Mediating role of alexithymia in relationship between cyberbullying and psychotic experiences in adolescents

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Abstract

Background Today, addressing issues related to the use of virtual space is of paramount importance due to its significant impact on mental well-being. This is especially crucial when the research community consists of teenagers who are cyber bullies or their victims who have higher vulnerability. The aim of the present study was to investigate the mediating role of alexithymia in the relationship between cyberbullying and psychotic experiences in adolescents.

Methods The research method employed in this study was correlational, and the study population consisted of all male and female middle school students in Tehran during the 2022–2023 academic years. As for data collection, the Cyber-Bullying/Victimization Experiences questionnaire, Community Assessment of Psychic Experiences, and the Toronto Alexithymia scale were applied. A total of 602 samples were gathered by using multi-stage cluster sampling from Tehran in Iran. Four selection of the sample, the regions in Tehran were selected randomly according to the geographical directions of them and then some schools and classes were chosen randomly. Sample was included in the analysis after data entry into SPSS software and subsequent structural equation modeling using AMOS software.

Results According to the findings, cyberbullying ($\beta = 0.11, p < 0.05$) and cyber victimization($\beta = 0.41, p < 0.001$) were significant predictors of psychotic experiences. Alexithymia partially mediated the relationship between cyberbullying and psychotic experiences with the mediation effect of 0.28 and cyber victimization and psychotic experiences with the mediation effect of 0.18.

Conclusions These findings underscore the importance of identifying cyber victims or cyberbullies in order to prevent alexithymia and psychotic experiences in future, in order to prevent more serious problems and becoming psychotic.

Trial registration The goals and conditions of this research were investigated and approved by the Ethics Committee of Alzahra University in Tehran (code: ALZAHRA.REC.1402.055) on 13th September 2023.

Keywords Alexithymia, Cyberbullying, Psychotic experiences, Adolescent

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Background

Adolescence is the most sensitive part of human development that is associated with important biological, behavioral and psychological changes [1]. Ever since Erik Erikson's Childhood and Society (1950), identification starts in adolescence and is achieved by harmony between a person's biological, psychological and social systems, failure to achieve this harmony leads to mistreat or harmful relationships [2]. According to the conflict model, which Hall is one of its pioneers, conflict and crisis are normal in adolescence and this period is characterized by its own distress and psychological suffering, these features make the person susceptible to some disorders. Psychotic experiences can emerge as the sign of the stress of this sensitive period and if they do not investigate and followed up at the right time, they will have dangerous and long-term effects on adolescent's mental health [2]. The average prevalence rates of psychotic experiences in adolescence are nearly one in four students [3]. At the beginning, these experiences are temporary but they can become permanent and these people may suffer from some problems like mental disorders, poor performance, high health care costs; these people also have an increased risk of suicide in future [4].

Psychotic experiences refer to psychotic-like experiences that are common in normal people with symptoms such as hearing unreal voices, magical thinking, delusional symptoms, worry about being harassed by others or cognitive dysregulation [5]; if these symptoms are weak in terms of duration, degree of helplessness, intensity and the need for treatment, they are called psychotic experiences [6, 7]. In other hand, cyberbullying and it's victimization by the prevalence rate of 73.5% between adolescents is one of the most important problems that can cause psychotic experiences in adolescents, too [8]. International statistics shows that the prevalence of cyberbullying is averagely between 14.6 and 52% and cyber victimization prevalence is between 6.3 and 32% percentage [9]. According to the research which was done by shariatpanahi et al. [10] about 29.82% of students who study at high school had experienced being cyberbullied and 30.90% had made attempts at cyberbullying and 40.62% had friends being cyberbullied [10] which these statistics show the challenging situation of Iranian teenagers and the importance of doing research on cyberbullying and it's victimization. In other hand, there has not done research on psychotic experiences of adolescents in Iran and the role of cyberbullying or cyber victimization on psychotic experiences prevalence.

