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ORIGINAL PAPER

Posttraumatic Stress and Interpersonal Sensitivity: Alexithymia as Mediator and Emotional Expressivity as Moderator

Gulnara Kobylanovna Slanbekova[1] · Man Cheung Chung[2] · Baizhol Iskakovich Karipbaev[1] · Raikhan Shaikhishevna Sabirova[1] · Roza Togayevna Alimbayeva[1]

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Abstract
This study examined 1) the link between PTSD from past trauma, interpersonal sensitivity and psychiatric co-morbidity, 2) mediational effects of alexithymia on 1), and 3) moderated mediational effects with emotional expressivity as the moderator. Five hundred and fifteen Kazakh students completed the Posttraumatic Stress Diagnostic Scale, General Health Questionnaire-28, Toronto Alexithymia Scale-20, Berkeley Expressivity Questionnaire and Interpersonal Sensitivity Measure. The results showed that 28% met the criteria for full-PTSD. Controlling for academic year, age and university major, PTSD from past trauma was significantly correlated with interpersonal sensitivity and psychiatric co-morbidity. Alexithymia mediated the impact of PTSD on interpersonal sensitivity and psychiatric co-morbidity. Alexithymia, however, did not interact with type of emotional expressivity to influence outcomes. Moderated mediational effects were not found. To conclude, following trauma, Kazakh students can experience heightened levels of interpersonal sensitivity and psychological symptoms. These problems are particularly severe for those who have difficulty getting in touch with their emotions.

Keywords PTSD · Alexithymia · Interpersonal sensitivity · Emotional expressivity

Introduction

Interpersonal sensitivity is defined as an excessive awareness of or sensitivity to the behaviour and feelings of others. Elevated sensitivity is often accompanied by preoccupation with

✉ Man Cheung Chung
man.chung@cuhk.edu.hk

[1] Karaganda State University, Karaganda, Kazakhstan

[2] Department of Educational Psychology, Faculty of Education, The Chinese University of Hong Kong, Ho Tim Building, Shatin, NT, Hong Kong

interaction with others, vigilance to others' behaviour and mood or sensitivity to perceived criticism or rejection during the interaction [1]. Posttraumatic stress disorder (PTSD) from past events has been associated with interpersonal sensitivity among victims of war [2–4], military operation [5], fire and rescue operation [6, 7], natural [8] or technological disaster [9], accident [10], child abuse [11–15], adult emotional abuse [11], and sudden death of a loved one [16]. Hospital inpatients receiving treatment for trauma-related disorders reported significantly more interpersonal sensitivity than did inpatients receiving help for other disorders, although this finding was mainly based on female patients [17]. The impact of PTSD on interpersonal sensitivity seems enduring [2, 9, 16] and, as suggested in the preceding studies, co-exists with other psychological symptoms such as anxiety, depression, somatization, dissociation, and aggression. Those who have met the full-PTSD criteria or experienced multiple-victimization tend to report higher levels of interpersonal sensitivity and psychiatric co-morbidity than individuals with partial PTSD [8, 12, 18, 19].

Whilst the link between PTSD and interpersonal sensitivity has been established, there is a paucity of research looking at possible risk factors for this. Limited studies have highlighted the role of coping. Emotional intelligence, characterized largely by emotional regulation, is associated with reduced interpersonal sensitivity and psychiatric co-morbidities [7]. However, according to the emotional processing model, trauma can affect emotion regulation skills which increases the likelihood for avoiding negative emotions associated with the trauma and inhibiting the emotional processing of it [20]. Alexithymia has been postulated as one such avoidance coping; it is considered an impairment in recognizing or processing emotions [21, 22] by having difficulty identifying feelings and distinguishing them from bodily sensations, and differentiating between cognition and emotions, and difficulty verbalizing or expressing feelings to others, but relying on externally oriented thinking patterns [23, 24]. This type of coping leaves intensive and negative emotions resulting from the trauma avoided, inhibited, unverbalized or unexpressed. This is how one is protected [20, 25–31].

