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Reliability and validity of the Mongolian version of the touch experiences and attitudes questionnaire (TEAQ)

Enkhnaran Tumurbaatar [1,2,†], Oyunsuren Jargalsaikhan [3,†], Gantsetseg Tumur-Ochir [1,4] and Elena Belovol [5,*]

[1] Brain and Mind Research Institute, Mongolian Academy of Sciences, Khasbaatar Street 16/2, Bayangol district Ulaanbaatar 16066, Mongolia
[2] Graduate School, Mongolian National University of Medical Sciences, Zorig Street 3, Sukhbaatar district, Ulaanbaatar 14210, Mongolia.
[3] Department of Psychology, University of the Humanities, Sukhbaatar square 20/4, Ulaanbaatar 14210, Mongolia.
[4] Department of Mental Health, Mongolian National University of Medical Sciences, Zorig Street 3, Sukhbaatar district, Ulaanbaatar 14210, Mongolia.
[5] Department of Psychology, Moscow Pedagogical State University, Moscow, Russia.

† These authors contributed equally.
* Correspondence: belovol@mail.ru; Tel.: +7 903 119 69 30

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Abstract: Communication via the sense of touch has long been perceived as an important aspect of human development, social comfort, and well-being. Our current understanding is that the human somatosensory system has two tactile sub-modalities. One provides the well-recognized discriminative touch input to the brain, and the second is the affective or emotional input. The C-tactile system is hypothesized to represent the neurobiological substrate for affective and rewarding properties of touch. Lower relationship quality is associated with lower resilience to stressors and increased vulnerability to mental health disorders. A range of scales and questionnaires assess individual, social, and cultural differences in terms of experiences and attitudes to affiliative social touch in different situations and contexts. Our goal was to prove content validity for the Mongolian version with the factor structure of the original English version of the TEAQ. We translated and adapted TEAQ for the Mongolian language version. In the present study, 204 participants were recruited. Their age ranged from 18 to 57 years (26.9±8.8), of which 57.8% were women. TEAQ-57 items were used, and Exploratory factor analysis confirmed 55 items with 6 component structures. TEAQ in the Mongolian language demonstrated good consistency, 6-factor structure of the TEAQ had a satisfactory model fit. Several subscales of the TEAQ revealed positive correlations on quality of life domains, in contrast to negative correlations with anxiety and depression. In conclusion, the analyzed Mongolian version of the TEAQ-55 is a reliable and valid assessment tool of experiences and attitudes toward the touch and is similar to component structure for different cultures (Validated British TEAQ-57, and TEAQ-37 RUS). We expected that the Mongolian version of the TEAQ might be a helpful tool for screening mental health issues and researchers.

Keywords: C-tactile system; questionnaire; touch; validation study; Mongolia;

1.0 INTRODUCTION

The human somatosensory system has two tactile sub-modalities; discriminative touch input to the brain and affective or affiliative input. A low-threshold mechanosensitive C-fibers synonym of CT-afferents (in several studies C-tactile) innervating the hairy skin of the body as a system has been identified and characterized (Löken et al., 2009; Vallbo & Johansson, 1984; Vallbo et al., 1984). The literature suggests that the C-tactile system is the neurobiological substrate for touch's affective and beneficial properties (Abraira & Ginty, 2013; Craig, 2008; Lumpkin & Caterina, 2007; Mazur, 1977; Suvilehto et al., 2015;).

A large body of literature certifies the importance of gentle caring touch in our social and emotional well-being, but there was no general agreement until the mid-20th century. A mother's reassuring touch is linked to a more beneficial type of attachment in view of Bowlby's theory (Bowlby, 1982); a securely attached infant both seeks and is comforted by physical contact with his mother (Lamb, 1980); a comprehensive review of the data linking touch and attachment is provided by Duhn (Duhn, 2010). The attitude to touch is very individual and largely depends on touch experience, age, gender and culture. Being touched by strangers is often perceived differently from being touched by friends and family (Suvilehto et al., 2015). The touch of people of the same sex is perceived differently from those of the opposite sex (Heslin et al., 1983; Kashdan et al., 2017). In Italy, it is customary to greet each other with cheek-to-cheek kisses, and in Japan, people greet each other by bowling (McDaniel & Andersen, 1998). Studies have shown that some cultures are more involved in tactile communication than others; Italians exhibit a higher-touch frequency than the British (Jourard, 1966).

