

Psychometric Propensities of the Traditional Chinese Version of Gay Community Stress Scale-Cognition Subscale

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Abstract

Objectives: In this study, we intended to examine the psychometric propensities of the traditional Chinese version of the Gay Community Stress Scale-Cognition subscale (GCSS-C) for measuring gay community stress experienced by gay and bisexual men (GBM) in Taiwan. **Methods:** Totally 736 GBM participated in this study and completed the traditional Chinese version of the GCSS-C, the Measure of Internalized Sexual Stigma for Lesbians and Gay Men (MISS-LG), the State-Trait Anxiety Inventory-State Scale (STAI-S), and the Center for Epidemiological Studies Depression Scale (CES-D). **Results:** In exploratory factor analysis, we found that a five-factor structure (i.e., Sex, Status, Competition, Exclusion, and Externals) for the 32-item traditional Chinese version of the GCSS-C among Taiwanese GBM had significantly positive correlations in validity with MISS-LG ($p < 0.001$), STAI-S ($p < 0.001$), and CES-D ($p < 0.001$). **Conclusion:** The traditional Chinese version of GCSS-C has been found to have satisfactory psychometric properties in this study.

Key words: Bisexuals, gays, stress, traditional Chinese version of the Gay Community Stress Scale-C
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Introduction

Sexual minority stress theory has been used to illustrate mental health problems among gay and bisexual men (GBM) as the results of enacted, obscure, and internalized sexual stigma (i.e., enacted sexual stigma, sexual orientation microaggression, and internalized sexual stigma) originating from heterosexualism [1-4]. But GBM experience not only the stress due to sexual stigma but also the stress from the gay community [5]. According to the intraminority gay community stress theory [5], GBM experience competitive pressures arising from the processes of social and sexual interactions with the members of the gay community. Intraminority gay community stress comes from the rigid standards and expectations of status such as masculinity and attractiveness, so-called “mainstream gay community phenomena and values” upheld by the members of the gay community [5]. The intraminority gay community stress theory expands the

understanding of the sources of mental health problems in GBM [5].

To measure GBM’s levels of intraminority gay community stress, Pachankis et al. [5] developed the Gay Community Stress Scale (GCSS). The original GCSS contains 29 items developed based on the results of qualitative interviews with GBM in the United States of America (USA); in the first part of the GCSS, the respondents indicate how much they agree that the statement of each item describing “mainstream gay community phenomena and values” is true (the cognitive aspect, GCSS-C); in the second part of the GCSS, the respondents indicated how stressed they feel by that potential aspect of the mainstream gay community (the stress aspect, GCSS-S) [5]. The results of exploratory and confirmatory

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factor analyses show that the GCSS-S contains 20 items that consist of four factors describing stress resulting from experiencing the mainstream gay community's focus on sex, status, social competition, and exclusion of diversity [5]. The GCSS-S has also been confirmed to have satisfactory internal consistency, 1-year temporal stability, and congruent validity with significant associations with mental health problems [5].

Although the GCSS-S is a reliable instrument for measuring GBM's minority gay community stress, the psychometric propensities of the GCSS-C have not been examined. Specifically, the initial items of the GCSS-C are derived from a sample of GBM living in the US [5]. Whether GBM living in other regions and cultures (e.g., Eastern countries like Taiwan in the present study) have similar attitudes toward the values commonly praised by the mainstream gay community warrants examination, is unknown. According to the World Values Survey Wave 7 [6], conducted between 2017 and 2021, 34.5% of the survey respondents in Taiwan disagree or disagree strongly with the statement "Homosexual couples are as good parents as other couples;" the ratio was lower than those in China (59.8%) and South Korea (40%) but higher than those in Hong Kong (18.2%), Japan (10%), and the US (16.6%). Moreover, 41.6% of the survey respondents in Taiwan mentioned "homosexuals" as the group of people that they do not like to have as neighbors; the ratio was lower than those in China (70.8%) and South Korea (79.6%) but higher than those in Hong Kong (23.9%), Japan (26.4%), and the US (12.7%). Furthermore, Taiwanese society is highly collectivistic. GBM in a collectivistic society possibly have different attitudes toward what "mainstream gay community phenomena and values." Whether the mainstream gay community phenomena and values in Taiwan are similar to those shown in the GCSS-C developed in the US warrants examination.