Given these characteristics, one could speculate that alexithymia is associated with "reduced" or "restricted" emotional expressivity. Different individuals will appraise emotional experiences differently and generate emotion-response tendencies which are then expressed behaviourally with varying strength [32]. Some individuals have a tendency to express positive or negative emotions in a way that is visible to other people. Others hide how they feel from their peers. However, expressivity tendencies partly depend on how readily such emotions can be identified, described or expressed, regardless of type of emotion.

Failing to express feelings can lead to failing to process distressing emotional experiences. As a result, unresolved and unprocessed distressing feelings in the physiological and neurological system accumulate and may lead to the emergence of psychological symptoms [33–36] including somatization [37, 38], anxiety [39–41], depression [42], dissociation [43], self-harm [44], obsessive-compulsive disorder [45], panic disorder, social phobia [46], eating disorders [47–51], and substance abuse [52].

What has been articulated here sets the basis for a hypothesized model for the present study which has not been examined among Kazakh university students. The model is: PTSD from past trauma relates to alexithymia which interacts with reduced emotional expressivity to influence interpersonal sensitivity and psychiatric co-morbidity. We hypothesized that 1) PTSD from past trauma would be associated with interpersonal sensitivity and psychiatric co-morbidity, 2) alexithymia would mediate this association, and 3) mediational effects would be moderated by a low level of emotional expressivity.

Methods

Procedure

Approval for the research was granted by the ethics committee at Karaganda State University. Participants were recruited via advertisements in student halls of residence and classes taught by the authors from Karaganda State University. The purpose of the research and its hyperlink were clearly stated in the advertisement with inclusion criteria: 1) students aged over 18, and 2) Kazakh in ethnic origin. A snowball recruitment method was also used. Participants who completed the study were encouraged to pass the hyperlink onto friends using social networking media such as Facebook and SMS. The on-line survey began with a page stating that the research was entirely voluntary and anonymous, that data would be kept confidential and that participants were entitled to exit from the research at any point. Completing the survey constituted the consent to the study.

Measures

A demographic page was used to collect information on gender, age, marital status, ethnicity, student status (full or part time), university majors and the academic year at the time of the research.

The Posttraumatic Stress Diagnostic Scale for DSM-5 (PDS-5) [53] was used to assess students' self-report on traumatic events and PTSD symptoms. The first part provides a list of possible traumatic events (e.g. natural disaster, accident). Participants need to indicate whether they have experienced any of them and, if more than one, choose the one which has affected them the most. The second part consists of 20 trauma reaction items, each rated on a 5-point Likert scale from 0 (not at all) to 4 (6 or more times a week/severe). Students were instructed to rate each item to indicate the severity of a particular symptom during the past month. The Posttraumatic Stress Diagnostic Scale demonstrates excellent internal consistency ($\alpha = 0.95$), test–retest reliability ($r = 0.90$) and good convergent validity with the PTSD Checklist—Specific Version ($r = 0.90$) and the PTSD Symptom Scale—Interview Version for DSM–5 (PSSI–5; $r = 0.85$). Based on the current sample, the Cronbach's α for the total score was 0.96.

The General Health Questionnaire-28 (GHQ-28) [54] was used to measure levels of somatic symptoms, anxiety and insomnia, psychosocial dysfunction, and depression among students using a 4-point Likert scale (0 = better than usual to 3 = much worse than usual). The questionnaire has excellent reliability with Cronbach's α ranging from 0.90–0.95 [55]. The current study revealed good reliability for the total score (Cronbach's $\alpha = 0.91$).

The Toronto Alexithymia Scale-20 (TAS-20) [56] yields a total score and three dimension scores: difficulty in identifying feelings, difficulty in describing feelings, and external oriented thinking. The questionnaire is scored on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree). The reliability of the scale was found to be satisfactory in previous research (dimension 1, Cronbach's $\alpha = 0.86$; dimension 2, $\alpha = 0.71$; dimension 3, $\alpha = 0.61$), and the 3-week test–retest reliability was 0.77. For the current study, 0.71 was the α for the entire questionnaire.