Today, because of increasing trend toward cyberspace and Internet addiction, cyberbullying has become more prevalent among teenagers. Adolescents have a great tendency to use information and communication technologies such as the internet and smartphones in order to cover their emotional and communicational needs which is crucial for them [11, 12]. On the other hand, some teenagers try to overcome and control their negative feelings or bad environmental conditions by performing risky behaviors in this space [13], which it can make them engage in cyberbullying [14]. In addition, teenagers who experience a lack of self-esteem and also spend much time on the internet may become victims of cyberbullying [15].

Otake and Luo [15] said that there is a significant relationship between being a perpetrator or victim of cyberbullying and having psychotic experiences in people [15]. Perpetrators of cyberbullying often have low empathy and high aggression and because of that they are predisposed to psychotic experiences [16, 17] and alexithymia due to their inability to properly regulate their emotions and they try to use avoidance coping strategies to deal with the negative feelings and stress of cyberbullying [18].

On the other hand, victims of cyberbullying also are affected by the bad memories of this victimization and it can become like a trauma in a person's life and it can cause some psychological distress such as depression, stress and anxiety that these are some factors that can cause psychotic experiences [8, 19]. Having trauma and not receiving proper support from others can increase the stress of adolescents and this situation can cause alexithymia in victims [20]. Alexithymia is defined as some problems related to one's feelings, which include problems in identifying and distinguishing between feelings and bodily sensations, problems in describing and expressing feelings, weakness in imagination, external thinking style which it means not focusing on feelings and thoughts [21]. Alexithymia can be an inciting factor of psychotic experiences [22].

The main purpose of this research was investigating the mediating role of alexithymia in the relationship between cyberbullying and psychotic experiences in adolescents which it is the first time that the relationship among these three variables and their model is examine. Another purpose of this research was measuring and predicting and controlling the effect of doing cyberbullying or victimization of it on the psychotic experiences of the adolescents. Also, the adolescents who have psychotic experiences are more likely to suffer from psychosis and cognitive dysregulation in future; therefore, the need to identify and control these factors is essential [2]. Especially the other importance of doing this research is because of that it is the first time that psychotic experiences among Iranian adolescents is studied. This research was done by using structural equation modeling that its' variables include: independent variables (Cyberbullying and Cyber victimization), dependent variable (Psychotic experiences) and mediator variable (Alexithymia). The main assumption of this research is that alexithymia is the mediator in the

relationship among cyberbullying and cyber victimization with psychotic experiences.

Methods

Design and participants

To start this research, the goals and conditions of its implementation were investigated and approved by the Ethics Committee of Alzahra University. Then the necessary permissions were taken from the Tehran Department of Education and the relevant school administrators. The study population consisted of all males and females in both middle school and high school students in Tehran during the 2022–2023 academic years. Multi-stage cluster sampling was used and four regions were selected according to the geographical directions of North, South, West and East in Tehran. After that, four schools were randomly chosen from each selected region and then four classes were chosen from each school. After evaluating the questionnaires and questions by the headmasters of the schools again, the headmasters obtained informed consent from the students' parents or their legal guardian of chosen classes. After that, the researcher went to school on the specified day that the headmaster allowed and went to the selected classes and after explaining the research entry conditions which consisted of not experiencing parental divorce or family members' death in the last 6 months and having informed consent from their parents or their legal guardian, they distributed the questionnaires. After collection the questionnaires, out of the 700 copies of the questionnaires, 36 ones were useless and they were removed from the study. Among the 663 remaining questionnaires the outlier data were removed and finally 602 samples (females=48%, n=289; males=52%, n=313) were distinguished suitable for evaluation that age range of samples was 13–18 (age less than 14=8%, age 14=10.3%, age 15=22.8%, age 16=33.1%, age 17=19.1% and age 18 and more=6.8%). Initial validations were performed using SPSS26 and AMOS24.

