze gender differences. The serial mediation analysis was performed through Hayes' *PROCESS* tool (Field, 2013) in SPSS 25 (Model 6). The mediation effect was tested on 1000 samples by means of Bootstrap. The advantage of the mediation analysis (Van Jaarsveld, Walker & Skarlicki, 2010) is the identification of a direct relationship (Hypothesis 1), indirect relationships of both mediators: loneliness (Hypothesis 2) and depressive symptoms (Hypothesis 3), as well as investigation of indirect relationships through serial mediation of both mediators (Hypothesis 4). Controlled variables of the serial mediation analysis were university students' gender and age.

## Results of research

Descriptive analysis

The level of university students' fear of contracting the virus was relatively low (Table 1). Investigation of gender differences confirmed a higher level of fear of virus contraction among female students (*Md = 3*) in comparison with male students (*Md = 2), U = 81 678, p* < 0.001). Overal, students reported an above-average level of academic stress during the first wave of the pandemic. The correlation analysis showed a positive relationship between fear of contraction and loneliness, depressive symptoms and academic stress in university students during the pandemic (Table 1). The relationship between age and academic stress, loneliness and depressive symptoms was negative.

**Table 1.** Correlations, means, standard deviations of the studied variables

	Academic stress	Fear of contraction	Loneliness	Depressive symptoms	Gender	Age
Academic stress	1					
Fear of contraction	.191***	1				
Loneliness	.353***	.222***	1			
Depressive symptoms	.417***	.191***	.785***	1		
Gender	0.041	.112***	0.053	0.026	1	
Age	-.097**	-0.015	-.138***	-.100**	-.096**	1
M	7.20	3.51	17.72	11.98		22.71
SD	3.0	2.78	5.10	3.58		3.69

Notes: **p < .01. ***p < .001

A DIRECT RELATIONSHIP

| Fear of contraction | b = 0.035*** → | Academic stress |
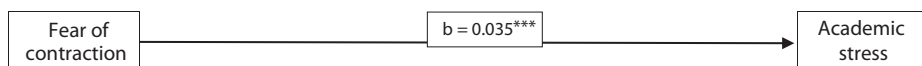
B SERIAL RELATIONSHIP
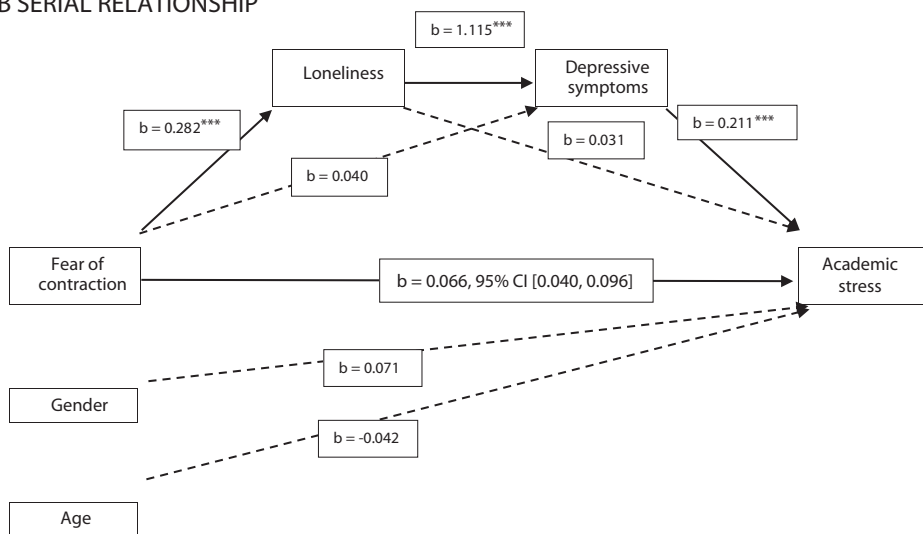
Picture 2. Statistical serial mediation model among university students
Notes: *p < .05. **p < .01. ***p < .001

In line with the Hypothesis 1, a direct positive relationship was confirmed between fear of contraction and academic stress (Picture 2, A). Contrary to the Hypotheses 2 and 3, loneliness was not a confirmed mediator of the relationship between fear of contraction and academic stress during the COVID-19 pandemic (Picture 2, B), 95% CI [-0. 015; 0.036]; likewise, depressive symptoms were not a confirmed mediator of the relationship between fear of contraction and academic stress during the COVID-19 pandemic (Picture 2, B) , 95% CI [-0. 010; 0.027].

