International e-Journal of Educational Studies

IEJES

October 2023   Volume 7 Issue 15

e-ISSN: 2602-4241

http://dergipark.org.tr/iejes
DOI Number: 10.31458/iejes

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Abstract

The purpose of this research is the longitudinal examination of the change in learning motivation (LM) and attention level (AL) of students continuing formal education at secondary school in the pre-pandemic period (PreP), in the pandemic period (PP) during the process of online education, and in the post-pandemic period (PostP) during the new school year of face-to-face education. The data for the research was collected through the Persona 360 software, which is used to support guidance and psychological counseling services in K-12 and follows the development of students. It is known that the students' psycho-social and educational developments are followed at school by the psychological counselors. The data for the research was collected through the Persona 360 school guidance software used for this purpose from 1,183 students continuing education in 9th and 10th grades at private and state schools in Azerbaijan and Turkey. Within the longitudinal research model, the data was collected three years in a row by the Burdon Attention Test, Learning Motivation Scale, and Temperament-Enneagram 9-Factor Personality Test (MEM-9). The analyses were performed using SPSS 23.0/Windows software pack and ANOVA, two-way ANOVA, and MANOVA tests. Pursuant to the findings obtained, it was found that the students' learning motivations and attention levels changed negatively in the COVID-19 period for the three different time frames. The findings were discussed in the context of temperament and traumatic stress experiences affecting the students' learning motivations and attention levels.

To cite this article:

Palancı, M., (2023). Change in the learning motivations and attention orientations of students in the pre- and post-covid-19 periods: A longitudinal study. *International e-Journal of Educational Studies, 7* (15), 515-529. https://doi.org/10.31458/iejes.1296769

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<u>*Research Article*</u>

Change in the Learning Motivations and Attention Orientations of Students in the Pre- and Post-COVID-19 Periods: A Longitudinal Study [*]

Mehmet PALANCI [1] (iD)

Abstract

The purpose of this research is the longitudinal examination of the change in learning motivation (LM) and attention level (AL) of students continuing formal education at secondary school in the pre-pandemic period (PreP), in the pandemic period (PP) during the process of online education, and in the post-pandemic period (PostP) during the new school year of face-to-face education. The data for the research was collected through the Persona 360 software, which is used to support guidance and psychological counseling services in K-12 and follows the development of students. It is known that the students' psycho-social and educational developments are followed at school by the psychological counselors. The data for the research was collected through the Persona 360 school guidance software used for this purpose from 1,183 students continuing education in 9th and 10th grades at private and state schools in Azerbaijan and Turkey. Within the longitudinal research model, the data was collected three years in a row by the Burdon Attention Test, Learning Motivation Scale, and Temperament-Enneagram 9-Factor Personality Test (MEM-9). The analyses were performed using SPSS 23.0/Windows software pack and ANOVA, two-way ANOVA, and MANOVA tests. Pursuant to the findings obtained, it was found that the students' learning motivations and attention levels changed negatively in the COVID-19 period for the three different time frames. The findings were discussed in the context of temperament and traumatic stress experiences affecting the students' learning motivations and attention levels.

Keywords: Learning motivation, attention deficit, temperament, COVID-19, psychological well-being

1. INTRODUCTION

Schools and students may be indicated as being among the parties affected the most by the measures taken due to the COVID-19 pandemic. The pandemic constituted a new social order in statuses requiring face-to-face contact and in nearly all the domains of the ordinary course of life. The prerequisite of social distance that manifested itself with the COVID-19 pandemic caused the closure of educational institutions for a long period (Telavi at al., 2020). Until that period, the traditional schools used to work under a design in which teachers, students, and families were nearly always coming together in person and in which the events were being carried out face-to-face. But during the pandemic period, the foresight that the number of people infected with COVID-19 would rapidly increase if the current practice continued caused the physical closure of schools in nearly the whole world. Even if different preferences were observed among the countries regarding the closure, Azerbaijan and Turkey ranked at the top among the world's countries in terms of both total closure duration and uninterrupted closure duration at a single time (OECD, 2021). In the new order of life that began with long-term lockdown, the students' online education without the theme of peers caused significant educational and behavioral problems (Lupas et al., 2021). The lack of foresight regarding when the pandemic would end and how much the problems might grow initiated discussions at

different levels among the educators regarding the preparation they were required to do and the scope of online education. For that reason, the schools became obliged to continuously redetermine their educational priorities and their approaches regarding the students at specific intervals in the online education process. Especially the problems resulting from online education for the small age groups and for the students with individual differences caused additional discussion (Kumar & Nayar, 2021). Because, in a pedagogic sense, the limitations of online education generated problems regarding the consideration of individual differences and the determination of the curriculum's priorities. Preparing a proper infrastructure generating contents conforming to the status, determining the measurement processes, and keeping the students' motivation high caused distress for the educators. Along with the lockdown, the problems observed in the students' adaptation to the new status and especially their decreasing learning motivation and attention level, in addition to the arising new habits, caused negative effects on the students' success. The students' motivations that were waning before the screen and the teachers' decreasing active management skills began to become more complex especially for the small age groups and for students showing developmental individual differences (Merzon et al., 2021)