In the present study, we intended to make a cultural translation of the GCSS-C describing the mainstream gay community phenomena and values and examine its psychometric propensities among GBM in Taiwan. Given the sociocultural background differences between Taiwanese and United States societies, we hypothesized that differences in the items and factor structure would exist between the traditional Chinese version of the GCSS-C used for GBM in Taiwan and the original GCSS-C used for GBM in the USA.

Methods

Participants and procedure

The inclusion criteria and the method of recruitment of participants have been described elsewhere [7]. In brief, this study recruited Taiwanese men who were aged 20 years or older and had an identification of sexual orientation as gay or bisexual. We posted an advertisement on several social media (i.e., Facebook, Twitter, and LINE, the PPT Bulletin Board System) between the periods of August 2021 and May 2022. The research assistants evaluated the participants in the on-site study room to determine whether they had impaired intellect or showed signs of alcohol and substance use that might interfere with their understanding of the study's purpose or completing

the questionnaire. In total, 736 GBM participated in the study. No participant was excluded. The study was approved by the institutional review board of Kaohsiung Medical University Hospital (KMUHIRB-F(I)-20210003 and date of approval = January 8, 2021), requiring to obtain informed consents from all participants before the assessment.

Measures

Traditional Chinese Version of the GCSS-C

This study included the viewpoints of GBM living in Taiwan into the GCSS-C by the processes described below. First, we conducted three focus group interviews before beginning the formal research to collect the experiences of mainstream gay community phenomena and values among 24 GBM living in the sociocultural background of Taiwan. The principal investigator led the group discussion on what mainstream gay community phenomena and values the participants had observed or experienced in Taiwan. We reviewed the coding results and compared them with the contents of the 29 items on the GCSS-C. The results indicated that the coding of mainstream gay community phenomena and values collected in the focus groups contained all 29 items on the GCSS-C or similar concepts. In contrast, some concepts of mainstream gay community phenomena and values collected in the focus groups did not appear in the 29 items on the GCSS-C. The principal investigator and two researchers discussed and formed six new items of mainstream gay community phenomena and values in Taiwan in addition to the 29 items of the original GCSS-C, including "The mainstream gay community views men who conceal sexual orientation from their family as losers;" "The mainstream gay community ignored their elders' expectations for marrying and giving birth to babies;" "The mainstream gay community views men with a physical disability as less desirable;" "The mainstream gay community views men with chronic psychiatric illnesses as less desirable;" "The mainstream gay community views Taiwanese indigenous men as less desirable;" and "The mainstream gay community views men who live in nonurban regions as less desirable." Thus, we used the 35-item traditional Chinese version of the GCSS-C for the exploratory factor analysis. The participants indicated how much they agreed with the item using a five-point Likert scale from 1 (strongly disagree) to 5 (strongly agree).

Measure of Internalized Sexual Stigma for Lesbians and Gay Men

With the use of 17 items rated using a 5-point Likert scale (score 1 = strongly disagree; score 5 = strongly agree), the Measure of Internalized Sexual Stigma for Lesbians and Gay Men (MISS-LG) assessed internalized sexual stigma through three perspectives of Sexuality, Identity, and Social discomfort. After summing up the 17 MISS-LG item scores, a higher total score in the MISS-LG represents a higher level of internalized sexual stigma for individuals [8]. The MISS-LG has been translated into the Taiwan version, and the Taiwan version of MISS-LG has a promising psychometric property [9].

State-Trait Anxiety Inventory-State Scale

With the use of 20 items rated using a four-point Likert scale (score 1 = almost never; score 4 = almost always), the State-Trait Anxiety Inventory-State Scale (STAI-S) assessed anxiety. After summing up the 20 STAI-S item scores, a higher total score in the STAI-S represents a higher level of anxiety for individuals [10]. The STAI-S has been translated into the Taiwan version, and the Taiwan version of STAI-S has a promising psychometric property [11].

Center for Epidemiological Studies Depression Scale

With the use of 20 items rated using a 4-point Likert scale (score 0 = rarely or none of the time; score 3 = most or all of the time), the Center for Epidemiological Studies Depression Scale (CES-D) assessed depression. After summing up the 20 CES-D item scores, a higher total score in the CES-D represents a higher level of depression for individuals [12]. The CES-D has been translated into Taiwan version, and the Taiwan version of CES-D has a promising psychometric property [13].