Furthermore, a touch recipient's age might influence his/her touch perception as interaction patterns change throughout life (Willis & Hofmann, 1975). Since a person's attitude to touch stems from many different socio-cultural factors and unique experiences, touch can be perceived completely differently, especially in trauma or emotional difficulties. For instance, patients with post-traumatic stress disorder show abnormal reactions to non-threatening tactile stimulation (Badura-Brack et al., 2015). A study reported that patients with autism spectrum disorders often display altered reactions to touch (Kaiser et al., 2015). Furthermore, patients with depression report a more negative attitude towards social touch than healthy controls, which is associated with problems in interpersonal relationships in the depression group (Triscoli et al., 2019). Social anxiety is also considered one of the mental disorders associated with touch attitude and can lead to generalized fear and avoidance of social interactions (Pinto-Gouveia et al., 2003). Patients with social anxiety often exhibit general social communication deficits in verbal and nonverbal communication (Voncken & Bögels, 2008). In non-verbal communications, they avoid situations involving interpersonal touching (Vieira et al., 2016; Wilhelm et al., 2001) and show less comfort with social touch and higher touch avoidance. High levels of social anxiety expect higher fear of intimacy, related to lower support and higher potential for conflicts in romantic relationships (Cuming & Rapee, 2010; Montesi et al., 2013). Lower relationship quality is associated with lower resilience to stressors and increased vulnerability to mental health disorders (Cochrane, 1990).

A range of scales and questionnaires reveal individual, social, and cultural differences in terms of experiences and attitudes to affective social touch in different situations and contexts. For our study, the most closely related questionnaires are the touch avoidance measure (TAM) (Andersen & Leibowitz, 1978), the Early Childhood Touch scale (Jones & Brown, 1996), the tactile type questionnaire (TACTYPE) (Deethardt & Hines, 1983), the Questionnaire on Physical Contact Experience (QPCE) (Cochrane, 1990), and the Social Touch Questionnaire (Wilhelm et al., 2001). The TEAQ is a recently developed questionnaire that assesses life experiences and attitudes towards different stages of a person's life and validates factor structure in cross-cultural studies.

We aimed to validate a Mongolian version of the TEAQ. There are clear cultural differences in behaviours related to social touch within different cultures (Remland et al., 1995), leading to possible natural differences in factor structures of different national versions of multi-factor psychometric tools. Our goal was to prove content validity for the Mongolian version with the factor structure of the original English version of the TEAQ.

2.0 MATERIALS AND METHODS

2.1 Participants

A total of 166 people aged 26.2±10.0 years (51 men and 113 women) participated in the pilot testing. The final results of the pilot testing were compared to the original English tool with 117 items. As the rating patterns were highly comparable, no further linguistic changes were made to the Mongolian version. More than half of the participants expressed explicit complaints that the questionnaire was too long and incorporated inappropriate or seemingly irrelevant questions. According to this feedback, we used the TEAQ 57 items, those validated factor structures by the original development study by Trotter in the main study. Initially, we translated the original full items of TEAQ 117. In the pilot analysis, half of the items in the pool had a factor loading of less than 0.4. The remaining items with a satisfactory factor loading and item-total correlation remained in the Mongolian version, which was 90% consistent with TEAQ 57 in English. The present study was conducted between April and June 2021. Snowball sampling method was used to recruit participants via other participants. We used recommendations ranging from 2 to 20 subjects per item, with an absolute minimum of 100 to 250 subjects. All participants (N = 204) freely agreed to answer an online questionnaire and gave informed consent. In the beginning, the participants were informed of the aim of the study and that all collected data would be anonymous and confidential. Also, only group data would be analyzed in this study. It was highlighted that there were no right or wrong answers for the items. The participants completed the questions online alongside some general information related to demographic data. Participants' ages varied between 18 and 57 years (26.9±8.8), 57.8% of participants were female.

2.2 TEAQ

TEAQ was developed by Trotter et al. (Trotter et al., 2018a) and consisted of 117 items, including various types of affective touch with partners, friends or relatives, strangers, and several general statements regarding social touch. Authors of the original TEAQ proposed a 5-point Likert scale (Strongly Disagree = 1, Slightly Disagree = 2, Neither Agree nor Disagree = 3, Slightly Agree = 4, Strongly Agree '= 5) was used to assess participants' positive touch attitudes and experiences. More scores of TEAQ indicate a positive attitude towards the touch and a good experience. After four steps of development and validation study of the TEAQ, the final English version included 57 items, divided into six subscales: Friends and Family Touch (FFT), Current Intimate Touch (CIT), Childhood Touch (ChT), Attitude. to self-service (ASC), attitude towards intimate touch (AIT) and attitude towards unfamiliar touch (AUT). According to a consensus on cross-cultural adaptation, translation provided by a qualified translator, forward-backwards translation, and a peer review improve translation quality (Epstein et al., 2015). Accordingly, the original TEAQ was adapted to the Mongolian population following a four-step procedure: 1. Forward translation, 2. Expert panel and backward translation, 3. Pilot testing, and 4. Final version. First, the English original of the TEAQ was translated into Mongolian by experienced translators (neurobiologists and psychiatrists). Furthermore, the translators were familiar with the specifics of the original questionnaire and all the British, Russian and Mongolian cultural backgrounds, which typically results in a better understanding of the matter and an improved translation (Merenda, 2006). The Mongolian draft was reviewed and edited by an expert committee of three professional researchers in neuroscience (psychiatry, psychology, and linguistics). It was then passed on to two health care professionals for the back translation into English and Russian. Both back translators were medical doctors accustomed to health questionnaires but unfamiliar with the original TEAQ. The back-translation was then compared to the English validated TEAQ-57 and Russian validated TEAQ RUS-37. An expert committee then reviewed it to identify difficulties in the Mongolian version. After approval of the expert committee, it was handed out to a sample of the target population for evaluation (pilot testing).