Additional problems also occurred for children experiencing distractibility and having difficulty adapting to the new education model due to their temperament, as well as for children with limited domestic physical conditions and means of technology usage. One of the most significant problems observed in the COVID-19 period in terms of students and the learning process was what the status of students who experienced problems even during face-to-face education and who developed differently despite being normal would be. The students' attention levels (Ando, Takeda, & Kumagai, 2021), internal motivation levels (Capone & Lepore, 2022; Hatip & Nurkamilah, 2023), and temperament types (Fiske, Scerif, & Holmboe, 2022) have a significant place among the individual differences affecting learning. The uncertainties brought by the process for children in whom problems and differences are observed in their mental, attentional, and emotional development, including those with dynamic temperaments and personality traits, increased incrementally. In normally developing children, factors such as rate of learning, difference of perception, adaptability to school, concerns and fears, participation behaviors, and introversion define individual differences that would affect the quality of general education. The intensity of these factors and the conditions affecting their increase or decrease also have a direct or indirect effect on the children's sense of belonging to school and their passion for educational purposes. Numerous scientific studies on the effects of online education on children are known to have been conducted. In the researches within this scope, concern, depression, behavioral problems, loss of motivation, distractibility, domestic communication conflicts, anger, technology addiction, malnutrition and extensive problems affecting the learning quality (Hernández-Peña, Gea-García, García-Fuentes, Martínez-Aranda, & Menayo, 2023; Kumar & Nayar, 2021) were emphasized. The students' attention deficit and low motivation quite increased depending on the students' ages, grades, and developmental characteristics in the online education process. As being exposed to screens extended, problems especially regarding some courses became more apparent. Ultimately, excessive contact with technology, domestic physical conditions, and the children's individual differences and talents made the inequality of opportunity in education more apparent (Kumar & Nayar, 2021).

It can be assumed that this process progressed more negatively for some children due to personality traits and emotional development characteristics. In children, there is a close relationship between temperament and learning. Temperament expresses the individual's innate personality traits and plays a significant role in the learning process. Temperament affects the children's learning styles and preferences. While some children are eager and curious about events and new experiences, others may be more shy and prudent. These characteristics may affect the child's learning style. While curious and eager children may adopt a learning approach based on exploring, shy and prudent

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children may prefer a directional learning approach. The status may be analyzed additionally for children who are more dynamic, who are distracted more easily, who already have continuing problems on this issue within the scope of temperament characteristics, and for children who can be emotionally motivated more easily within the group. The Nine-Factor Temperament Model suggests an extensive model examining the children's learning and behavioral tendencies as per individual differences (Palancı et al., 2015). For instance, attention deficit and impulsivity, as neurodevelopmental problems, may be defined as problems making the educational and behavioral adaptations observed in numerous settings, including school, difficult. It is known that the problem in question increases as per the students' temperament characteristics (Palancı, 2017), and it is possible for it to increase the learning problems that came to light in the pandemic period. Students with low AL frequently experience difficulties in intragroup relationships and academic and professional problems. It is known that the students and individuals in this group get low social support due to their impulsive behaviors and improper emotional expressions and experience more conflict with others including their family members and friends. In addition, such children's possibility of experiencing difficulties such as depression, anxiety, and fear is higher, and their self-esteem is significantly low. Moreover, they tend to experience academic difficulty more as they typically use less efficient learning strategies during this process, and their academic success decreases significantly (Li, Luo, Lei, Xu, & Chen, 2022). In the research performed by, the psychological effects of COVID-19 on the students were examined. The findings of the research revealed that 27.3% of the participants had experienced slight or more traumatic ache, and 34.2% of them had experienced a slight or more depressive symptoms (Anglim & Horwood, 2021). It was determined that such emotional difficulties differ as per temperament and personality traits and that personal variables such as learning motivation, gender, and psychological well-being level affect the students' learning behaviors, online learning satisfaction, and perception of success. The students' temperament differences affect their behavioral tendencies. The temperament may positively or negatively affect the children's learning process. For instance, while a careful and disciplined child may be more successful in learning activities, and an angry and anxious child may not direct his attention to learning. For this reason, teachers and parents may develop suitable strategies to support the learning process in the best manner by recognizing the children's temperamental characteristics. For instance, a shy child may be included in learning activities slowly, or a hyperactive may be assisted in gathering his attention by including physical activities in his learning process (Palancı, 2015). Examination within the scope of the pandemic of individual differences among children, who are more emotional and dynamic and who have lower attention and competition skills, is deemed significant within this scope (Buthmann, Miller & Gotlib, 2022). The psychological characteristics and adaptations of mainly adults in the pandemic period were examined according to the 5-factor personality model (Krupić, Žuro & Krupić, 2021). The number of researches about personality differences in children and adolescents is very limited. The temperament characteristics will assist in understanding the children's resistance behaviors that they will exhibit in the face of educational problems as well as clarifying the children's learning motivations and participation behaviors. In this research, the temperament construct was addressed as a 9-factor as per the Temperament-Enneagram theory. In order to form a more typical sampling, the temperament construct was addressed as the comparison of M1 and M6 (Buthmann, Miller & Gotlib, 2022; Fiske, Scerif, & Holmboe, 2022) children, who are deemed to be more advantageous, and M2 and M7 children (Palancı at al., 2015; Palancı, 2017), who are known to be more disadvantageous.