In line with the Hypothesis 4, our results showed that the relationship between fear of contraction and academic stress during the COVID-19 pandemic was serially mediated by university students' loneliness and depressive symptoms (Picture 2, B).

Discussion

The literature review of publication outputs dealing with e-learning and e-teaching (Mseleku, 2020) showed availability of a number of studies dealing with the pandemic, however, little attention was paid to thorough investigation of the educational process in the online space. An above-average level of academic stress during the first wave of the COVID-19 pandemic was reported by university students in our research. In the context of the findings from the international study C19 ISWS published so far (Tasso, Hisli Sahin, & San Roman, 2021), the research results based on the sample of Slovak university students correspond with the overall results of C19 ISWS showing that high academic frustration was related to the change in teaching methods, increasing academic workload, lower quality of education, as well as concerns about completing the academic year successfully (Tasso, Hisli Sahin, & San Roman, 2021). Our investigation shortly after declaration of the pandemic first wave in Slovakia correspond also with other available investigation results. The results of the study by John and John (2021) carried out among university students showed that in the early days of lockdown students were not anxious about long-term effects of the pandemic, but they reported to be less prepared academically and less confident to face examinations successfully. However, further investigation should focus on the relationship between university students' fear of contraction, academic stress and academic achievement. The results of previous research confirmed a positive change in university students' learning strategies towards more continuous and efficient learning during pandemic restrictions (Gonzalez, De La Rubia, Hincz et al., 2020).

The results of C19 ISWS carried out among university students in 28 countries showed on a 10-point scale (1–10) that their worry about being infected had a mean of 4.87 (SD = 3.10) (Tasso, Hisli Sahin, & San Roman, 2021). Slovak students reported an under-average level of fear of contraction with gender differences found in favour of a lower level of fear in male students. The results of this study correspond with research findings showing gender differences in the negative psychological influence of COVID-19 (Ataş, & Yildirim, 2020) as well as fear of contraction (Ataş, & Yildirim, 2020, Nguyen, Do, Pham et al., 2020) with a higher level of fear in female students.

The results of this study confirmed the assumption of serial mediation, i. e. that the relationship between fear of contraction and academic stress during the COVID-19 pandemic was serially mediated by university students' loneliness and depressive symptoms. The above mentioned corresponds with the finding that experiencing loneliness significantly contributed to depressive thoughts (Son,

Hegde, Smith et al., 2020). However, the study did not show single mediations; neither loneliness nor depressive symptoms were single mediators of the relationship between fear of contraction and academic stress during the COVID-19 pandemic.

The differences found out by serial mediation and single mediations can be hypothetically explained also by research results reported by Son, Hegde, Smith et al., 2020. The authors found out that although a majority of university students participating in their research expressed concerns regarding academic performance, almost half of them reported lower stress levels related to academic pressure and workload since the pandemic began, which might be, as the authors maintained, due to teachers' methods chosen to ease students' sudden transition to distance learning. Likewise, despite possible concerns of students who had to return to their parental homes and were concerned about certain problems related to concentration and independence, might benefit from family support and reduced social responsibilities. In addition, students who coped with the pandemic social isolation better, were those who received more regular contacts from university staff that mitigated loneliness in students (Blake, Knight, Jia et al., 2021).

As our study results showed, fear of contraction had a direct positive relationship with academic stress and loneliness, but the loneliness itself was not a mediator of the relationship between fear of contraction and academic stress, i. e. the mediation analysis did not show the relationship between loneliness and academic stress. Another important finding of our study was that single mediation of the relationship between fear of contraction and academic stress through depressive symptoms was not confirmed. However, the existing research results are not unambiguous in this respect. The mediation analysis results of our study do not correspond with conclusions of the study by Li, Hafeez a Zaheer (2020), who confirmed a significant positive relationship between university students' fear of contraction and depression; results of the Italian study (Balsamo, & Carlucci, 2020) showed the highest level of psychological distress among university students in comparison with other groups of population, they showed that although younger persons reported a lower level of risk of contracting the virus, they experienced a higher level of depressive symptoms during the COVID-19 quarantine.

Our results of the mediation analysis, however, showed the relationship between depressive symptoms and academic stress; showed the relationship between loneliness and depressive symptoms. These findings is in line with results of several other studies. For example Ceyhan and Ceyhan (2011) confirmed the relationship between depression and loneliness, while showing higher levels of depression and loneliness in first-grade students than those of others. Bahmani, Faraji, Faraji et al. (2017) investigated the relationship between depression, and loneliness and

academic achievement among students, and found out that increased age was not associated with lower levels of loneliness and depression. Results of our investigation likewise correspond with the results of the above authors who confirmed the relationship between a higher level of depression and a higher level of loneliness but did not confirm the relationship of depression and loneliness with academic achievement. Bahmani, Faraji, Faraji et al. (2017) assumed that academic achievement might be related to other cognitive and emotional processes such as motivation, goal-oriented processes, mental toughness and stress resistance.