The Berkeley Expressivity Questionnaire (BEQ) [57] was used to assess individual differences in emotional expressivity. Students were asked to rate the 16 statements (1 = strongly disagree to 7 = strongly agree) concerning three facets of emotional expressivity: negative

expressivity, positive expressivity, and impulse strength. The questionnaire demonstrated a good α (0.86) for the total score. Based on the current sample, the Cronbach's α for the total score was 0.70.

The Interpersonal Sensitivity Measure (ISM) [1] generates five subscales concerning interpersonal sensitivity: interpersonal awareness, need for approval, separation anxiety, timidity and fragile inner self. Students rated 36 statements on a 4-point Likert scale (4 = very like me to 1 = very unlike me). The coefficient α for the total of interpersonal sensitivity was 0.86 for the student sample in the original study. Data based on the current study yield the α of 0.85.

Data Analysis Plan

Descriptive statistics were used to describe the sample including the prevalence rate for PTSD. T-tests were used to compare diagnostic group differences (PTSD vs no-PTSD) in psychiatric co-morbidity, alexithymia, emotional expressivity and interpersonal sensitivity. Correlation coefficients, point biserial correlations (r_{bp}) included, were used to examine the link between demographic variables and distress outcomes. PROCESS was used for mediational and moderated mediational analyses. It generated bootstrap confidence intervals (bias-corrected) for testing total and specific indirect effects of X (PTSD) on Y (interpersonal sensitivity or psychiatric co-morbidity) through the mediator (alexithymia). It also examined whether emotional expressivity would moderate mediational effects. Bias-corrected bootstrapping addressed the problem of power resulting from the asymmetric and non-normal sampling distributions of an indirect effect [58]. The bootstrap estimates were based on 1000 bootstrap samples. Point estimates and confidence intervals (95%) were estimated for the indirect effects. The point estimate was considered to be significant when the confidence interval did not contain zero.

Results

Five hundred and fifteen Kazakh students (F = 367, M = 148) with a mean age of 19.88 (SD = 1.19) participated in the study. The majority were single (93%), full-time (99%), studying for an undergraduate degree (98%) mainly in sciences (46%) followed by social sciences (29%) and humanities (25%). Both junior (year 1: 26% and year 2: 38%) and senior students (year 3: 29%, year 4: 7%) were involved in this study.

The majority had experienced at least one traumatic life event (69%) of whom 8% experienced more than one event. Sexual assault was the most common (25%) followed by physical assault (19%), child abuse (18%) and accident (15%). Using the diagnostic criteria of PDS-5, 28% ($n = 143$) met the criteria for full-PTSD. Compared to the no-PTSD group, the PTSD group reported significantly higher levels of psychiatric co-morbid symptoms, difficulty identifying and describing feelings, expression of negative feelings but a lower level of expression of positive feelings; they also reported significantly more interpersonal awareness, separation anxiety and fragile inner-self but less need for approval (see Table 1).

Literature suggests that "victim variables" can play a role in influencing distress outcomes [59, 60]. It follows that, prior to examining the research aim, correlation coefficients including point biserial correlations (r_{bp}) were carried out to examine whether demographic variables would be related to interpersonal sensitivity and psychiatric co-morbidity. Marital status, student status (full vs part time), and type of degree (undergraduate vs postgraduate) were

Table 1 Differences between diagnostic groups in psychiatric co-morbidity, alexithymia, emotional expressivity and interpersonal sensitivity

	PTSD		No-PTSD			
	Mean	SD	Mean	SD	T	Cohen's *d*
Somatic problems	16.54	4.28	13.21	4.51	7.36[b]	0.75
Anxiety	16.62	4.53	13.09	4.69	7.45[b]	0.76
Social dysfunction	15.83	3.41	14.33	2.48	4.66[b]	0.50
Depression	15.03	5.23	10.70	4.07	8.66[b]	0.92
Difficulty identifying feelings	18.92	5.67	16.32	4.82	4.72[b]	0.49
Difficulty describing feelings	14.12	3.16	12.75	2.90	4.56[b]	0.45
External oriented thinking	21.90	4.39	22.35	3.26	−1.07	0.19
Negative expressivity	22.80	4.60	21.61	4.92	2.54[a]	0.24
Positive expressivity	17.13	5.69	18.97	4.70	−3.40[b]	0.35
Impulse strength	24.05	7.77	22.84	5.55	1.67	0.17
Interpersonal awareness	18.34	4.06	15.40	3.83	7.43[b]	0.74
Need for approval	22.60	4.76	23.58	4.17	−2.21[a]	0.21
Separation anxiety	20.11	4.68	18.31	3.62	4.04[b]	0.43
Timidity	20.99	4.33	19.77	4.47	1.76	0.17
Fragile inner-self	11.42	3.54	8.61	3.35	8.15[b]	0.81