Instruments

Cyber-bullying/victimization experiences (CBVEQ-G)

This scale was designed by Antoniadou et al. [23] which consists of 24 items and 2 subscales to detect cyber victims and cyberbullying offenders and each subscales consists of 12 items. A 5-point Likert scale (1=never, 2=once or twice, 3=sometimes, 4=most of the time, 5=daily) utilizes to score this scale. The acquired points of each question are added and the score of each subscale is obtained in this way. The score can range from 1 to 24. A high score in the subscale of being a victim of cyberbullying means that a person is exposed to cyberbullying a lot, and a high score in cyberbullying also means a high level of doing cyberbullying. The reported Cronbach's alpha by Antoniadou et al. for cyberbullying is 0.89 and for cyber victimization is 0.80 and a good fitness (CFI=0.97, TLI=0.97 and RMSEA=0.031). The Cronbach's alpha reported for this questionnaire in Iran is 0.75 for cyberbullying and 0.78 for cyber victimization and the results of confirmatory factor analysis showed a good fitness (CFI=0.92, NFI=0.91 and RMSEA=0.071) by Basharpoor and Zardi [24]. In the present study, the reliability was calculated by using Cronbach's alpha coefficient and it turned out to be 0.86 for cyberbullying, 0.87 for cyber victimization and fitness were (CFI=0.93, NFI=0.91 and RMSEA=0.07) for cyber victimization and (CFI=0.95, NFI=0.93 and RMSEA=0.06) for cyberbullying.

Community assessment of psychic experiences (CAPE-P15)

This scale is a short form of CAPE-42 and was developed by Capra et al. [25]. and it has 15 items. It uses as a screening-instrument for detection of individuals at ultra-high risk for psychosis. A 4-point Likert scale (1=never, 2=sometimes, 3=often, 4=almost always) uses to score this scale. Subscales of this questionnaire are Persecutory Ideation (5 items), Bizarre Experiences (7 items) and Perceptual Abnormalities (3 items). In order to score this questionnaire, the acquired points are added together based on the selected Likert scale. The scores in this questionnaire can range from 15 to 60 and the weighted score can be calculated by dividing the sum of the scores to the number of answered questions. Weighted scores range from 1 to 4. A cut-off point of 1.7 for weighted score defines for psychotic experiences in normal people. People who get a score higher than the cut-off point have alarming psychotic experiences. The Cronbach's alpha of this scale was reported as 0.88 by Capra et al. and good fit was achieved on all criteria (CFI=0.94, NFI=0.90, RMSEA=0.048). The Cronbach's alpha for CAPE-42 in Iran was reported 0.93 and the result of the confirmatory factor analysis demonstrated the relevance of the fitness (CFI=0.95, NFI=0.94, RMSEA=0.077) by Mirzaee et al. [26]. The Cronbach's alpha in Iran was calculated as 0.88 in the present study and fitness (CFI=0.97, NFI=0.94, RMSEA=0.041).

Toronto alexithymia scale (TAS-20)

This scale was proposed by Bagby et al. [27] and it is the most frequently and widely used measure of alexithymia that consists of three subscales: difficulty identifying feelings (7 items), difficulty describing feelings (5 items) and externally oriented thinking (8 items). The participants should answer to 20 questions on a 5-point Likert scale (1=strongly disagree, 2=disagree, 3=neither agree nor disagree, 4=agree, 5=strongly agree). To score this questionnaire, first the score of items 4, 5, 10, 18 and 19 should reverse (1=5, 2=4, 4=2, 5=1, 3=3) then the acquired points of all items based on their selected Likert scale should add together. According

Table 1 Mean, Std. Deviation, skewnesss, Kurtosis and the Cronbach's alpha of subscales

Variable	Mean	Std. Deviation	Skewness	Kurtosis	Cronbach's alpha
Difficulty identifying feelings	18.53	6.69	0.39	-0.43	0.88
Difficulty describing feelings	14.41	4.07	0.16	-0.17	0.88
Externally oriented thinking	21.77	6.41	0.07	-0.31	0.81
Total Alexithymia	55.51	12.74	0.30	-0.02	0.92
Cyber victimization	17.95	8.20	1.67	1.80	0.87
Cyber bullying	16.49	7.69	2.03	3.11	0.86
Total Cyber	34.44	14.93	1.80	2.21	0.90
Persecutory ideation	6.99	3.74	0.13	-0.60	0.79
Bizarre experiences	7.03	4.77	0.54	-0.30	0.79
Perceptual abnormalities	2.16	2.45	1.13	0.39	0.75
Total Psychotic Experiences	16.19	9.31	0.46	-0.15	0.87