2.3 Measures

To assess the convergent validity of the TEAQ, we used the WHOQOL-BREF. It gives a method to determine the quality of life with four domain scores: physical, psychological, social relationships and environments. The mean score in each domain indicates the individual perception of satisfaction with each aspect of his/her life, relating to the quality of life, where a higher score indicates a better perception of that aspect. To assess the discriminant validity, the psychological symptoms were assessed using the GAD-7 to identify cases of anxiety and PHQ-9 for assessing depression.

2.3 Statistical analysis

All statistical analyses of the data were conducted using SPSS 26.0 software. We used principal component analysis (PCA) as a factor extraction technique with Varimax rotation (Finch, 2006). After assessing the PCA component structure, CFA was performed in AMOS 21.0.0 software. Kaiser-Meyer-Olkin test of sampling adequacy over 0.5 at a significance level of the Bartlett test of Sphericity below 0.05, the number of relevant

factors via eigenvalue>1 were retained for rotation. A factor loading over 0.4 was chosen as satisfactory. The overall model fit was assessed using the chi-square test statistic. It used the following criteria for the structural equation modelling: goodness-of-fit index (CFI), the Tucker–Lewis index (TLI), and the comparative fit index (CFI) close to 0.90 or above, the root mean square error of approximation (RMSEA<0.08). Distribution assessments (Kolmogorov-Smirnov test) and subscale cross-correlation analysis were performed to evaluate the general psychometric properties of the subscales. The distributions were close enough to normality to justify the use of parametric statistics for correlations and between-group comparisons for total TEAQ scores and subscale scores. Therefore, Pearson's correlation coefficients (r) were used. Between groups, Independent t samples and one-way ANOVAs were used.

The study was conducted according to the Helsinki Declaration, and it was approved by the medical ethical committee of the Mongolian National University of Medical Sciences (METc 2021/3-06). All participants freely agreed to answer an online questionnaire and gave informed consent.

3.0 RESULTS

3.1 Demographic characteristics

A total of 204 (mean age=26.9±8.8) participants, 118 (57.8%) were women, 125 (61.3%) were residents of Ulaanbaatar city, 114 (55.9%) were religious, 124 (60.8%) held a bachelor's degree or above, 79 (38.7%) were never married, 112 (54.9%) were in single status, 132 (64.7%) without any children, and 72 (35.3%) arranging with their own family **(Table 1)**.

3.2 Psychometric properties of the Mongolian version of the TEAQ

3.2.1 Exploratory factor analysis

According to the principal component analysis using an eigenvalue higher than 1, and Varimax rotation suggested six components were extracted and explained 49.49% of the variance. The six-component structure yielded an easily interpretable factor structure. Some items were considered weak as they show factor loadings of less than 0.4. Removal of these two items (Q23R, My life lacks physical affection) and (Q4, I find it natural to greet my friends and family with a kiss on the cheek) led to a shortened 55-item version, in which the six factors explained 50.30% of the variance, Eigenvalues were ranged between 1.91 and 12.03 and, and the KMO measure was 0.836 with Bartlett's Test of Sphericity significance level (p<0.001). A six-factor model had previously been worked out in the original English validation study. Compared to the original validation study of TEAQ-57, in our study, one question from the ChT subscale (Q6. As a child, I often hugged family members) and four questions from the CIT subscale (Q17. I often hold hands with someone I know intimately), (Q45. I am often stroked on the skin), (Q46. I often hold hands with someone I love), (Q54. I often get a shoulder massage) entered with higher factor loading to the FFT subscale factor. Also, one question from subscale CIT (Q11. I often snuggle up to someone on the couch) is loaded to the AIT subscale factor. The factor loadings of the Mongolian version of the TEAQ are shown in **Table 2**. Cronbach's alpha for the complete 55 items was 0.925. Each subscale had high homogeneity above Cronbach's alpha 0.763, except AUT had a satisfactory value of Cronbach's alpha 0.688.