1.1. Purpose of the Research

The purpose of this research is to comparatively examine the students' changing AL and LM levels in the pre-pandemic period, in the pandemic period, and in the post-pandemic period. It is known that individual differences affect educational motivation and sustainable attention levels. In the research, it was also tried to understand the possible effects of temperament characteristics, which are

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known to affect psychological resistance and well-being, regarding the students' attention levels and learning motivations. Even if the pandemic ended, it is also important to understand whether it had left some lasting effects on the students or not. Consequently, it was observed that the COVID-19 pandemic affected the students' psychological health, learning motivations, attention levels, and social developments. It has been known that the students develop in a versatile manner in school life, both directly and indirectly, by keeping up with norms and face-to-face interaction. It is considered that being face-to-face assists in exhibiting a higher struggle for attaining life's purposes due to motivation and socio-psychological factors on human psychology. It is evident that online education will make more distinct some disadvantageous issues resulting from the children's individual differences. The conflicts increased by technology addiction and concerns of the parents and the difficulties that the children experienced in understanding the requirements of the pandemic have been reflected more in the children's individual differences. And understanding the change in the pandemic's effects that it longitudinally revealed on this issue as per the personality traits and attention levels will be able to contribute to understanding child development and psychological well-being levels. The research carried out for this purpose was intended to understand the effect of individual differences on learning motivation and sustainable attention skills. Understanding how the pandemic, sudden losses, earthquake, and other possible traumatic experiences are being perceived as per the children's individual differences is considered important. Because of this, more consistent approaches and priorities based on individual differences that may assist the children's development and learning in traumatic cases will be able to be determined. Four hypotheses formed for attaining these purposes are given below.

Hypothesis 1. In PP and PostP periods, the students' attention levels significantly decreased compared to PreP period.

Hypothesis 2. In PP and PostP periods, the students' learning motivations significantly decreased compared to PreP period.

Hypothesis 3. In PP and PostP periods, the students' attention levels decreased by differing as per their genders.

Hypothesis 4. The students' learning motivations and attention levels undergo change as per their temperaments and personality types.

2. METHOD

2.1 Research Design

The research was carried out by taking repeated measurements of secondary school students in the pre-pandemic period, in the pandemic period, and in the post-pandemic period. This approach corresponds to the longitudinal research method type (Lynn, 2009), which is data collection from the same research group at different time frames using the same variables.

2.2. Participants

The research group was selected randomly from among 17,824 students studying at schools using the Persona 360 school guidance program. The data was collected within the scope of the variables from the students in the pre-pandemic period, in the pandemic period, and in the post-pandemic period. 1,200 ninth and tenth grade students, calculated as per cutoff scores as having low and high attention levels according to the results of the attention test, were selected randomly from the universe. During the selection of the sample, it was considered necessary for the students to have been studying for three years at a school included in the system and to have completed their measurements in full. While the participants were determined through the computer method as per their AL, the gender and temperament distributions came out through random method. The participants consisted of

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students studying at private and state schools providing Turkish education in the cities of Baku, Antalya, Diyarbakır, Istanbul, Hatay, Samsun, and Van.

2.3. Instruments

2.3.1. Persona 360

It is a web-based software application used in order to provide support for school psychological counseling and guidance practices. Persona 360 is software that assists the faultless completion of the psychological and educational tests by the students under the supervision of teachers and psychological counselors. Within the scope of educational, personal, and career development, 283 development parameters of the students were measured. The program is used with the support of parents and teachers until the 3rd grade. The construct and usage interface were designed in a manner that will allow the children to complete the tests by themselves after the referred grade. 9th and 10th grade students, constituting the research group, complete the tests by themselves via computer. Persona 360 statistically monitors each year the change in student scores and tries to predict the arising change. By the tests that are increased or decreased as per the developmental expectations of each grade level, the students' learning, psychological well-being, and adaptation developments. Numerous variables such as AL, LM, impulsivity, fear, anxiety, depression, anger, success purposefulness, academic procrastination, and technology addiction are continuously monitored within the scope of school psychological counseling services for each educational level.

2.3.2. Burdon Attention Test

The Burdon Attention Test (BAT), developed by Benjamin Burdon (1955), was used in order to determine the attention levels of the participants in the research. Today, it is extensively used in education, psychology, neurology, and psychiatry researches. The test is applied by marking specific letters among mixed letters. These letters are organized in a specific order on the page, and 660 letters are available on each page. On a page prepared for testing purposes, there are 31 units of the letter "a", 29 units of the letter "g", 30 units of the letter "b", and 29 units of the letter "d". In the test, 5 minutes are provided to the participants for each section. It is asked for the participants to mark under the letters a, b, d, and g on a page and not to mark a single letter while examining a row. But the participants should underline all the letters a, b, d, and g on the page. This status is notified to the participants prior to the test. After completion of the test, the marks are counted, and the test is evaluated. In the evaluation of the test, the correct answers of the participants are considered, and each correct answer is recorded as a score. The time spent on the completion of the test and the number of correct answers constitute the individual's score. In the study performed by Karaduman (2004), the correlation coefficient of validity and reliability of the Burdon Attention Test was found to be .78. During the calculation of the attention scores in the research, the correctly and incorrectly marked letters were determined, and they were arranged in such a manner that each incorrectly marked letter would delete a correctly marked letter.