[a] $p < 0.05$; [b] $p < 0.001$

not included in the bivariate analysis, given that the majority (over 93%) were single, full-time and undergraduates. Gender and the number of traumas were not significantly correlated with distress outcomes (Gender: interpersonal sensitivity, $r_{bp} = -0.02$, ns; psychiatric co-morbidity, $r_{bp} = -0.07$, ns; number of trauma: interpersonal sensitivity, $r = -0.03$, ns; psychiatric co-morbidity, $r = 0.06$, ns). Academic year (junior vs senior students) was correlated with interpersonal sensitivity ($r_{bp} = -0.15$, $p < 0.001$). Age ($r = -0.11$, $p < 0.05$) and type of major (sciences vs non-science) were correlated with psychiatric co-morbidity ($r_{bp} = -0.22$, $p < 0.001$).

The variables significantly correlated with distress outcomes were then treated as co-variates for mediational and moderated mediational analysis using PROCESS. The results showed that PTSD from past trauma was significantly correlated with interpersonal sensitivity (effect = 0.240, SE = 0.050, $t = 4.85$, $p < 0.00$, LLCI = 0.1467, ULCI = 0.3401) and psychiatric co-morbidity (effect = 0.323, SE = 0.042, $t = 7.58$, $p < 0.00$, LLCI = 0.2394, ULCI = 0.4068). Since a large proportion of the sample reported interpersonal traumas (62%), point biserial correlations were carried out to examine whether trauma type (non-interpersonal vs interpersonal) would relate to interpersonal sensitivity and psychiatric co-morbidity. In line with literature [61–63], interpersonal trauma was defined as an assault experienced by students directly from another person. These included robbery, physical or sexual abuse/assault, assault with a weapon, domestic violence, and relationship breakup of which assault was a cause. The results showed that interpersonal trauma was related to increased levels of distress outcomes (interpersonal, $r_{bp} = 0.15$, $p < 0.001$; psychiatric co-morbidity, $r_{bp} = 0.18$, $p < 0.001$).

The impact of PTSD on interpersonal sensitivity and psychiatric co-morbidity was mediated by alexithymia (see Table 2). Contrary to our hypotheses, however, alexithymia did not interact with type of emotional expressivity to influence outcomes. Neither did emotional expressivity moderate meditational effects of alexithymia (see Tables 3 and 4).

Table 2 Mediational analysis of X (PTSD) on Y (types of interpersonal sensitivity, psychiatric co-morbidity) with alexithymia as the mediator

Effect	Boot SE	Boot LLCI	Boot ULCI
Indirect effect of X (PTSD) on Y (interpersonal sensitivity) with alexithymia as mediator			
0.026	0.0136	0.0036	0.0572
Indirect effect of X (PTSD) on Y (interpersonal awareness) with alexithymia as mediator			
0.001	0.0006	0.0000	0.0025
Indirect effect of X (PTSD) on Y (need for approval) with alexithymia as mediator			
0.007	0.0008	0.0004	0.0036
Indirect effect of X (PTSD) on Y (separation anxiety) with alexithymia as mediator			
0.002	0.0008	0.0006	0.0038
Indirect effect of X (PTSD) on Y (timidity) with alexithymia as mediator			
0.003	0.0007	−0.0006	0.0022
Indirect effect of X (PTSD) on Y (fragile inner self) with alexithymia as mediator			
0.004	0.0024	0.0003	0.0096
Indirect effect of X (PTSD) on Y (psychiatric co-morbidity) with alexithymia as mediator			
0.027	0.0125	0.0076	0.0561