Table 1. Demographic characteristics of the study participants by TEAQ subscales

Characteristics		Participants	
		n	(%)
Age (years), mean ±SD		26.9±8.8	
Gender	Male	86	(42.2)
	Female	118	(57.8)
Place of residency	Ulaanbaatar city	125	(61.3)
	Rural areas	79	(38.7)
Religion	Religious	114	(55.9)
	Non	90	(44.1)
Education	Above Bachelor's degree	124	(60.8)
	Below Bachelor's degree	80	(39.2)
Marital status	Married	64	(31.4)
	Others*	61	(29.9)
	Never married	79	(38.7)
Years of marriage	< 3 years	15	(7.4)
	3-5 years	17	(8.3)
	6-10 years	22	(10.8)
	11-20 years	24	(11.8)
	>20 years	14	(6.9)
	Single	112	(54.9)
Children	No children	132	(64.7)
	1 child	23	(11.3)
	2 children	25	(12.3)
	3 children	17	(8.3)
	> 3 children	7	(3.4)
Living arrangements	With own family	72	(35.3)
	With spouse	12	(5.9)
	With parents	72	(35.3)
	With relatives	15	(7.4)
	With roommates	3	(1.5)
	Alone	30	(14.7)
	Total:	204	(100)

Table 2. Mongolian version of the TEAQ-55 items factor structure. At the bottom of the table Cronbach's alpha and total variance explained by each factor are given.

Items		FFT	AIT	CIT	ChT	ASC	AUT
48. I am on huggable terms with quite a few people		**0.787**	0.148	0.068	0.114	0.149	0.017
30. I always greet my friends and family by giving them a hug		**0.763**	0.025	0.053	0.123	0.117	-0.140
57. I often link arms with my friends and family as I walk along		**0.724**	-0.076	0.160	-0.030	0.112	0.065
51. I often put my arm around a close friend as we walk along together		**0.665**	0.167	-0.024	-0.046	0.003	-0.076
56. I like it when my friends and family greet me by giving me a hug		**0.600**	0.225	-0.058	0.054	0.154	-0.131
54. I am often given a shoulder massage		**0.592**	0.000	0.355	0.060	0.013	-0.071
45. I often have my skin stroked		**0.589**	0.255	-0.145	0.023	0.251	0.056
46. I often hold hands with someone I am fond of		**0.586**	0.173	0.163	0.029	0.286	0.001
14. I usually hug my family and friends when I am saying goodbye		**0.579**	0.098	0.070	0.160	0.139	-0.145
16. It's nice when friends and family members greet me with a kiss		**0.578**	0.065	0.044	0.228	0.005	0.192
38. I often make physical contact with my friends and family when I am with them		**0.556**	0.282	0.152	0.157	0.089	-0.077
17. I often hold hands with someone I know intimately		**0.555**	0.049	0.218	0.147	0.293	0.071
6. As a child I would often hug family members		**0.490**	0.224	0.077	0.349	-0.177	0.057
13. I like to link arms with my friends and family as I walk along		**0.459**	0.187	0.051	0.021	0.326	0.030
21. I regularly hug people I am close to		**0.400**	0.200	0.424	0.224	0.007	-0.008
47. I like to stroke the skin of someone I know intimately		0.094	**0.742**	0.188	-0.048	-0.030	-0.051
8. I find stroking the hair of a person I am fond of very pleasurable		0.123	**0.684**	-0.047	0.105	0.106	0.035
50. Snuggling up on the sofa with someone is great		0.134	**0.637**	0.257	0.020	0.236	-0.096
10. I like to fall asleep in the arms of someone I am close to		0.067	**0.622**	-0.015	0.152	0.144	-0.146
34. I enjoy the feeling of my skin against someone else's if I know them intimately		0.166	**0.621**	0.142	0.053	0.083	-0.135
20. It feels really good when someone I am fond of runs their fingers through my hair		0.258	**0.617**	-0.109	0.086	0.011	0.063
24. I enjoy having my skin stroked		0.289	**0.611**	0.109	0.058	0.225	0.230