2.3.3. Temperament-Enneagram 9-Factor Personality Test (MEM-9)

It is a Likert-type scale with ratings of tenfold, developed by Palancı (2018). The responses have ratings of tenfold (0-10-20-30-40-50-60-70-80-90-100) varying between 0% (this article doesn't represent me at all) and 100% (this article represents me completely). During the first stage of the development of the test, a question pool of 134 articles was prepared by the researcher in the first stage. In the direction of the feedback of six specialists, who have knowledge about Temperament-Enneagram and who are serving as active scholars in the domain of psychology and psychiatry, the articles of the scale in the pool were reduced or revised, and a pilot scheme form of 111 articles was applied to the participants. Its final form of 106 articles, which was revised by the use of preadministration data from 150 individuals, was applied to the participants in order to carry out the validity and reliability research. The data analyses were performed using exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). In the first stage, the two articles that disrupted the

latent relationship assumption and total correlation calculations of the article with excessively low and high calculation values were eliminated. EFA and CFA were carried out with the remaining 104 articles. Then the scale form of 90 articles, which ensures validity and reliability at the most optimum level and that is practicable, was obtained. The data for the validation study of the scale was obtained from 4,774 participants. To be subjected to the test, one must be at least 15 years old. The average age of the participants was calculated as 25.12 (Sd: 11.02). The participant with the lowest age was 15, and the participant with the highest age was 51. The distribution of the participants as per gender was 3,110 women and 1,664 men. It was determined that factor load values for MEM-9 were changing between 0.47 and 0.71, that the articles of the scale were being gathered under 9 factors, and that they were defining 68.6% of the total variance. Fit index values obtained as the result of confirmatory factor analysis (CFA) performed for MEM-9 were calculated as $\chi2=116.09$ (p=.000), $\chi2/sd=5.82$, RMSEA=.09, GFI= 0.82, AGFI=0.88, CFI=0.89, and NNFI=0.93. The results obtained from the confirmatory factor analysis indicated that the 9-type Temperament – Enneagram construct of the hypothetical construct anticipated for the measured construct statistically matched. In the reliability study, it was calculated with the Cronbach's alpha coefficient. The values obtained varied between .82 and .90 for the sub-factors.

2.3.4. Scale of Learning Motivation

It was developed by Kandemir and Palancı (2017). It's a means of measurement focused on measuring the holistic motivation strength of the students as per their self-consciousness, self-regulation skills, and external attributions. The measurement instrument with 5-point Likert-type grading has a single factor construct with 12 articles. The scale was applied with the participation of 1,610 high school students. It was obtained from volunteering students studying at schools which participated in school seminars organized in the provinces of Trabzon, Bayburt, Antalya, Aydın, Ankara, Istanbul, and Ordu. Under a single factor, the scale defined .66 of the total variance. Internal consistency reliability was .86, and the test-retest reliability coefficient (according to data collected from 270 students after 4 online weeks) was .80. Some sample scale articles are "my desire for learning increases as I learn new subjects", "my belief in being successful is high", "I like learning new information while preparing assignments", and "I don't quit studying until reaching the solution". The increase in scores indicated an increase in the learning motivations of the students.

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2.4. Procedure

Persona 360 is a special software prepared for bringing into the open the individual differences of the students and providing personal psychological support. The software used for K-12 monitors and measures the students' educational, personal, and career development characteristics through 283 different parameters. Persona 360 is an application that assists in collecting data from students under the supervision of psychological counselors and classroom teachers. The measurements taken at four different times in the school year are obtained under the control of school specialists. In the pandemic period, the data was obtained for each classroom in groups of 10 through the online participation of classroom teachers. While responding to the online tests, the students got support from teachers and PCG specialists for statuses and questions for which they had to get information. Each application was constructed by the specialists in a manner that could be completed in at least 40 minutes and at most in 60 minutes. The families and schools using the application monitor the students' holistic developments each year. The presence of such software provided an opportunity for the use of an unplanned dataset in the COVID-19 period that had been compiled in advance in order to contribute to science. As anticipating the pandemic wouldn't be possible, measuring the effects occurring before and after the pandemic became possible by this means. In this sense, the AL and LM data collected in the PreP period are deemed valuable. Along with the declaration of the pandemic, the researches performed on AL and LM naturally mostly belongs to the acute period. It has been observed that some researchers tried to calculate the possible effects through follow-up studies. There were 17,824 students whose

data was regularly being collected through Persona 360 in the period before the pandemic. In the PP, it was decided to make a longitudinal study on this subject, and the research was carried out by monitoring 1,200 students with determined levels of low (600) and high (600). The selection of students according to low and high values was performed as per the random computer method and attention test cutoff scores. And the LM and temperament types of these students came out within the random distribution as per the selection results.   After the elimination of deficient data and data disrupting homogeneity, the final analyses were carried out on 1,183 students.