Table 3 Conditional indirect effects of X (PTSD) on Y (interpersonal sensitivity) at values of moderators (negative or positive expressivity, impulse strength)

Interpersonal sensitivity						
	Co-eff	SE	T	P	LLCI	ULCI
PTSD	0.1853	0.0527	3.51	0.00	0.0818	0.2887
Alexithymia	0.2279	0.0870	2.61	0.00	0.0568	0.3990
Negative expressivity	0.5272	0.1643	3.20	0.00	0.2042	0.8501
Interaction[a]	0.0012	0.0144	0.08	0.93	−0.0270	0.0295
PTSD	0.1819	0.0537	3.38	0.00	0.0764	0.2875
Alexithymia	0.2730	0.0879	3.10	0.00	0.1003	0.4458
Positive expressivity	−0.2944	0.1547	−1.90	0.06	−0.5984	0.0096
Interaction[b]	0.0118	0.0169	0.70	0.48	−0.0213	0.0450
PTSD	0.1975	0.0532	3.71	0.00	0.0930	0.3020
Alexithymia	0.2315	0.0901	2.56	0.01	0.0543	0.4086
Impulse strength	0.0345	0.1273	0.27	0.78	−0.2156	0.2846
Interaction[c]	−0.0146	0.0111	1.31	0.18	−0.0073	0.0365
Conditional indirect effects of X on Y: Indirect effect						
	Index	Effect	Boot SE	Boot LLCI	Boot ULCI	
Negative expressivity						
−4.84	–	0.0294	0.0176	−0.0077	0.0609	
0.00	–	0.0251	0.0137	0.0023	0.0556	
4.84	–	0.0258	0.0161	−0.0009	0.0626	
Positive expressivity						
−5.06	–	0.0235	0.0175	−0.0109	0.0587	
0.00	–	0.0301	0.0147	0.0060	0.0627	
5.06	–	0.0367	0.0223	0.0015	0.0881	
Impulse strength						
−6.48	–	0.0150	0.0187	−0.0248	0.0508	
0.00	–	0.0255	0.0144	0.0004	0.0569	
6.48	–	0.0359	0.0175	0.0088	0.0764	
Index of moderated mediation						
Negative expressivity	0.0001	–	0.0020	−0.0037	0.0045	
Positive expressivity	0.0013	–	0.0027	−0.0030	0.0076	
Impulse strength	0.0016	–	0.0017	−0.0010	0.0057	

Interaction[a] = alexithymia x negative expressivity; Interaction[b] = alexithymia x positive expressivity; Interaction[c] = alexithymia x impulse strength

Table 4 Conditional indirect effects of X (PTSD) on Y (psychiatric co-morbidity) at values of moderators (negative or positive expressivity, impulse strength)

Psychiatric co-morbidity						
	Co-eff	SE	T	P	LLCI	ULCI
PTSD	0.3094	0.0441	7.01	0.00	0.2227	0.3960
Alexithymia	0.2631	0.0713	3.69	0.00	0.1231	0.4032
Negative expressivity	0.2741	0.1375	1.99	0.04	0.0038	0.5443
Interaction[a]	−0.018	0.0123	−1.40	0.14	−0.0423	0.0061
PTSD	0.2977	0.0448	6.64	0.00	0.2096	0.3858
Alexithymia	0.2890	0.0718	4.02	0.00	0.1479	0.4302
Positive expressivity	−0.1281	0.1282	−0.99	0.31	−0.3801	0.1239
Interaction[b]	0.0261	0.0141	1.85	0.06	−0.0016	0.0538
PTSD	0.3012	0.0447	6.73	0.00	0.2133	0.3892
Alexithymia	0.2455	0.0734	3.34	0.00	0.1013	0.3896
Impulse strength	0.1045	0.1046	0.99	0.31	−0.1011	0.3101
Interaction[c]	0.0102	0.0096	1.06	0.28	−0.0086	0.0290
Conditional indirect effects of X on Y: Indirect effect						
	Index	Effect	Boot SE	Boot LLCI	Boot ULCI	
Negative expressivity						
−4.73	–	0.0370	0.0150	0.0116	0.0701	
0.00	–	0.0279	0.0123	0.0078	0.0557	
4.73	–	0.0188	0.0136	−0.0027	0.0506	
Positive expressivity						
−5.03	–	0.0167	0.0125	−0.0068	0.0437	
0.00	–	0.0306	0.0134	0.0083	0.0607	
5.03	–	0.0446	0.0214	0.0109	0.0940	
Impulse strength						
−6.33	–	0.0192	0.0123	−0.0021	0.0466	
0.00	–	0.0260	0.0121	0.0068	0.0541	
6.33	–	0.0328	0.0171	0.0068	0.0734	
Index of moderated mediation						
Negative expressivity	−0.0019	–	0.0015	−0.0053	0.0010	
Positive expressivity	0.0028	–	0.0022	−0.0005	0.0082	
Impulse strength	0.0011	–	0.0014	−0.0010	0.0045	