to the recommendation of the developers of this scale, a total score above 60 is considered as the cut-off point for diagnosing alexithymia. Cronbach's alpha for this questionnaire was reported by Bagby et al. as 0.85, and in Iran Besharat reported it as 0.85 [28] and good fitness (CFI=0.92, NNFI=0.93, RMSEA=0.05); Cronbach's alpha of this questionnaire was calculated as 0.92 in this study and (CFI=0.92, NFI=0.90, RMSEA=0.069).

Analysis method
Descriptive analysis of this research was performed by SPSS26. First, the situation of missing data was investigated and 15 questionnaires which had more than 5% of missing data were left out from the calculations. Other remaining questionnaires which had less than 5% of

missing data were handled by using the listwise deletion procedure [29]. The outlier data were also identified by the box diagram in SPSS so 47 questionnaires were removed and 602 suitable samples remained, after that to ensure the appropriateness of outlier data removal, Mahalanobis distance was calculated, which It was calculated by dividing the largest amount of Mahalanobis distance in AMOS which it was 231.248 and it was divided to the number of questions (which is 59), and Mahalanobis value was 3.9 which this number is less than cut off point of 4 and it indicates that there is any multivariable outliers. Normality of the data was checked by skewness and kurtosis values of subscales (Table 1), Also the mean, standard deviation and Cronbach's alpha of all subscales of the questionnaires which had used in this research are available in Table 1. For evaluating multicollinearity of the variables, variance inflation factor was checked and for cyber victimization and cyberbullying it was 2.397 which this amount is less than cut off point 5 and it shows that there is not multicollinearity between independent variables.

Results
Descriptive analysis
The bivariate correlations of all variables were calculated and they are available in Table 2. The data shows that cyberbullying was positively correlated with alexithymia ($r=0.37, p<0.01$); cyber victimization with alexithymia ($r=0.41, p<0.01$). Alexithymia was significantly and positively correlated with the dependent variable ($r=0.36, p<0.01$), too. After that, the structure equation modelling was conducted in Amos software in order to examine the model fit and mediation model of the variables.

Confirmatory factor analysis
The factor loading of all items of the questionnaires was checked in Amos and it was observed that all the factor loadings were in the appropriate range (more than 0.4) therefore none of them was deleted.

Table 2 Pearson Correlation Matrix to examine the relationship among variables ($n=602$)

Variable	1	2	3	4	5	6	7	8	9	10
1.Difficulty identifying feelings	1									
2.Difficulty describing feelings	0.60**	1								
3.Externally oriented thinking	0.50**	0.30**	1							
4. Total Alexithymia	0.85**	0.70**	0.70**	1						
5. Cyber victimization	0.47**	0.31**	0.23**	0.41**	1					
6. Cyber bullying	0.40**	0.25**	0.25**	0.37**	0.76**	1				
7.Persecutory ideation	0.32**	0.19**	0.05	0.22**	0.36**	0.35**	1			
8.Bizarre experiences	0.43**	0.35**	0.10**	0.36**	0.47**	0.40**	0.51**	1		
9.Perceptual abnormalities	0.38**	0.32**	0.03	0.29**	0.42**	0.33**	0.44**	0.66**	1	
10. Total Psychotic Experiences	0.45**	0.36**	0.08	0.36**	0.51**	0.43**	0.70**	0.91**	0.85**	1

**p < 0.01

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Table 3 Confirmatory factor analysis -model fit indices for study variables