2.5. Data Analysis

Data analyses were performed by the SPSS/Windows 22.0 software pack. The homogeneity and distribution adequacy of the data were analyzed by SPSS/Explore. After the elimination of extreme and deficient data, analyses were carried out on 1,183 students. The data was analyzed by ANOVA for longitudinal comparisons, by two-way ANOVA for the time * AL/LM interaction effect, and by MAVOVA for examining the interaction of temperament types and AL/LM. Before proceeding with the analyses, it was checked whether the dataset met the assumptions or not in order to perform ANOVA, two-way ANOVA, and MANOVA. The skewness value was calculated as -.15, and the kurtosis value was calculated as .22. The values being between -1 and +1 indicate that there is a distribution suitable for analysis. The variance homogeneity of the data was also examined, with the Levene's test being a prerequisite. As the F value calculated for each dependent variable is at the significance level of p>.05, it was deemed that the intergroup initial equality values were met. It was observed that the covariance matrix among variables along the groups was Box's M: 30.1 in MANOVA, and that this prerequisite was met as the calculated p value was bigger than .05. As per these results, it was deemed that the obligation to use an additional correction and calculation type withered. As per the convenience presented by the listed current analyses, only the Wilks' lambda value was examined in the analyses for MANOVA. The data was analyzed in such a manner as to be at the significance level of p<.05 the lowest.

3. FINDINGS

Table 1. Distribution values regarding the data

Scale	N	$\bar{X}$	S.d.	Skewness	Kurtosis	Min	Max	Power
AL	1200	15.03	6.74	.687	-.458	12.00	186.00	.933
LM	1200	6.21	7.03	.457	-.567	2.00	102.00	.979

Table 2. ANOVA analysis of the change of AL and LM in the PreP, PP, and PostP periods

Source	Var	Kt	Ko	F	p	Var	Kt	Ko	F	p
Between Group	AL	160.01	9.33			LM	107.03	6.70		
				11.06	.01				5.12	.05
Within Group		3035.5	3.04				2111.7	2.14		

Hypothesis 1: It is understood by the findings in Tables 3 and 4 that the students' AL changed significantly in the PreP, PP, and PostP periods. A significant difference was found among groups at the F=11.60, p<.01 level. In the group difference analysis after Tukey's comparison, it was observed that the change in AL was significant for all the groups, including the PreP, PP, and PostP periods.

Hypothesis 2: It is understood by the findings in Tables 3 and 4 that the students' LM changed significantly in the PreP, PP, and PostP periods. A significant difference was found among groups at F=5.12, p<.01 level. In the group difference analysis after Tukey's comparison, it was observed that the change in LM was between the PreP and PP periods. In terms of LM, the difference between the

PreP and PostP periods was not significant. Even if the PostP period exhibited lower LM results compared to the PreP period, the difference was not statistically significant.

Hypothesis 3: As per the findings of the two-way ANOVA performed in order to analyze the time-gender interaction effect of AL in PreP, PP, and PostP periods, a significant difference (F=11.49, p<.01) was found.   As the main effect analysis was similar to the ANOVA analysis, it is not given again as a finding. But when the averages of the change of AL (X $_{(Male) =}$ 3.11 males X $_{(Female)}$ = 4.59) was examined for gender * PreP, PP, and PostP period, it is understood that the change of AL is mostly to the detriment of males.

Table 3. Means and standard deviations of total and two-way ANOVA results of students with low and high AL in the PreP, PP, and PostP periods

	PreP	PP	PostP
AL (Negative)	4.10 (.72)	2.80 (.98)	3.04 (.42)
AL (Positive)	4.79 (.91)	3.61 (.57)	4.20 (.62)
Total	4.27 (.88)	3.17 (.74)	3.99 (.47)
F (Group: AL, High, Low)	F=47.07***, (η^2) =.04)		
F (Sample: PreP, PP, PostP)	F=45.12***, (η^2) =.05)		
F Group X sample (Gender)	F=11.49** , (η^2 =.03)		

Hypothesis 4: As observed in Table 4, the AL and LM levels significantly changed as per temperament types in the PP. Through the MANOVA analysis, M7 and M2 students, who were assumed to be affected the most by concern, fear, and online education, were subjected to comparison with M1 and M6 students, who were assumed to have more resistant characteristics. LM differs significantly as per four different temperament types (λ: .64, F: 8.18, p<.001). According to the Tukey's test used for the post-comparison range calculations of data exhibiting homogenous distribution, it was understood that the significant difference for LM resulted from the M7 and M2 students, respectively, as per effect degree. The difference between these two groups was also calculated to be significant. The group experiencing the highest loss for LM was the M7 students, and a significant change difference was not calculated for the M1 and M6 students.