Interaction[a] = alexithymia x negative expressivity; Interaction[b] = alexithymia x positive expressivity; Interaction[c] = alexithymia x impulse strength

Discussion

The present study examined the relationship between PTSD from past trauma and interpersonal sensitivity and psychiatric co-morbidity, whether alexithymia would mediate this relationship and whether emotional expressivity would moderate mediational effects of alexithymia. In support of hypotheses 1 and 2, after controlling for academic year, age and university major, PTSD was significantly correlated with interpersonal sensitivity and psychiatric co-morbidity; Alexithymia mediated these associations. However, contrary to hypothesis 3, mediational effects on distress outcomes were not moderated by type of emotional expressivity.

The current findings reflected the literature depicted in the introduction, that PTSD from past trauma is associated with interpersonal sensitivity and psychiatric co-morbidity. Students meeting the criteria for full-PTSD reported higher levels of interpersonal awareness, separation anxiety, fragile inner-self and psychiatric co-morbid symptoms than did the non-PTSD group. This provided further support to the literature [8, 18] and offered support to the general claim that PTSD is not a discrete clinical syndrome but often expressed through other psychiatric disorders [64, 65].

For a substantial proportion of students, interpersonal trauma was related to heightened levels of interpersonal sensitivity and psychiatric co-morbidity. Assault by another person would have likely shattered assumptions about the benevolence and trustworthiness of people, increased expectation of rejection, loss and interpersonal conflict and triggered a rethink of the amount of danger in the world, all of which would have likely contributed to the level of interpersonal sensitivity and been associated with psychological symptoms [66–68] Janoff [69]. Also, interpersonal trauma can disrupt anxiety buffering mechanisms which protect people against psychological symptoms [70].

The impact of PTSD from past trauma onto distress outcomes was mitigated by alexithymia. This mediational role of alexithymia has been demonstrated in several studies [25, 71–74]. Theoretically, as was outlined in the introduction, past trauma could have triggered alexithymia as a defense, characterized by avoidance, aiming to inhibit intensive and negative emotions resulting from traumatic events [25–27, 71–75] and thereby prevent access to distressing feelings [28, 29]. Research shows that individuals with a high level of alexithymia tend to endorse more defenses than individuals with a low level [25, 73, 76–81]. This is why alexithymia has been argued to be best conceptualized as the emotional numbing or avoidance aspect of PTSD rather than a distinct construct [e.g., 82–84]. However, such avoidance defense could hinder emotional processing [85–87] leading to unresolved and unprocessed feelings ultimately manifesting as psychological symptoms. Specifically, focusing on interpersonal sensitivity as the outcome variable, whilst traumatized students were struggling with internal issues, i.e. difficult in recognizing, verbalizing or expressing inner feelings, they also struggled with external issues, for example, how other people perceived them, whether they would be criticized (interpersonal awareness), approved of (need for approval) or disliked once they knew their true self (fragile inner self) or even leave them (separation anxiety).