44. Kissing is an enjoyable part of expressing romantic feeling		0.038	**0.597**	0.060	0.099	0.166	-0.164
26. I enjoy having sex		-0.062	**0.596**	0.360	0.024	-0.184	-0.173
40. I enjoy holding hands with someone I am fond of		0.035	**0.592**	0.037	0.106	0.233	-0.318
12. I enjoy the physical intimacy of sexual foreplay		-0.034	**0.551**	0.262	0.065	0.022	-0.259
11. I often snuggle up on the sofa with someone		0.224	**0.506**	0.166	0.121	0.163	-0.038
31. I enjoy being cuddled by someone I am fond of		0.450	**0.452**	-0.180	0.051	0.045	0.086
19. Kissing is a great way of expressing physical attraction		0.299	**0.444**	-0.029	0.102	0.045	0.041
27. I often have sex		-0.038	0.160	**0.804**	0.099	-0.009	-0.081
36. Most days I get a hug or a kiss		0.223	0.140	**0.749**	0.036	0.070	0.076
41. I often share a romantic kiss		0.101	0.325	**0.692**	0.002	0.048	-0.062
53 (R). I don't get many hugs these days		-0.164	-0.097	**0.577**	0.099	0.144	0.337
18. When I am upset, there is usually someone who can comfort me.		0.169	-0.013	**0.562**	0.352	-0.074	-0.207
49. I often fall asleep while holding someone I am close to		0.172	0.466	**0.487**	-0.044	0.020	-0.077
29. I can always find somebody to physically comfort me when I am upset		0.314	-0.036	**0.482**	0.369	-0.065	-0.248
25. I often take a shower or bath with someone		0.403	0.114	**0.476**	-0.112	-0.144	-0.101
15. As a child I found a hug from my parents when I was upset made me feel much happier		0.062	0.166	0.064	**0.728**	0.144	0.037
33. As a child my parents always comforted me when I was upset		0.214	-0.025	0.117	**0.712**	-0.083	-0.090
22. As a child my parents would tuck me up in bed every night and give me a hug and a kiss		0.240	0.005	0.028	**0.678**	-0.025	-0.036
35. As a child my parents would often hold my hand when I was walking along with them		0.159	0.199	0.125	**0.666**	0.130	-0.048
5. There was a lot of physical affection during my childhood		0.038	0.216	0.034	**0.643**	0.061	-0.019
9 (R). My parents were not very physically affectionate towards me during my childhood		-0.111	-0.070	-0.073	**0.607**	0.035	0.271
32. My mother regularly bathed me as a child		0.039	0.135	0.108	**0.560**	0.135	-0.286
42. As a child my mother regularly brushed my hair		0.191	0.135	0.070	**0.426**	0.451	-0.167
55. I like to use face masks on my skin		0.151	0.183	-0.005	0.084	**0.757**	-0.167
2. I like using body lotions		0.124	-0.004	0.011	0.018	**0.734**	-0.170
43. I like exfoliating my skin		0.227	0.116	0.002	0.134	**0.706**	-0.186
52. I like having a bath with lots of bubble bath		0.191	0.286	0.032	-0.007	**0.699**	-0.097
7. I like to use bath essence when having a bath		0.183	0.194	-0.063	0.037	**0.648**	-0.056
37 (R).. If someone I don't know very well puts a friendly hand on my arm it makes me feel		-0.074	-0.130	-0.034	-0.002	-0.027	**0.687**
28 (R).. I am put off by physical familiarity		0.081	-0.146	-0.096	-0.028	-0.167	**0.675**
39 (R).. It makes me feel uncomfortable if someone I don't know very well touches me in a		-0.093	-0.072	-0.012	-0.028	-0.112	**0.600**
1 (R).. I dislike people being very physically affectionate towards me		0.048	0.156	-0.132	0.001	-0.321	**0.568**
3 (R).. I have to know someone quite well to enjoy a hug from them		0.027	-0.196	0.066	-0.080	-0.096	**0.489**
Total variance explained	**0.50**	0.12	0.11	0.07	0.07	0.07	0.05
Cronbach's alpha	**0.925**	0.900	0.885	0.763	0.823	0.852	0.688