AL differs significantly as per four different temperament types (λ: 0.78, F: 11.17, p<.001). According to the Tukey's test used for the post-comparison range calculations of data exhibiting homogenous distribution, it was understood that the significant difference for AL resulted from the M7, M2, and M1 students, respectively, as per effect degree. The difference between these three groups was also calculated to be significant. The group experiencing the highest loss for AL was the M7 students, and a significant change difference was not calculated for the M6 students.

Table 4. MANOVA results of AG and ADHD personality traits by groups during COVID-19

		Type1	Type7	Type2	Type6	F	(η^2)
LM	Mean	3.10	1.85	2.93	3.32	8.18***	(.05)
	SD	.70	.77	.60	1.00		
AL	Mean	2.79	0.63	2.02	2.14	11.17***	(.07)
	SD	.76	.09	.80	.82		
Multivariate /\ F (df=13.80)						5.07***	

4. DISCUSSION and CONCLUSION

4.1. Discussion

Hypothesis 1: The hypothesis that the students' AL will decrease longitudinally in the PP and PostP period compared to the PreP period was verified as per the current findings. The most remarkable finding of the research was that AL in PostP period couldn't reach again the level of the PreP period. The average difference between these two periods preserves its statistical significance. The period in which AL was measured the lowest was PP. It is known that the pandemic, which

caused a traumatic lifestyle, resulted in significant health, economic, educational, social, sociologic, psychological, and political consequences. But it was observed that the highest discussion came out as per the concerns and expectations (Werner & Woessmann, 2023) in the domains of health (Billing, 2023; Caesar, Layer, & Barasi, 2023) and education. It is known that the cessation of face-to-face education in a period in which educational population and mobilization are very high in the world caused depression, anxiety (Lakhan, Agrawal, & Sharma, 2020), hopelessness, trauma, and concern for the future (Harper, Satchell, Fido, & Latzman, 2021) among the families and education professionals as the students being in the first place in terms of time management and child development. But as it is possible for numerous educational themes or concepts for children to be open for discussion, it is observed that the problems of motivation loss (Yu, 2022; Faridah, Sari, Wahyuningsih, Oganda, & Rahardja, 2022; Naciri, Radid, Kharbach, & Chemsi, 2021) and attention deficit experienced especially due to online education are encountered more as the focus discussion domain (Advokat, Lane, & Luo, 2011; Ando, Takeda, & Kumagai, 2021; Bailie & Linden, 2023; Behrmann et al., 2023; Bruni et al., 2023; Helsin, Shuai, Wang, Qiu, M, & Wilson, 2023). The studies carried out within this scope often use university students as references. Moreover, in nearly all the current researches accessed, there is no comparative data regarding the PreP period. For this reason, it may be deemed important for the data obtained to address the AL of high school students in three different periods of the pandemic.

Consequently, it was observed that the AL of high school students decreased at a statistically significant level in the PP and PostP period compared to the PreP period. As the main finding, it can be said that the quality of attention in the PreP period couldn't be attained again by the children. Moreover, the findings of the research indicated that the AL of all the students decreased, irrespective of their low or high attention levels in the PreP period. As low AL in the PreP period was a disadvantage, PD increased that risk more considering the style of education. In PP, the AL of students, who are eager for education with high motivation, success, and attention levels, also decreased. In addition, the continuation in the PostP period of the problems of students with low or high AL revealed that all the students were negatively affected by this process, independent of their current attention levels. This finding revealed the conclusion that the pandemic caused negative and permanent effects on the adolescents' skills of gathering and maintaining attention and their skills of using the same for educational purposes. Most of the researches performed within this scope indicated that the attention of the students was negatively affected by the process (Altszuler et al., 2012; Dvorsky et al., 2022; Lupas et al., 2021; Merzon et al., 2021). Another reason for the decrease in attention is the decrease in in-class education interaction, which mediates peer learning and the development of social skills. Loneliness and being in front of the screen caused the students to be more nervous and inattentive (Bailie & Linden, 2023). The findings of the current research and the data obtained in the post-COVID period indicate that the attention levels of the students decreased in the COVID-19 process and that such effects are still continuing due to the changing and disrupted development of the children. The problems of being attached to the screen more and of increasing game addiction occurred in children with ADHD. Unsuccess, negative feedback, academic procrastination, problems due to time management, and loss of motivation had also been effective on AL. Other significant causes of the decrease in AL in children and adolescents are decreasing personal learning skills and disruption of personal studying, reading and understanding strategies (Capone & Lepore, 2022). Both the lack of knowledge of the children and families in terms of what they would do for personal transformation in such a case and the limitedness of the interference of the professionals increased the problems observed (Shuai et al., 2021). Consequently, it can be assumed that the sudden change in face-to-face education standards and applications forming the basis of competences and education of children that used to occur through personal learning strategies and attendance at school negatively affected the sustainable AL of the children. Moreover, along with the addition of

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uncertainty, concern, stress, and physical restrictions, multidimensional educational and behavioral problems came out, including the decrease in AL for the children.