Statistical analysis

Descriptive statistics were used to summarize the participants' characteristics and the score distributions of the traditional Chinese version of the GCSS-C items (i.e., mean, standard deviation [SD], frequency, percentage, mean, SD, skewness, and kurtosis). The score distributions were further checked if they violated normal distribution severely using the skewness and kurtosis: absolute values <3 in skewness and those <10 in kurtosis suggest no severe deviations [14].

Afterward, parallel analysis with 100 Monte Carlo simulation samples was used to determine the number of extracted factors for the traditional Chinese version of the GCSS-C. In the parallel analysis, when a factor has an eigenvalue derived from the present dataset higher than the 95% upper limit confidence interval (CI) of the eigenvalue calculated from the 100 Monte Carlo simulation samples, the number is considered to be needed. In contrast, if the eigenvalue derived from the present dataset is lower than the 95% upper limit CI of the eigenvalue calculated from the 100 Monte Carlo simulation samples, this factor is considered to be unnecessary [15]. After deciding the number of factors, exploratory factor analysis (EFA) was used to explore which items in the traditional Chinese version of the GCSS-C should be clustered into the same factor with an extraction method of principal axis factoring. The Oblimin method was applied for the EFA rotation. Moreover, if an item has factor loading < 0.3 , it is suggested to be removed from the traditional Chinese version of the GCSS-C [16]. The procedures of parallel analysis and EFA were done for the traditional Chinese version and the original version of the GCSS-C to provide a clear comparison regarding how the two versions were interpreted by the Taiwanese GBM.

Internal consistency of the factors summarized by the EFA findings was calculated and a value > 0.7 indicating acceptable [17]. Pearson correlation coefficients were utilized to examine the concurrent validity of the traditional Chinese

version of the GCSS-C with the external measures of the MISS-LG, STAI-S, and CES-D.

We used International Business Machines Statistical Package for Social Science software version 20.0 for Windows (IBM SPSS Corp., Armonk, New York, USA) for all the statistical analyses. The differences between groups were considered significant if p -values were smaller than 0.05.

Results

As shown in Table 1, the present sample ($n = 736$) had a mean age of 31.03 ± 6.59 years (range = 20 to 67 years) with majority of them possessed a college or above degree ($n = 520$; 70.7%). In addition, over four-fifths of the participants ($n = 611$; 83.0%) were homosexual. The score distributions of the traditional Chinese version of the GCSS-C items are presented in Table 1 with relatively normal distributions (skewness = -1.59 to 0.82 ; kurtosis = -1.10 to 2.94). Moreover, the mean scores of the traditional Chinese version of the GCSS-C items ranged between 1.94 and 4.37.

Results from the parallel analysis supported a five-factor solution for the traditional Chinese version of the GCSS-C structure (Table 2). More specifically, the fifth factor had an eigenvalue from the present real dataset (i.e., 1.41) larger than the 95% CI upper limit from the 100 Monte Carlo simulation samples (i.e., 1.31), whereas the sixth factor had its eigenvalue from the present real dataset (i.e., 1.06) smaller than both the mean and the 95% CI upper limit from the 100 Monte Carlo simulation samples (i.e., 1.25 and 1.28, respectively).

As a result, the EFA was constrained to obtain a five-factor solution: Sex factor with items 1 to 6 (factor loadings = 0.575 to 0.824); Status factor with items 7 to 10 and 17 (factor loadings = 0.361 to 0.886); Competition factor with items 11 to 16 (factor loadings = 0.514 to 0.786); Exclusion factor with items 18 to 20, 30, and 32 to 35 (factor loadings = 0.304 to 0.760); and Externals factor with items 21 to 24, 26, 28, and 29 (factor loadings = 0.325 to 0.689). Three items (i.e., 25, 28, and 31) were deleted due to low factor loadings (i.e., < 0.3) (Table 3).