3.2.2 Confirmatory factor analysis

CFA results for the original English TEAQ-57, Russian TEAQ-37, and Mongolian TEAQ-55 are shown in **Table 3**. CFA was performed for a six-factor model, and this model demonstrated a nearly satisfactory fit. The path diagram for the CFA is provided in **Figure 1**.

3.2.3 Correlation analyses

As an additional measure of construct validity, we compared the associations of the TEAQ subscales using Pearson's correlation analyses to test the independent association with quality of life, anxiety, and depression. Physical health, Psychological state, Social relationship, and Environmental domains of WHOQOL-BREF ($p<0.01$) were positively correlated, and anxiety and depression ($p< 0.01$) were negatively correlated with the CIT subscales score. The ChT subscales score were positively correlated with 3 domains (Psychological state, Social relationship, and Environmental) of the WHOQOL-BREF ($p<0.01$), and negatively correlated with depression ($p=0.05$) were negatively correlated with the mean scores of all domains of WHOQOL-BREF. Anxiety was positively correlated with the ASC subscales score. Participants' age was positively correlated with the FFT subscales score ($p=0.05$), and CIT subscales score ($p<0.01$) **(Table 4)**.

Table 3. CFA satisfactory model fit compared to the English, and Russian version of the TEAQ.

Indices	English T EAQ-57	TEAQ-37 RUS	Mongolian TEAQ-55
Chi^2/df		3.809	2.083
RMSEA	0.069	0.071	0.073
CFI	0.805	0.817	0.692
TLI	0.796	0.803	0.677
SRMR	0.071		

Comparative analyses

The mean TEAQ CIT subscale score was lower in single participants ($p<0.001$), never married ($p<0.001$), hadn't any children ($p=0.018$) and had education below a bachelor's degree ($p=0.04$). Participants living with parents, relatives, and roommates or alone had lower CIT subscale scores than other arrangement styles ($p<0.001$). The mean ChT subscale score differed in the number of children growing up in the family ($p=0.030$) and arrangement styles of living ($p=0.013$). The mean ASC score was significantly higher for females than for the male gender ($p<0.001$), AUT score was significantly higher for men than for a female ($p=0.004$). For detail, see Table 5 with demographic characteristics.

4.0 DISCUSSION

In the present study, the psychometric properties of the TEAQ-55 MNG have been evaluated. Overall, the TEAQ-55 MNG showed to be a valid instrument to measure FFT, AIT, CIT, ChT, ASC, and AUT in the current sample. The original six-factor structure was confirmed, and internal consistency was good. Trotter et al. determined the 6-component structure of the reduced 57 items pool of the TEAQ by PCA. In our Mongolian sample using the Mongolian language version, this result was repeated. The CFA in the present study showed support for the hypothesized six-factor structure with five variables from the subscale CIT generally pointing intimate touch into a subscale FFT. Also, it sounded that some items related to personal intimate touch had cross-loaded into more than one subscale. This problem has been addressed in previous studies (Trotter et al., 2018a; Trotter et al., 2018b). The model fit according to all indices allowed to delete cross-loadings of the items above mentioned. The internal consistency is well supported by both ordinal and traditional Cronbach's alpha values for whole TEAQ-55 MNG, and all subscales. This is similar to findings from studies of the same mean age (Trotter et al., 2018a; Trotter et al., 2018b). The additional analysis results revealed a number of statistically sound differences and relationships between TEAQ-55 MNG subscales and other variables (physical, psychological, social, environmental domains of the WHOQOL-BREF depression, anxiety, demographic). Gender effect should be considered when interpreting TEAQ-55 MNG scores, specifically ASC and AUT subscale. Females from infancy are touched more than males, and men initiate touch with women much more frequently than women initiate touch with men (Major, 1981). Females had a more positive attitude toward self-care touch. Research in primates has shown that females provide support from others, either by directly exchanging care for help or by using care to strengthen social bonds (Kalueff & Tuohimaa, 2005). The AUT subscale score was higher in males, suggesting a more positive attitude to unfamiliar touch than women. Compared to men, women showed a stronger touch avoidance of the opposite sex (Andersen et al., 1987), confirming the previous result and suggesting this difference in touch avoidance depends on the context in women for communicating with strangers.

Based on previous literature (Guerrero & Andersen, 1991), married participants reported significantly more significant amounts of current intimate touch than those who had never married. Positive touch plays an important role in the healthy mental development of children at an early age (Bowlby & World Health, 1952).

As expected, positive touch in childhood was identified as a predictor of touch disturbance. TEAQ RUS-37 ChT subscale was significantly correlated with age (Trotter et al., 2018a). Unlike the result of the Russian version in our study, age was positively correlated with FFT and CIT, and there was no relation between ChT and any other subscales. The difference in CIT in education can be interpreted by age. CIT subscale score difference in the living arrangement is shown in the Russian study (Trotter et al., 2018a). Additionally, we found that ChT with a roommate is higher than with others. Married participants have higher CIT than others, identical to the result of the British study (Trotter et al., 2018b). The difference within years of marriage, children, and living arrangements in subscale CIT can be explained by the bidirectional association between parent-child interactions and couples' intimate relationship satisfaction (Khajehei, 2016).

Table 4. Correlations between TEAQ subscales and WHOQOL-BREF domains, anxiety, and depression.

TEAQ subscales	WHOQOL-BREF					GAD-7	PHQ-9
	Age	Physical	Psychological	Social	Environmental	Anxiety	Depression
CIT	.224**	.215**	.403**	.370**	.260**	-.209**	-.373**
ChT	-.040	.131	.188**	.218**	.210**	-.082	-.150*
ASC	.029	-.116	-.059	-.089	-.058	.154*	.132