Hypothesis 2:

The hypothesis that the students' LM would decrease in the PP and PostP period compared to the PreP period was verified as per the findings. The PP, during which only online education continued, was the period during which the LM of the high school students was the lowest. As different from the AL variable, LM changed more rapidly in the PostP period, and got close to its general level in the PreP period. Along with the continuation of a partial decrease, this difference is not statistically significant. This finding reveals that the learning variables examined as characteristics (status) for the COVID-19 period improved in time, but that the time (improving conditions of the pandemic) couldn't eliminate the disruption in competences (in gradual developmental characteristics) such as attention. Even if similar researches don't include a longitudinal comparison for the three periods, they indicated that learning motivations had decreased in the pandemic period and in the subsequent new normal period (Shuai et al., 2021). It is known that the students' success and motivation positively change depending on the size and quality of the group they are in and on the content of the course (Moliner & Alegre, 2022). In the process of pandemic, the variable that decreases the students' motivation levels the most is the decrease in in-group motivation interaction, which contributes to cognitive stress and psychological well-being. The reflection on the children of parents' concerns and stress related to the future of schools and exams is also effective in decreasing LM (Martin, Ginns, & Collie, 2023). The decrease of socialization skills, boredom of the children from online education, losses in teacher performance, and insufficiency of some practices as per content or age level may be indicated among the most significant causes of motivation loss (Jhawar, El-Ghandour, Ezzat, & Gonzalez-Lopez, 2023). Education strategies developed as peculiar to the status, cooperation of teachers and students, gamification, and computer practices are able to increase learning success (Yu, 2022), but it may be difficult to achieve this for each course, age level, and student. On the other hand, it can be said that the impossibility for the educational institutions to be ready in advance against such a process, rapidly making the curriculum suitable for online education, the difficulty of the control of student events and of the assistance processes to be provided (Lupas et al., 2021), and the limitation of other students' participation, listening, and understanding skills during the feedback in the process of online education also negatively affect the motivation of participation (Sibley et al., 2021). In addition, the decrease in readiness and self-regulation skills associated with online education is among the causes of motivation loss (Li et al., 2022). It can be assumed that face-to-face education may decrease academic procrastination with the power of decisiveness and exposure due to the observation of group synergy, ease of feedback, and educational performance (Capone &Lepore, 2022). Loss of motivation came out due to a decrease in self-efficacy level, a loss of interest, and a decrease in sense of reasoning. The stress caused by adaptation to the new status also impeded the students' motivation level (Martin et al, 2023). Moreover, subjects such as increasing academic procrastination, missing critical learning details, uncertainty experiences, difficulty in learning (Xhakolli &Hamzallari, 2023), loss of interest, observed benefit, and assignment of priority also caused motivation loss due to the performance of students and teachers (Hatip & Nurkamilah, 2023). Not being familiar with online education and the requirement of making more effort for success are also other causes of motivation loss. The decrease in external motivation resources revealed more risk for the students whose internal motivation remained low (He et al., 2021). The decrease experienced in subjects such as emotional bonding, watching peers, and being a leader in the classroom may be listed among the causes of deeming online education boring (Sibley et al., 2012). The mixture of weekday and weekend concepts, the limitation of natural entertainment, and the shortening or change of performance periods caused attention and motivation losses (Korpa et al., 2021), and the process generated worse conditions for children who were already unwilling for

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learning and school and who were already experiencing learning difficulty (Becker et al., 2020). The decrease in extra activities performed at school, in sports and travel events within and outside the school, in relationships outside the school, in behaviors requiring social association and in reading level may be listed among the cause of the decrease in LM (Relyea, Rich, Kim, & Gilbert, 2022).

Hypothesis 3: The hypothesis that the students' attention levels differ as decreasing as per gender in the PP and PostP period compared to the PreP period was accepted as per the findings of the research. It was observed that AL was more problematic especially among male students. Within the scope of getting the diagnosis of ADHD, it is known that males are more disadvantageous (Bauermeister et al., 2007). It is possible for AL to change as per gender due to physical restrictions and the online nature of educational events. The data verifies the assumption that the AL decreases more to the detriment of males in the pandemic period. As the difference occurring in the AL in terms of female students being significant, this difference is only limited with the PP for females. The decrease in AL in the PreP and PostP periods for male students was higher compared to female students, and such losses continue despite the new normal school process. The relationship between AL and pandemic is also related to different variables including the number of siblings, age, parent attitudes, medication usage, and gender (Takeda, Tsuji, Akatsu, & Nomura, 2023). It was observed that SES, culture, educational perception of the mother and father, and behavior and management skills caused more problems for disadvantageous groups regarding AL, depending on the quality of societies and education systems (Xhakolli & Hamzallari, 2023). It was found that the negative effect of online education regarding attention level in the pandemic period was higher among women. It was found that attention deficits at different SES levels decreased success and that this affected whole student groups, whether a diagnosis of disorder exists or not. It was observed that low self-efficacy, including anxiety, depression, learning difficulties, and other conditions requiring special education, caused negative pressure on the quality of attention and learning skills. There had been periods and groups in which the losses experienced on this subject reached very high average values (Hoofman & Secord, 2021). In the context of culture and SES, it can be said that ADHD affects males and black, Latino, and Middle Eastern children more (Breaux et al., 2022). The results indicated that the AL in a longitudinal sense decreased for females and males, but that more problems occurred for males within the scope of time*level and that the problems continued also in the PostP period as different from the LM.