What stimuli and changes in the field of education have been brought by the pandemic shall be fully recognized and understood only later (Černý, 2020). The results of the study are presented with the intention to contribute to the above findings, understanding, professional discourse. The investigation results lead to the need to support students' resistance to fear of contraction, as well as their willingness and ability to the active, autonomous and system approach to learning. This presupposes respecting the need for students' being well informed about requirements for academic achievement (Steinmetz, & Marshall, 2021), limitations and demands of distance learning perceived by students and teachers during the pandemic (Juszczyk, & Kim, 2020). The results indicate the importance of teacher-student in/formal continuous online individual/group meetings, continuously addressing problems related to students' academic stress.

Our investigation has some limitations that have to be mentioned and that are mentioned also by Van de Velde, Buffel, Bracke et al. (2021). They concern mainly the non-representative research sample, the fact that university students who experienced stress due to the COVID-19 pandemic might be more likely to participate in the investigation than students who did not experience stress or vice versa. Certain limitations are also connected with the research sample size and the related fact of invitation to the online research during the stress associated with the sudden change of in-person teaching to distance teaching. Despite the above, the presented study results add to the knowledge of the psychological mechanism of the impact of the pandemic on mental health (Nearchou, F., Flinn, C., Niland et al., 2020) and academic performance of university students (Son, Hegde, Smith et al., 2020).

Conclusion

Slovak students reported an above-average level of academic stress, i. e. their academic workload, fear of being unable to successfully complete the academic year due to COVID-19, stressfulness of the change in teaching methods caused

by the COVID-19 pandemic. The results of our investigation confirmed rather a below-average level of university students' fear of virus contraction, with gender differences found in favour of a lower level of fear in male students against female students. The results of the investigation showed, in line with the assumption, that the relationship between fear of contraction and academic stress during the COVID-19 pandemic was serially mediated by university students' loneliness and depressive symptoms.

The above results support the importance of monitoring the level of fear of virus contraction and the perspective of academic achievement perceived by students in the course of actions taken by academic authorities to support the quality of teaching and students' mental health (Zhai, & Du, 2020). A current challenge for university teachers is also to implement the system of open education practices and open education resources during the COVID-19 pandemic (Huang, Tlili, Chang et al., 2020).

References
Al-Dwaikat, T.N., Aldalaykeh, M., & Rababa, M. (2020). The relationship between social networking sites usage and psychological distress among undergraduate students during COVID-19 lockdown. *Heliyon*, *6*(12), e05695.

Ataş, O., & Yildirim, T.T. (2020). Evaluation of knowledge, attitudes, and clinical education of dental students about COVID-19 pandemic. *PeerJ*, *8*, e9575.

Bahmani, D.S., Faraji, R., Faraji, P., Holsboer-Trachsler, E., & Brand, S. (2017). Depression and loneliness did not affect academic achievement among university students. *European Psychiatry*, *41*(S1), S541-S541.

Balsamo, M., & Carlucci, L. (2020). Italians on the Age of COVID-19: The Self-Reported Depressive Symptoms Through Web-Based Survey. *Frontiers in psychology*, *11*.

Bartoszek, A., Walkowiak, D., Bartoszek, A., & Kardas, G. (2020). Mental well-being (Depression, loneliness, insomnia, daily life fatigue) during COVID-19 related home-confinement—A study from Poland. *International journal of environmental research and public health*, *17*(20), 7417.

Blake, H., Knight, H., Jia, R., Corner, J., Morling, J.R., Denning, C., ... & Vedhara, K. (2021). Students' Views Towards SARS-CoV-2 Mass Asymptomatic Testing, Social Distancing and Self-Isolation in a University Setting during the COVID-19 Pandemic: A Qualitative Study.

Bu, F., Steptoe, A., & Fancourt, D. (2020). Who is lonely in lockdown? Cross-cohort anal-

yses of predictors of loneliness before and during the COVID-19 pandemic. *Public Health*, *186*, 31–34.

Ceyhan, E., & Ceyhan, A.A. (2011). Loneliness and depression levels of students using a university counseling center. *Education, 36*(160), 81–92.