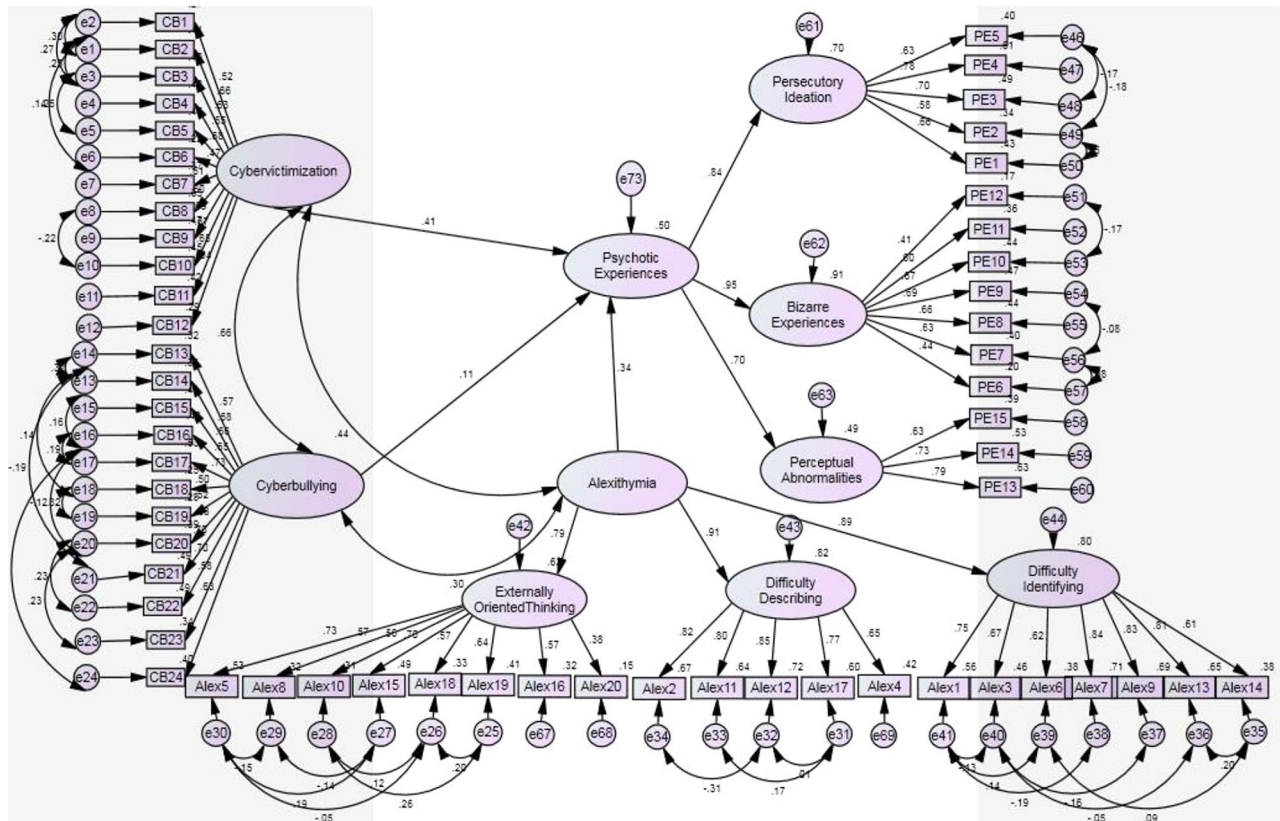| Model	*p*	CMIN/DF	CFI	NFI	GFI	RMSEA
standard values		< 5	> 0.9	> 0.9	> 0.9	0.03 < < 0.08
Alexithymia	0.001	3.83	0.92	0.90	0.90	0.06
Psychotic Experiences	0.001	1.91	0.97	0.94	0.96	0.03
Cyberbullying	0.001	4.39	0.94	0.93	0.94	0.07
Cyber victimization	0.001	4.71	0.93	0.91	0.94	0.07

Fig. 1 Structural model of psychotic experiences

Measurement model fit

The values of the normalized chi-square index CMIN/DF, RMSEA, NFI, TLI, CFI, and GFI of the model and the scales were checked (Table 3). According to the literature, the resulting value for the normalized chi-square should be less than 5, the value of the root mean square error of approximation (RMSEA) should be between 0.03 and 0.08, and the values of the comparative fit index (CFI), goodness of fit index (GFI) and normalized fit index (NFI) should be all higher than 0.9 [30]. All the scales which were used in this research had good validity and reliability and they were suitable for the structural equations modeling. The model fit of the research model was (CMIN/DF = 2.09, CFI = 0.9, TLI = 0.88, RMSEA = 0.04) and all standardized factor loadings were significant ($p < 0.001$).