** Correlation is significant at the 0.01 level, * Correlation is significant at the 0.05 level (2-tailed)

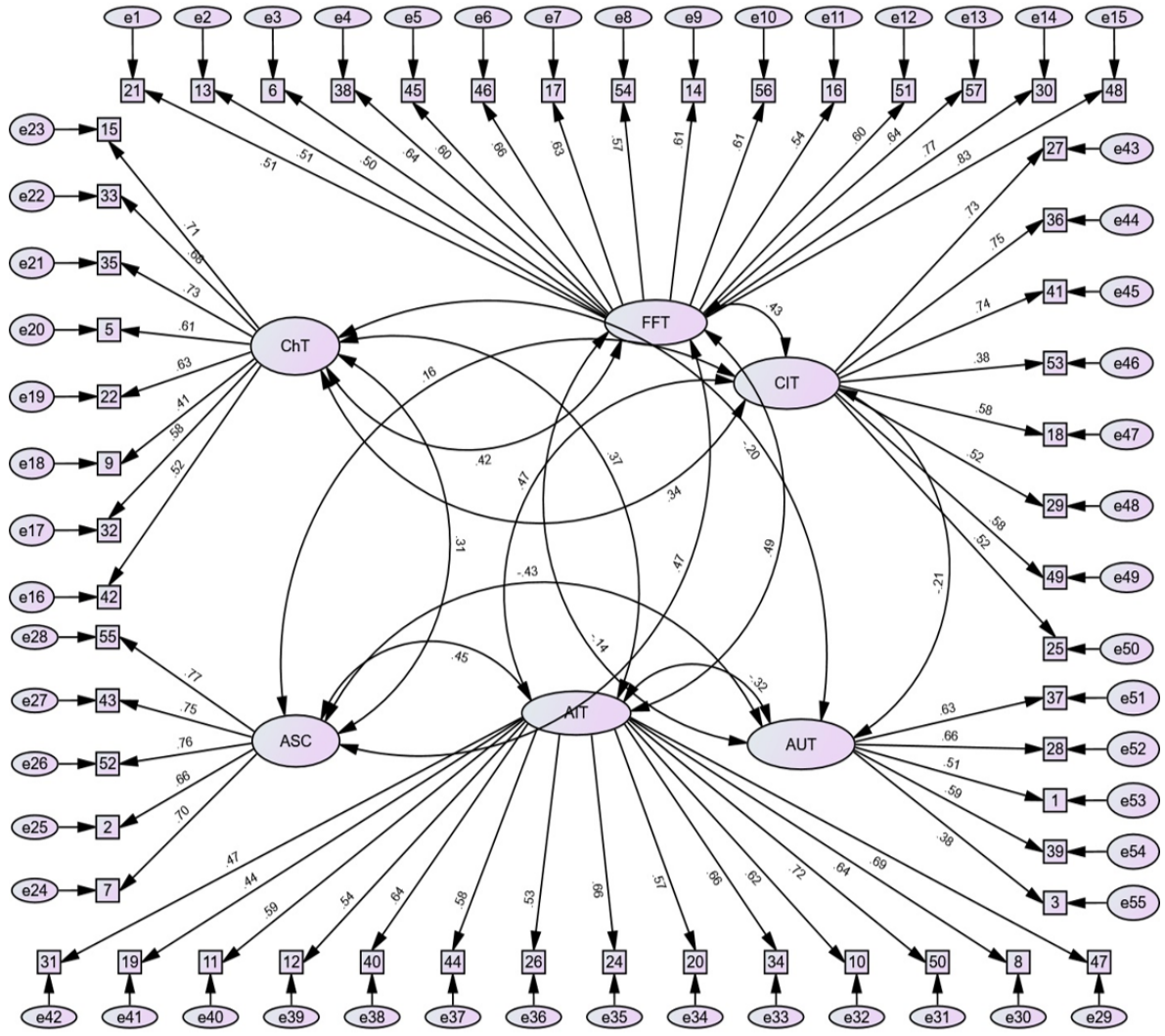

Figure 1. CFA path diagram for Model 2 of the TEAQ-55 MNG. Rectangles indicate measured variables and large ellipse represent subscales. Covariances of errors between items with similar content are shown.

The stroking touch activates C-tactile afferents, implicated in the encoding of affective rather than discriminatory touch (McGlone et al., 2014). The positive touch in childhood is negatively associated with childhood emotional neglect and a predictor of positive emotion of interpersonal touch in childhood. As in previous studies, it has been revealed that the current intimate and childhood positive touch protects from depression (Cochrane, 1990). Massage therapy as positive touch has a therapeutic effect on reducing depression and anxiety (Field et al., 1996; 2004). Severe mental health issues may influence the neglect of individuals' physical appearance and hygiene, reflecting self-care neglect (Corrigan, 2000; Häfner et al., 2003). Consistent with the previous study, social anxiety is accompanied by heightened aversion toward social situations that involve touch. Still, this enhanced aversion and negative-emotion report are not reflected in differential physiological responses (Wilhelm et al., 2001). CIT had negative correlations with the anxiety and depression scale, and positive correlations with QoL domains. A previous study revealed significant correlations between intimate touch, the quality of life, and psychological distress (Khaleque, 2004). ChT correlated with quality of life and mental distress. People with anxious attachment exhibited more severe social anxiety and avoidance, greater depression, and lower life satisfaction than one's who had secure (Eng et al., 2001). In contrast, the ASC subscale positively correlated with the anxiety scale. The experiment with a lab-animal model highlights the association between stress-evoked states or grooming research in rats (Kalueff & Tuohimaa, 2005).