Černý, M. (2020). Technika překonala všechny vzdálenosti, avšak nevytvořila žádnou blízkost. (Technology has overcome all distances but created no nearness). *Pedagogická orientace*, *30*(2), 287–295.

Field, A. (2013). *Discovering statistics using IBM SPSS statistics*. Sage.

Gonzalez, T., De La Rubia, M.A., Hincz, K.P., Comas-Lopez, M., Subirats, L., Fort, S., & Sacha, G.M. (2020). Influence of COVID-19 confinement on students' performance in higher education. *PloS one*, *15*(10), e0239490.

Huang, R., Tlili, A., Chang, T.W., Zhang, X., Nascimbeni, F., & Burgos, D. (2020). Disrupted classes, undisrupted learning during COVID-19 outbreak in China: application of open educational practices and resources. *Smart Learning Environments*, *7*(1), 1–15.

Hysing, M., Petrie, K.J., Bøe, T., Lønning, K.J., & Sivertsen, B. (2020). Only the lonely: a study of loneliness among university students in Norway. *Clinical Psychology in Europe*, *2*(1), e2781, https://doi.org/10.32872/cpe.v2i1.2781.

John, R.R., & John, R.P. (2021). Impact of Lockdown on the Attitude of University Students in South India – A Cross-Sectional Observational Study. *Journal of maxillofacial and oral surgery*, 1–8.

Juszczyk, S., & Kim, S. (2020). Distance Learning in the Polish and Korean Universities During COVID-19 Pandemic. *The New educational Review*, *62*(4), 115–127.

Kapasia, N., Paul, P., Roy, A., Saha, J., Zaveri, A., Mallick, R., ... & Chouhan, P. (2020). Impact of lockdown on learning status of undergraduate and postgraduate students during COVID-19 pandemic in West Bengal, India. *Children and Youth Services Review*, *116*, 105194.

Li, H., Hafeez, H., & Zaheer, M.A. (2020). COVID-19 and Pretentious Psychological Well-Being of Students: A Threat to Educational Sustainability. *Frontiers in Psychology*, *11*, 4034.

Mseleku, Z. (2020). A Literature Review of E-Learning and E-Teaching in the Era of Covid-19 Pandemic. *SAGE*, *57*(52), 6.

Nearchou, F., Flinn, C., Niland, R., Subramaniam, S.S., & Hennessy, E. (2020). Exploring the impact of CoViD-19 on mental health outcomes in children and adolescents: a systematic review. *International journal of environmental research and public health*, *17*(22), 8479.

Nguyen, H.T., Do, B.N., Pham, K.M., Kim, G.B., Dam, H.T., Nguyen, T.T., ... & Duong, T.V. (2020). Fear of COVID-19 scale – associations of its scores with health literacy and health-related behaviors among medical students. *International Journal of Environmental Research and Public Health*, *17*(11), 4164.

Son, C., Hegde, S., Smith, A., Wang, X., & Sasangohar, F. (2020). Effects of COVID-19 on college students' mental health in the United States: Interview survey study. *Journal of medical internet research*, *22*(9), e21279.

Steinmetz, C., & Marshall, N. (2021). Australian University Students: Survey of an International Cohort. *The New Educational Review*, *63*(1), 15–26.

Tasso, A.F., Hisli Sahin, N., & San Roman, G.J. (2021). COVID-19 disruption on college students: Academic and socioemotional implications. *Psychological Trauma: Theory, Research, Practice, and Policy*, *13*(1), 9.

Van de Velde, S., Buffel, V., Bracke, P., Van Hal, G., Somogyi, N.M., Willems, B., ... & C19 ISWS consortium. (2021). The COVID-19 International Student Well-being Study. *Scandinavian Journal of Public Health*, *49*(1), 114–122.

Van de Velde, S., Bracke, P., Levecque, K., & Meuleman, B. (2010). Gender differences in depression in 25 European countries after eliminating measurement bias in the CES-D 8. *Social science research*, *39*(3), 396–404.

Van Jaarsveld, D.D., Walker, D.D., & Skarlicki, D.P. (2010). The role of job demands and emotional exhaustion in the relationship between customer and employee incivility. *Journal of management*, *36*(6), 1486–1504.

Wang, X., Hegde, S., Son, C., Keller, B., Smith, A., & Sasangohar, F. (2020). Investigating mental health of US college students during the COVID-19 pandemic: cross-sectional survey study. *Journal of medical Internet research*, *22*(9), e22817.

Zhai, Y., & Du, X. (2020). Addressing collegiate mental health amid COVID-19 pandemic. *Psychiatry research*, *288*, 113003.