Regarding the original version of the CGSS-C, a three-factor structure was proposed by the parallel analysis results (Table 4). The third factor had an eigenvalue from the present real dataset (i.e., 1.44) larger than the 95% CI upper limit from the 100 Monte Carlo simulation samples (i.e., 1.24), whereas the fourth factor had its eigenvalue from the present real dataset (i.e., 1.10) smaller than both the mean and the 95% CI upper limit from the 100 Monte Carlo simulation samples (i.e., 1.17 and 1.20, respectively). Using a three-factor structure for the EFA, a similar item-factor structure to the traditional Chinese version of the CGSS-C was found: items 1 to 6 embedded in Sex factor (factor loadings = 0.527 to 0.881); items 7 to 10 and 17 embedded in Status factor (factor loadings = 0.369 to 0.898); and items 11 to 16 embedded in Competition factor (factor loadings = 0.362 to 0.878). But items 18 to 20 were not found to have a specific factor; instead, items 18 and 20 were integrated into the Competition factor while item 29 did not have a strong factor loading for inclusion in the CGSS-C (Table 5).

Table 1. Item properties of the traditional Chinese version of the Gay Community Stress Scale-Cognition subscale ($n = 736$)

Item	Score 1, n (%)	Score 2, n (%)	Score 3, n (%)	Score 4, n (%)	Score 5, n (%)	Mean $\pm$ SD	Skewness	Kurtosis
1	30 (4.1)	82 (11.1)	146 (19.8)	356 (48.4)	122 (16.1)	3.62 $\pm$ 1.02	-0.76	0.13
2	59 (8.0)	101 (13.7)	160 (21.7)	316 (42.9)	100 (13.6)	3.40 $\pm$ 1.13	-0.61	-0.41
3	25 (3.4)	52 (7.1)	151 (20.5)	316 (42.9)	192 (26.1)	3.81 $\pm$ 1.01	-0.83	0.38
4	89 (12.1)	123 (16.7)	134 (18.2)	230 (31.3)	160 (21.7)	3.34 $\pm$ 1.31	-0.39	-1.01
5	57 (7.7)	107 (14.5)	183 (24.9)	243 (33.0)	146 (19.8)	3.43 $\pm$ 1.18	-0.43	-0.67
6	54 (7.3)	107 (14.5)	209 (28.4)	229 (31.1)	137 (18.6)	3.39 $\pm$ 1.16	-0.37	-0.64
7	86 (11.7)	171 (23.2)	231 (31.4)	176 (23.9)	72 (9.8)	2.97 $\pm$ 1.15	-0.01	-0.79
8	71 (9.6)	140 (19.0)	187 (25.4)	214 (29.1)	124 (16.8)	3.24 $\pm$ 1.22	-0.24	-0.90
9	94 (12.8)	156 (21.2)	209 (28.4)	185 (25.1)	92 (12.5)	3.03 $\pm$ 1.22	-0.07	-0.92
10	32 (4.3)	53 (7.2)	129 (17.5)	326 (44.3)	196 (26.6)	3.82 $\pm$ 1.04	-0.93	0.50
11	82 (11.1)	139 (18.9)	270 (36.7)	180 (24.5)	65 (8.8)	3.01 $\pm$ 1.11	-0.12	-0.60
12	47 (6.4)	82 (11.1)	188 (25.5)	275 (37.4)	144 (19.6)	3.53 $\pm$ 1.12	-0.57	-0.31
13	72 (9.8)	101 (13.7)	226 (30.7)	240 (32.6)	97 (13.2)	3.26 $\pm$ 1.15	-0.38	-0.57
14	46 (6.3)	81 (11.0)	198 (26.9)	234 (31.8)	177 (24.0)	3.56 $\pm$ 1.15	-0.52	-0.47
15	109 (14.8)	145 (19.7)	243 (33.0)	185 (25.1)	54 (7.3)	2.90 $\pm$ 1.15	-0.11	-0.80
16	43 (5.8)	76 (10.3)	160 (21.7)	333 (45.2)	124 (16.8)	3.57 $\pm$ 1.07	-0.74	0.03
17	52 (7.1)	130 (17.7)	210 (28.5)	247 (33.6)	97 (13.2)	3.28 $\pm$ 1.12	-0.31	-0.65
18	107 (14.5)	153 (20.8)	158 (21.5)	209 (28.4)	109 (14.8)	3.08 $\pm$ 1.29	-0.15	-1.10
19	162 (22.0)	161 (21.9)	197 (26.8)	149 (20.2)	67 (9.1)	2.73 $\pm$ 1.26	0.14	-1.03
20	39 (5.3)	89 (12.1)	210 (28.5)	250 (34.0)	148 (20.1)	3.51 $\pm$ 1.10	-0.45	-0.43
21	10 (1.4)	20 (2.7)	53 (7.2)	275 (37.4)	378 (51.4)	4.35 $\pm$ 0.84	-1.57	2.93
22	13 (1.8)	19 (2.6)	100 (13.6)	300 (40.8)	304 (41.3)	4.17 $\pm$ 0.89	-1.18	1.63
23	11 (1.5)	32 (4.3)	149 (20.2)	279 (37.9)	265 (36.0)	4.03 $\pm$ 0.93	-0.82	0.36
24	25 (3.4)	66 (9.0)	151 (20.5)	273 (37.1)	221 (30.0)	3.81 $\pm$ 1.07	-0.75	-0.06
25	128 (17.4)	155 (21.1)	178 (24.2)	188 (25.5)	87 (11.8)	2.93 $\pm$ 1.28	-0.04	-1.09
26	33 (4.5)	47 (6.4)	127 (17.3)	268 (36.4)	261 (35.5)	3.92 $\pm$ 1.09	-0.98	0.41
27	64 (8.7)	104 (14.1)	222 (30.2)	248 (33.7)	98 (13.3)	3.29 $\pm$ 1.13	-0.39	-0.54
28	10 (1.4)	18 (2.4)	57 (7.7)	259 (35.2)	392 (53.3)	4.37 $\pm$ 0.84	-1.59	2.94
29	26 (3.5)	30 (4.1)	85 (11.5)	271 (36.8)	324 (44.0)	4.14 $\pm$ 1.01	-1.34	1.57
30	325 (44.2)	183 (24.9)	173 (23.5)	39 (5.3)	16 (2.2)	1.96 $\pm$ 1.04	0.82	-0.09
31	89 (12.1)	204 (27.7)	209 (28.4)	171 (23.2)	63 (8.6)	2.88 $\pm$ 1.15	0.09	-0.84
32	106 (14.4)	154 (20.9)	221 (30.0)	192 (26.1)	63 (8.6)	2.93 $\pm$ 1.18	-0.09	-0.87
33	103 (14.0)	154 (20.9)	239 (32.5)	178 (24.2)	62 (8.4)	2.92 $\pm$ 1.16	-0.06	-0.80
34	301 (40.9)	230 (31.3)	161 (21.9)	38 (5.2)	6 (0.8)	1.94 $\pm$ 0.95	0.72	-0.24
35	214 (29.1)	192 (26.1)	159 (21.6)	120 (16.3)	51 (6.9)	2.46 $\pm$ 1.26	0.43	-0.91