Table 5. Subscale difference by demographic characteristics

Characteristics			CIT		ChT		ASC		AUT	
			Mean	± SD	Mean	± SD	Mean	± SD	Mean	± SD
		P value	0.224		0.937		**<0.001**		**0.004**	
Gender	Male		23.3	±7.4	25.8	±7.3	14.5	±5.5	13.0	±4.3
	Female		24.6	±7.0	25.9	±7.3	19.8	±4.7	11.1	±4.7
		P value	**0.040**		0.221		0.441		0.473	
Education	Above Bachelor's degree		24.9	±6.9	25.4	±6.6	17.8	±5.8	11.8	±4.7
	Below Bachelor's degree		22.8	±7.4	26.7	±8.2	17.2	±5.6	12.2	±4.5
		P value	**<0.001**		0.418		0.166		0.266	
Marital status	Married		27.1	±5.7	24.9	±6.3	18.1	±4.9	11.9	±4.2
	Others*		26.1	±7.9	26.3	±7.5	18.1	±5.9	11.3	±5.0
	Never married		19.9	±5.5	26.3	±7.8	16.6	±6.1	12.5	±4.7
		P value	**0.001**		0.801		0.187		0.765	
Years of marriage	< 3 years		29.2	±6.9	29.2	±6.9	27.4	±7.1	18.9	±5.1
	3-5 years		26.6	±7.1	26.6	±7.1	23.9	±7.1	17.9	±6.1
	6-10 years		27.6	±6.1	27.6	±6.1	25.6	±7.8	18.1	±6.1
	11-20 years		25.5	±6.6	25.5	±6.6	25.2	±6.4	19.5	±4.2
	>20 years		26.9	±6.8	26.9	±6.8	25.7	±5.6	15.1	±4.4
	Single		21.6	±6.6	21.6	±6.6	26.2	±7.6	17.1	±6.0
		P value	**<0.001**		**0.030**		0.669		0.664	
Children	No children		22.4	±7.3	26.6	±7.6	17.2	±6.1	11.8	±4.9
	1 child		27.1	±6.9	23.6	±6.4	17.6	±5.6	12.7	±5.0
	2 children		27.9	±5.3	27.3	±6.4	17.9	±4.2	12.0	±3.4
	3 children		26.1	±6.0	23.5	±4.8	18.8	±4.7	12.8	±4.1
	> 3 children		25.7	±5.1	20.1	±7.7	19.6	±4.5	10.1	±3.5
		P value	**<0.001**		**0.013**		0.794		0.529	
Living arrangements	With own family		27.5	±6.1	24.4	±6.4	18.2	±4.9	11.9	±4.2
	With spouse		26.6	±6.6	27.2	±6.1	17.5	±7.2	12.3	±5.4
	With parents		22.5	±7.4	27.5	±7.6	17.0	±6.0	11.3	±4.7
	With relatives		18.6	±6.6	21.9	±6.9	16.3	±6.4	13.5	±4.5
	With roommates		25.0	±3.6	32.7	±8.4	19.0	±3.6	10.7	±5.5
	Alone		21.1	±5.8	26.4	±7.7	17.6	±6.2	12.8	±5.0

P values tested using One-way ANOVA, whereas Independent t sample's test for dichotomous variables. SD (standard deviation)

The strength of this study was that it firstly checked the reliability and factor structure of TEAQ. However, the relatively small sample size for TEAQ 57 items pool and other measures is a limitation. Therefore, further studies should be conducted to confirm the factor structure of the TEAQ in different populational characteristics. Also, there was a limitation to choosing convergent and discriminant validity measures due to the lack of validated instruments in Mongolia. Thus, we used the adapted WHO opensource measures WHOQOL-BREF, GAD7, and PHQ9 to identify the relationship between touch and a person's quality of life, and psychological problems through validity.

5.0 CONCLUSIONS

This study aimed to evaluate the homogeneity and factor structure of the Mongolian version TEAQ-55 MNG. The validated TEAQ in English with 57 items, cultural fit, and factor analysis has been reduced to a 55-item questionnaire and a clear six-factor structure. The factors are: Friends and Family Touch (FFT), Current Intimate Touch (CIT), Childhood Touch (ChT), Attitude to Self-Care (ASC), Attitude to Intimate Touch (AIT), and Attitude to Unfamiliar Touch (AUT). High Cronbach's alpha for the whole scale, sufficient Cronbach's alpha for all the subscales (with relatively low reliability for AUT-subscale) suggested that the questionnaire can be considered a sufficiently reliable measurement tool. The reliability of the 6-factor structure of the TEAQ-55 MNG was confirmed using CFA with a satisfactory model fit on a separate sample. Overall, the results of the psychometric analysis of Mongolian TEAQ-55 show that the questionnaire can be used in research practice. Further research is needed to obtain more precise estimates for the influence of social and subcultural backgrounds on touch-related attitudes and behaviour.

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