Structural model

The structural model was conducted in order to investigate linear relationships and beta coefficients between exogenous and endogenous variables and calculating coefficient of determination (Fig. 1). Based on the results of the structural model, cyberbullying (β = 0.10, $p < 0.05$) and alexithymia (β = 0.33, $p < 0.001$) were positively predicted the psychotic experiences of adolescents. There was also a positive relationship between cyber victimization (β = 0.41, $p < 0.001$) and psychotic experiences. These variables explain 50% of the variance of psychotic experiences among Iranian students.

Mediation model

In order to determine the type of mediator of the research model, the meaningfulness of relationships investigated; a comparison was performed between full and indirect models. The results proved that the research model was

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partially mediated by alexithymia, which it means that a part of the effect of the independent variable on the dependent variable was depended on the presence of the mediator. There is a positive and significant direct relationship between cyber victimization and psychotic experiences ($\beta=0.64$, $C.R=9.81, p<0.001$) which the standard coefficient in the full model decreased ($\beta=0.49$, $C.R=8.43, p<0.001$) which it means that the mediator affected the direct relationship between cyber victimization and psychotic experiences. The mediation effect of cyber victimization in this model was equal to 0.18.

In the relationship between doing cyberbullying and psychotic experiences, the direct relationship ($\beta=0.52$, $C.R=8.26, p<0.001$) decreased to ($\beta=0.38$, $C.R=7.97, p<0.001$) in full model which it means that there is a partial mediation between these two variables. The mediation effect of this model was 0.28.

Discussion

Current research was done in Iran on middle and high school students to realize the effect of cyberbullying on psychotic experiences in adolescents which are one of the most important and sensitive group of the societies. This research emerged some finding; investigation the relationship between doing cyberbullying and its victimization with psychotic experiences was the first purpose of this study; this result is similar to the result of Otak and Luo's [15] research which indicated that both doing cyberbullying and cyber victimization relate to psychotic experiences [15].

Cyber victimization had positive relationship with psychotic experiences ($r=0.51, p<0.01$) in this research which this result was compatible with the results of the research of Fekih-Romdhane et al. [8]; in order to describe this relationship, they represented that cyber victimization are often unpleasant experience that can cause stress and trauma [8]; while Turner et al. [31]. resulted that trauma and stress are some important factors that can cause psychotic experiences in adolescents [31] and according to the type of trauma, it can have different level of effects on the person; for example, it has proven that traumas caused by interpersonal violence or being ignored by parents are more effective than other traumas and they are more probable to cause psychotic experiences [32]. This relationship was delineated by Croft et al. [32] and Hartley et al. [33]. in this way that cyber victims may suffer from some kinds of distrust, pessimism and rumination, which these symptoms are related to psychotic experiences [33, 34]; however these symptoms can last for a long time and lead to social anxiety, illusions or strange behaviors in the person.

On the other hand, there is also a relationship between doing cyberbullying and psychotic experiences ($r=0.43, p<0.01$), and this result was compatible to the

researches of García-Vázquez FI et al. [35], Aricak [36] and Connolly and Moore [37] which indicate that most perpetrators of cyberbullying suffer from a high level of aggression and psychosis [35–37], and Fekih-Romdhane et al.(2023) told that these features make perpetrators more prone to psychotic experiences [16].