SD, standard deviation

Table 2. Parallel analysis results of the traditional Chinese version of the Gay Community Stress Scale-Cognition subscale ($n = 736$)

Factor number	Eigen value		
	Present real dataset	Mean [§]	95% upper limit [†]
1	11.37	1.43	1.49
2	2.28	1.39	1.42
3	1.84	1.34	1.38
4	1.73	1.31	1.33
5	1.41	1.28	1.31
6	1.06	1.25	1.28

[§]Mean eigenvalue from 100 Monte Carol simulation samples,[†]95% upper limit CI from 100 Monte Carol simulation samples

CI, confidence interval

The entire traditional Chinese version of the GCSS-C and its five factors all had satisfactory internal consistency

($\alpha = 0.799$ to 0.933). Moreover, the traditional Chinese version of the GCSS-C had significant correlations with the MISS-LG ($r = 0.14$ to 0.28 ; $p < 0.001$), STAI-S ($r = 0.15$ to 0.22 , $p < 0.001$), and CES-D ($r = 0.20$ to 0.28 , $p < 0.001$) (Table 6).

Discussion

The results of EFA (Tables 1-3) in this study indicated that the factor structure of the traditional Chinese Version of GCSS-C included five factors: Sex, Status, Competition, Exclusion, and External. Most of the items in the Sex, Status, and Competition factors of the traditional Chinese Version of GCSS-C had the same items as the original GCSS-C [5]. The items in the Sex factor encompassed perceptions of the gay community's hypersexuality and risky sex, even at the expense of romantic relationships [5]. The Status factor contained the items regarding the gay community's thinking highly of wealth and prestige [5]. The Competition factor

Table 3. Factor loadings derived from exploratory factor analysis for the traditional Chinese version of the Gay Community Stress Scale-Cognition subscale