The inter-relationship between PTSD, alexithymia and distress outcomes seemed to be robust, over and above the influence of emotional expressivity. Contrary to our prediction, alexithymia did not interact with low levels of emotional expressivity types to influence distress outcomes or the mediational effect of alexithymia. Instead, alexithymia carried the effects of PTSD onto distress independently of the effect of emotional expressivity. In other words, following a trauma, students who reported elevated levels of interpersonal sensitivity and psychiatric co-morbidity tended to be those with a high level of alexithymia, rather than those with similar levels of alexithymia who engaged in a low level of emotional expressivity. Prima facie, difficulty identifying, describing, verbalizing and accessing internal feelings should link with a low or restricted level of emotional expressivity, but the present results suggest that alexithymia and emotional expressivity are distinctively different as they required different underlying psychological mechanisms. Further analysis also showed that multicollinearity was not an issue between all the subscales of the two constructs (tolerance and VIF values ranged from 0.47 to 0.88, and 1.13 to 2.12 respectively).

Limitations of the current study need to be acknowledged. Firstly, the cumulative trauma effect [12, 19] was difficult to ascertain as a large proportion of the sample reported only one trauma. This is surprising given that polyvictimization, defined as two or more traumas experienced within one year, was found among 37% of Israeli students in their life time [88] or just over half of male (53%) and female (51.5%) US college students [89]. Secondly, the extent to which cultural characteristics among

these Kazakh students might have influenced the results [90] is unknown. Thirdly, a cross-sectional design was adopted yielding bias in mediational and moderated mediational analysis due to the lack of temporal precedence [91]. Our interpretation of these results should focus primarily on indirect effects (i.e. the structural relationship of the model) rather than causality inference [92].

To conclude, following trauma, students can become hyper-sensitive in relating to others along with psychological difficulties, especially those who have difficulty getting in touch with their feelings or emotions.

Compliance with Ethical Standards

Conflict of Interest All authors declare that they have no conflicts of interest.

Ethical Approval All procedures performed in this study involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all participants included in the study.

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Professor Gulnara Kobylanovna Slanbekova earned her BA (The Karaganda State University of the name academician E.A. Buketov, Kazakhstan) and PhD in Psychology (al-Farabi Kazakh National University, Kazakhstan). She is Associate Fellow of the Kazakh Psychological Society, a Chartered Scientist and Psychologist. She is currently Professor of Psychology at the E.A. Buketov named after Karaganda State University.

Professor Man Cheung Chung earned his BA in Psychology and Sociology (University of Guelph, Canada), PhD in Psychology (University of Sheffield, UK) and PhD in Philosophy (University of Durham, UK). He is Associate Fellow of the British Psychological Society, a Chartered Scientist and Psychologist. He is currently Professor of Psychology at the Chinese University of Hong Kong.

Professor Baizhol Iskakovich Karipbaev earned his BA in Law (The Karaganda State University of the name academician E.A. Buketov, Kazakhstan) and PhD in Philosophy (al-Farabi Kazakh National University, Kazakhstan). He is the Chairman of the Central-Kazakhstan branch of the Kazakh Congress of Philosophers. He is a corresponding member of the Russian Academy of Natural Sciences, member of the expert group of the Assembly of Peoples of Kazakhstan and Chartered Scientist and Philosopher. He is currently Professor of Philosophy at the Karaganda State University.

Professor Raikhan Shaikhishevna Sabirova earned her BA (Moscow State University, Russia) and PhD in Psychology (al-Farabi Kazakh National University, Kazakhstan). She is Associate Fellow of the Kazakh Psychological Society, a Chartered Scientist and Psychologist. She is currently the Head of Department of Psychology at the Karaganda State University.

Professor Roza Togayevna Alimbayeva earned her BA (Karaganda Pedagogical Institute, Karaganda, Kazakhstan) and PhD in Psychology (al-Faraby Kazakh National University, Kazakhstan). She is a Chartered Scientist and Psychologist. Her scientific interests are psychology of religion and existential psychology. She is currently Professor of Psychology at the E.A. Buketov named after Karaganda State University.