The second purpose of the research was investigating the relationship between cyberbullying and cyber victimization with alexithymia that these relationships were present according to the results of this research. Our findings support the previous interpretations of Aricak and Ozbay [38], Espinoza [39] and Waches et al. [40] and was compatible with them. Waches et al. [40] reported that there is a positive relationship between cyber victimization and alexithymia. Eichhorn et al. [20] discussed that victims of cyber bullying who have trauma and they also do not receive adequate support, try to overcome their stress and other negative emotions by avoiding and ignoring them, so they become more sensitive for alexithymia in the future [20]; also according to Fekih-Romdhane et al. [8]. which resulted that cyber victimization decreases self-esteem [8] and this can cause some problems like low self-assertivity and emotional expression that they can cause alexithymia in future [41]. In other hand, Levantini et al. [42] believed that perpetrators of cyberbullying who have low psychological, emotional and social adjustments use alexithymia as a defense mechanism to minimize their emotional conflicts by not empathizing and ignoring their feelings, so they will have more difficulty in identifying and describing their emotions; gradually this lack of empathy may become a personality trait in them [42]. Our finding in this scope is congruous with the findings of Wachs & Wright [43], Aricak & Ozbay [38] and Wachs et al. [44] researches.

According to this research, the relationship between alexithymia and psychotic experiences was proven ($\beta=0.36, p<0.001$) that this result is compatible with the result of the research was done by Poza [22] which it can delineate in this way that people need to identify and express their feelings in order to manage them better; however, this work is difficult for alexithymic person why they cannot identify and describe their feelings in difficult situations and they also have some problems with transferring their feelings to others in an appropriate way, and for this reason, they tolerate psychological pressure and stress that can make them more deserved to psychotic experiences [22]. This positive and significant relationship was aligned with the result of the van der Velde et al.(2015) research [45].

In the subscale levels, all the subscales of the variables that had a relationship with each other also showed a significant and positive correlation with each other, except for externally oriented thinking (subscale of alexithymia) that had a weak relationship with bizarre experiences in

psychotic experiences and it had not any relationship with others subscales, because this subscale have been associated with deficits in cognitive processing so it can cause some bizarre experiences in the person (Table 2) [46].

The limitation of this research was the cross-sectional nature of it; the results of this type of studies can only denote the relationships between the variables and longitudinal studies are needed in order to reach more accurate results and measure other influencing factors and understand their effects. In other hand, in this research the samples live in the city of Tehran and this can affect the access to facilities and culture of students, although it was tried to collect samples from all regions and all levels of welfare in Tehran. The special limitation of this research can be the age group of the participants, although this is a winning point and made a lot of suitable information about adolescents, but it can limit the generalization of the results.

Conclusions

Teenagers who have been victims of cyberbullying or have done cyberbullying can face with more negative thoughts, bad feelings and inner angers, and they try to suppress their feelings in order to decrease them, so they can become susceptible to alexithymia. Accompanying these bad memories and feelings with the lack of proper understanding of emotion can cause strange and illusory experiences and suspicion that these features are some causative factors of psychotic experiences especially in teenagers which are one the most sensitive group of people in societies.

The findings from this study illustrate the need of school base intervention programs in order to prevent cyberbullying and its victimization, in this way the adolescents will be protected against alexithymia and psychotic experiences. Students need to learn some protection methods to deal with the trauma have caused by cyberbullying victimization from psychologists in order to prevent alexithymia; Also educational planning or preparing some useful packages can help the alexithymic persons to control it by promoting their emotional intelligence with learning some useful techniques like mindfulness so they will be protected against psychotic experiences too.

Abbreviations

CAPE-P15	Community Assessment of Psychic Experiences
CBVEQ-G	Cyber-Bullying/Victimization Experiences
CFI	Comparative Fit Index
GFI	Goodness of Fit Index
NFI	Normalized Fit Index
RMSEA	Root Mean Square Error of Approximation
TAS-20	Toronto Alexithymia Scale

Declarations

Human ethics and consent to participate declaration
All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the1964 Helsinki declaration and its later amendments or comparable ethical standards. The goals and conditions of this research were investigated and approved by the Ethics Committee of Alzahra University in Tehran (code: ALZAHRA.REC.1402.055). In the schools, first informed consent was obtained from all the samples' parents or their legal guardian and confidentiality of data had been fully maintained by both the researcher and her colleagues and this was explained to the participants at the beginning, also necessary permissions were taken from all relevant organizations. No unnecessary confidential information was taken from the participants and if a person showed his unwillingness to participate in the research, according to the principles of respect for human rights, we have no right to force him and this research had no fee for the participants.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

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