Item number	Factor loading				
	Sex	Status	Competition	Exclusion	Externals
1	0.655	-	-	-	-
2	0.585	-	-	-	-
3	0.824	-	-	-	-
4	0.575	-	-	-	-
5	0.754	-	-	-	-
6	0.579	-	-	-	-
7	-	0.619	-	-	-
8	-	0.886	-	-	-
9	-	0.837	-	-	-
10	-	0.361	-	-	-
11	-	-	0.605	-	-
12	-	-	0.786	-	-
13	-	-	0.775	-	-
14	-	-	0.637	-	-
15	-	-	0.514	-	-
16	-	-	0.562	-	-
17	-	0.407	0.363	-	-
18	-	-	0.303	0.332	-
19	-	-	-	0.304	-
20	-	-	-	0.337	-
21	-	-	-	-	0.689
22	-	-	-	-	0.575
23	-	-	-	-	0.549
24	-	-	-	0.327	0.358
25	-	-	-	-	-
26	-	-	-	-	0.325
27	-	-	-	-	-
28	-	-	-	-	0.576
29	-	-	-	-	0.513
30	-	-	-	0.379	-
31	-	-	-	-	-
32	-	-	-	0.752	-
33	-	-	-	0.760	-
34	-	-	-	0.576	-
35	-	-	-	0.472	-

Factor loadings < 0.3 were not reported; items 30–35 were Taiwan cultural items developed by the present authors and were not in the original GCSS

GCSS, Gay Community Stress Scale

Table 4. Parallel analysis results of the original version of the Gay Community Stress Scale-Cognition subscale ($n = 736$)

Factor number	Eigenvalue		
	Present real dataset	Mean [§]	95% upper limit [†]
1	7.98	1.30	1.35
2	1.77	1.25	1.29
3	1.44	1.21	1.24
4	1.10	1.17	1.20

[§]Mean eigenvalue from 100 Monte Carol simulation samples, [†]95% upper limit CI from 100 Monte Carol simulation samples
CI, confidence interval

Table 5. Factor loadings derived from exploratory factor analysis for the original version of the Gay Community Stress Scale-Cognition subscale

Item number	Factor loading		
	Sex	Status	Competition
1	0.684	-	-
2	0.635	-	-
3	0.881	-	-
4	0.527	-	-
5	0.771	-	-
6	0.575	-	-
7	-	0.663	-
8	-	0.898	-
9	-	0.842	-
10	-	0.369	-
11	-	-	0.657
12	-	-	0.878
13	-	-	0.876
14	-	-	0.723
15	-	-	0.545
16	-	-	0.648
17	-	0.411	0.408
18	-	-	0.362
19	-	-	-
20	-	-	0.305

Factor loadings < 0.3 were not reported

contained the items describing fighting, gossip, and judgment within the gay community [5]. The results indicated that the gay community stressors contained in the Sex, Status, and Competition factors might commonly exist in both the Taiwan and the US gay communities and bother GBM across various sociocultural backgrounds. The EFA results of the present study classified item 17 into the Status factor of the traditional Chinese version but not in the Competition factor of the 20-item version. Item 17 described “The mainstream gay community is overly materialistic.” Given that GBM, who focus on materialism, may expect wealth and prestige to meet their material needs, it is reasonable to classify item 17 in the Status factor of the traditional Chinese version of CGSS-C.

The Exclusion factor of the traditional Chinese version of CGSS-C contained three items from the original CGSS-C (i.e., racism, sexual racism, and HIV infection) and five new items from this study’s focus group interviews (i.e., sexual orientation concealment from families, physical disability, psychiatric illnesses, indigenous identity, and nonurban residence). Most of the items in the Exclusion factor relate to public stigma to some groups with various conditions, statuses, and attributes that have been traditionally classified as an inferior status, negative regard, and relative powerlessness [18]. For example, GBM with severe mental illness experience dual stigma from the public toward both their sexual orientation and mental illness and definitely results in great stress in daily lives [19].