Hypothesis 4: The hypothesis that the learning motivation and attention level change as per the students' temperaments and personality types was verified as per the current findings. Within the scope of this hypothesis, it was found that the students' AL and LM levels changed in the PP depending on their temperament characteristics and personality traits. M7 and M2 students were the ones who were in the personality group experiencing the highest AL and LM decreases. In terms of AL, it was understood that only the M1 students experienced problems in PP, which was different from LM. It was found that all the personality types got affected by the pandemic, but especially the M7 male students were the sub-group experiencing the problem the most in the context of time*loss (AL-LM). It was observed that loss of motivation was experienced most among the M2 female students. These findings are consistent with the Temperament-Enneagram Theory's definition of behavior tendencies frequently observed in these personality types. But in the PP, a significant level of decrease was observed in the LM and AL of the children of all temperament types. In terms of AL, the M7 children are the sub-group who experienced the highest loss in the PP. For M7, this loss continued significantly also in the PreP and PostP periods. In terms of LM, the M2 children are the sub-group who experienced the highest loss in the PP. As different from the other findings, a statistically significant decrease in LM level continued in the PostP period only for the M2 children. The current finding indicated that the interaction effect of the high vulnerability level of the M2 children continued, depending on the trauma.

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Consequently, it was indicated that the interaction of personality type and pandemic focused on the Big Five Theory and on adults in the COVID-19 period (Anglim & Horwood, 2021; Krupić, Žuro, & Krupić 2021). The main reason for this is the complex construct of personality measurement and the relative difficulty of measuring the children or adolescents. There are studies addressing the relationship between temperament characteristics and psychological well-being, attention, and motivation. In the studies in which the pandemic period was addressed for different personality traits, it was observed that the status often caused problems for the neurotic personality types. It was observed that extroversion and openness to experience provide more resistance, and that the responsibility (Hernández-Peña et al., 2023) tendencies carry the individuals' psychological well-being levels to varying levels depending on age, profession, and other disorders (Liang et al., 2021). Moreover, it was revealed that the adaptation levels of the individuals change as per the social norms and personal values they adopt and as per their coping skills (Buthmann, Miller & Gotlib, 2022; Hipp et al., 2020; Kim et al., 2013). The results indicated that neuroticism and scrupulosity cause more anxiety (Xu et al., 2023) and that extroversion causes less anxiety (Anglim & Horwood, 2021). The findings of the research revealed a similar finding for the M2 and more introverted sensitive temperament characteristics (Fiske, Scerif, & Holmboe, 2022). It was understood from the findings that the M1, who are relatively more perfectionist, neat, and controller, and the M6, who have a high perception of responsibility, generate higher resistance. Emotional regulation problems and feelings of anxiety, which change depending on personality traits, affected both the motivation and AL of the students. It was observed that the temperament characteristics, being the source of personality, had an effect on the online LM and AL of the students in the pandemic period by affecting the resources determining personal motivation, including coping skills.

4.2. Conclusion and Recommendations

In the COVID-19 period, the high school students' LM and AL decreased significantly. Moreover, this decrease became more distinct to the detriment of impulsive and anxious children, depending on temperament type. According to the data obtained in the 3-year monitoring process of the students covering the periods of PreP, PP, and PostP, it was observed that the students couldn't completely reach their motivation and attention levels that they had prior to the pandemic despite the resumption of face-to-face education. The active pandemic period, when education was completely online and general social life was restricted, was the period in which the worst values in terms of LM and AL were obtained by the measurements.

- Health care professionals and teachers should be aware of the overall impact of COVID-19 on the health and well-being of children and young people with low AL.
- Educators and clinicians should be aware of the long-term consequences of individual differences during the COVID-19 pandemic and should implement pro-active strategies to support children and young people with low attention levels, low motivation, and poor temperament.
- Children and young people with poor AL and LM may suffer greatly from reduced access to sports and leisure facilities.
- Time management and appropriate web designs should be made for students who have online education periods and attention deficit.
- Policymakers should be aware of the potential negative consequences of COVID-19. In particular, in order to support individual differences and make this sustainable under all conditions, personal education should be supported more.
- In online education applications, it can be suggested that school psychological counselors increase group motivation by increasing e-guidance and motivation group studies.

- There is a mediating relationship between attention deficit, learning strength and loss of motivation. For this reason, the possible causality of this relationship should be adequately analyzed while approaching possible problems.

By monitoring the change observed in the PostP period through intermediary and predictor variability analyses, more indicators and means of interference on the subject should be brought to the attention of educators and psychology professionals.

Ethics Committee Decision

This research was carried out with the permission of Education Institute of the Azerbaijan Education Ministry with the decision number 072/1126 dated 17.06.2022

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