Table 6. Concurrent validity and internal consistency of the traditional Chinese version of the Gay Community Stress Scale-Cognition subscale

External measure	GCSS-CS					
	Sex ($\alpha = 0.845$)	Status ($\alpha = 0.840$)	Competition ($\alpha = 0.884$)	Exclusion ($\alpha = 0.799$)	Externals ($\alpha = 0.812$)	Total scale ($\alpha = 0.933$)
GCSS-C						
Sex	-					
Status	0.61	-				
Competition	0.59	0.65	-			
Exclusion	0.48	0.58	0.53	-		
Externals	0.54	0.55	0.55	0.48	-	
Total score	0.78	0.84	0.83	0.79	0.76	-
MISS-LG	0.28	0.18	0.15	0.20	0.14	0.24
STAI	0.16	0.21	0.17	0.17	0.15	0.22
CES-D	0.21	0.25	0.26	0.21	0.20	0.28

All $p < 0.001$ for the Pearson correlation coefficients.

MISS-LG, Measure of Internalized Sexual Stigma for Lesbians and Gay Men; STAI, State-Trait Anxiety Inventory; CES-D, Center for Epidemiological Studies Depression Scale; GCSS-C, Gay Community Stress Scale-Cognition subscale

Using the present data, the traditional Chinese version of the GCSS-C and the original version of the GCSS-C were compared for their factor structures (Tables 4 and 5). The factor structures were similar in the three factors: Sex, Status, and Competition. The differences in the two-factor structures were as follows: (i) a fewer factor number for the original GCSS-C as compared with the factor number for the Chinese version of the GCSS-C and (ii) items 18 and 20 were embedded in the Exclusion factor for the traditional Chinese version of the GCSS-C but in the Competition factor for the original GCSS-C. The fewer factor number found in the original GCSS-C could be explained by the fewer items (i.e., 20 items in the original GCSS-C vs. 32 items in the traditional Chinese version of the GCSS-C). Moreover, the traditional Chinese version of the GCSS-C considers the Taiwanese culture, which is a potential source to increase the number of factors. Regarding items 18 and 20, they were integrated into the Competition factor for original GCSS-C but embedded in another factor for the traditional Chinese version of the GCSS-C. This indicates that both items may have some cross-loading features across Competition and Exclusion. When there are no other strong items on Exclusion, the two items would group with the items assessing Competition.

The items in the Externals factor contained GBM perceived community stress based on physically fit bodies, penis size, masculinity, age, social media, fitting into a specific category, and sexual position [5]. Most of the items on the Externals factor are related to sex and relational partner preference in GBM [20, 21], indicating that partner preference in the mainstream gay community may contribute to intraminority stress in GBM.

The present study found that the traditional Chinese version of the GCSS-C had significant correlations with the MISS-LG, STAI-S, and CES-D (all $p < 0.001$), but r values ranged only between 0.14 and 0.28 (Table 6). The present study examined the cognitive but not stress aspect of the

GCSS; therefore, participants of this study might agree with the descriptions of the items on the GCSS-C as the intraminority community stress that GBM encounter but did not feel distressful. Moreover, intraminority community stress may contribute only a portion of the stress experienced by GBM. Alternatively, the MISS-LG assesses the internalized stigma derived from the endorsement of attitudes from the mainstream society (not only the gay community) to the identity of gay and bisexuality, and STAI-S and CES-D assess anxiety and depression. Therefore, the associations of GCSS-C with MISS-LG, STAI-S, and CES-D might not be high.

Study limitations

The readers are warned not to overinterpret the study findings because our study has several limitations:

- We recruited participants through an online advertisement. Sampling bias may have occurred. Whether the results of this study can be generalized to GBM who are not approached by the online advertisement warrants further study
- Inherent social desirability biases in the questionnaires should be considered
- We did not test and retest the reliability and responsiveness of the traditional Chinese version of GCSS-C
- This study asked participants to identify their gender as binary male or female; transgender, gender nonbinary, or genderqueer options were not offered.

Summary

This study supported the psychometric properties of the 32-item traditional Chinese version of the GCSS-C in a sample of GBM in Taiwan. The study also indicated that the traditional Chinese version of the GCSS-C shared several factors with the original GCSS-C but also revealed differences in the overall factor structure between the traditional Chinese GCSS-C and the original GCSS-C.

Data Availability Statement

The data are available upon reasonable request to the corresponding authors.

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Conflicts of Interest

C. F. Yen is a domestic advisory board member of the *Taiwanese Journal of Psychiatry* (Taipei). He did not participate in peer review of this manuscript or made any decision in accepting this manuscript to publish. All authors declare no conflict of interest.

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