

- 1 **The Factor Structure and Measurement Invariance of the Coping Inventory for**
- 2 **Stressful Situations in a Sexual Minority Population**
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1 **The Factor Structure and Measurement Invariance of the Coping Inventory for**
2 **Stressful Situations in a Sexual Minority Population**

3 **Abstract**

4 Coping strategies have been studied as protective factors against stress for individuals.
5 However, the psychometric properties of the most widely used coping self-report
6 questionnaires, the Coping Inventory for Stressful Situations (CISS-21), have not been
7 examined in a sexual minority population (men and women that identify as lesbian, gay, or
8 bisexual or LGB). In this study, we conducted exploratory factor analysis (EFA) and
9 confirmatory factor analysis (CFA) simultaneously to assess the factor structure of the
10 CISS-21 questionnaire in LGBs. Also, we tested the measurement invariance of CISS across
11 sex and sexual identity in the LGB sample ($N = 2850$, 52.00% woman, mean age = 32.46
12 years). The results show that a four-factor structure consisting of task-oriented coping (TOC),
13 emotion-oriented coping (EOC), distraction-oriented coping (DOC), and social
14 diversion-oriented coping (SOC) explained the data best. The results also show acceptable
15 internal consistency reliability, convergent validity, and discriminant validity. Subsequently,
16 multi-group analyses established measurement invariance across sex and sexual identity.
17 These results indicate that the CISS-21 could be used as a simple, reliable, and valid scale for
18 measuring coping strategies in LGBs, and that it allows valid score comparisons from
19 different sex and sexual identity groups.

20 **Keywords:** LGBs, coping inventory for stressful situations, factor structure, measurement
21 invariance

22

1 **Introduction**

2 Although attitudes in society towards lesbian, gay, and bisexual individuals (LGBs) have
3 improved to a great extent in many countries across the world (Rosenthal & Starks, 2015),
4 LGBs are still confronted with minority stressors, such as stigma, prejudice, and
5 discrimination (Meyer, 2003). Minority stressors are defined as stress which individuals from
6 stigmatized social categories are exposed to because of their social—often
7 minority—position (Meyer, 2003). These stressors can have detrimental effects on individual
8 mental health (see review, e.g., Pitoňák, 2017) and romantic relationships’ outcomes
9 (Gonçalves et al., 2019; Rosenthal & Starks, 2015). Studies whose findings affirm that
10 effective coping has a positive effect on sexual minority stress (e.g., Craig & Austin, 2016;
11 Song et al., 2020; Ouch & Moradi, 2019) have encouraged the development of coping
12 interventions that aim to increase LGB individuals’ abilities to engage in healthier, adaptive
13 coping behaviors. There are few studies, however, in which the factor structure of
14 multidimensional coping has been evaluated in a sexual minority sample. This study seeks to
15 address this gap by testing the psychometric properties and factor structure of a Dutch version
16 of the Coping Inventory for Stressful Situations (CISS, 21 items) in a sexual minority
17 population.

18 ***Coping Strategies and the Coping Inventory for Stressful Situations***

19 Coping is a process by which an individual responds to stimuli appraised as taxing and
20 as exceeding his/her resources (Lazarus & Folkman, 1984). The process includes cognitive,
21 behavioral, and emotional attempts to manage the demands imposed by a stressor and refers
22 to thoughts and actions that people employ to deal with stress (Lazarus, 1993, 1998; Lazarus

1 & Folkman, 1984). Among the most robust dimensions identified in research on coping
2 strategies are (1) task-oriented coping (TOC), which refers to strategies intended to actively
3 solve an underlying problem, cognitively reconceptualize it, and potentially minimize its
4 adverse effects, that is, to find a solution; (2) emotion-oriented coping (EOC), referring
5 strategies that involve an individual's efforts to restructure cognitions to modify the
6 emotional response, which can include emotional regulation without attempting to change the
7 situation but instead to change how the situation is attended to or to alter the subjective
8 appraisal of the situation, for example, by changing feelings or self-blame; (3)
9 avoidance-oriented coping (AOC), referring to strategies of engagement in distracting
10 activities in response to problems, like buying something for oneself (Endler & Parker, 1999;
11 Skinner et al., 2003). Coping abilities and strategies may vary depending on gender,
12 personality traits, social context, and the nature of the stressor involved (Carr & Umberson,
13 2013). In Lazarus and Folkman's model, coping is defined as an interaction between the
14 individual and the environment (Lazarus & Folkman,1984). It refers to a dynamic process
15 that depends on environmental changes and how the situation is perceived (Ruiz &
16 Hernández, 2014).

17 To help individuals improve their coping skills, we must first identify their preferred
18 coping strategies. The Coping Inventory for Stressful Situations (CISS) consists of three
19 subscales (TOC, EOC, and AOC) and has proven itself to be a psychometrically valid and
20 reliable self-reporting instrument for assessing coping skills (Choi et al., 2017; Endler &
21 Parker, 1994). This scale originally comprised 48 items but was later shortened to a more
22 participant-friendly and easier-to-administer version with 21 items (Endler & Parker, 1994,

1 1999). CISS's contribution to the comprehensive understanding of coping strategies for
2 psychological outcomes is unique. Moreover, studies have shown that it has good reliability
3 and validity, and has performed well as a measurement of coping strategies in various
4 independent studies (Choi et al., 2017; Han et al., 2009; Pisanti et al., 2015).

5 However, the findings regarding the structure of the CISS are mixed. Several studies on
6 the factor structure of CISS measures that were conducted on various samples confirmed the
7 hypothesized three-factor structure (Boysan, 2012; Brands et al., 2014; Choi et al., 2017). For
8 example, McWilliams and colleagues (2003) were able to replicate the three-factor structure
9 of the CISS scale in a large sample of outpatients with major depressive disorders. Likewise,
10 Boysan (2012) replicated the original three-factor structure of the CISS in a Turkish college
11 sample. More recently, Choi et al. and colleagues (2017) used the Korean version of the CISS in
12 an adult non-clinical sample and found the three-factor solution through using exploratory
13 factor analysis. However, some scholars suggested potential improvements to the AOC,
14 which contains two subscales—'distraction' (i.e., engaging in a substitute task) and 'social
15 diversion'(i.e., strategies that involve avoiding a stressful situation by seeking out others)
16 (Endler et al., 1993; Skinner et al., 2003). For instance, Van Horn and Wilpert (2017)
17 indicated that in a Dutch outpatient sex offender sample, a four-factor structure of the CISS,
18 fit the data better than other factor solutions. Similarly, Han and colleagues (2009) found
19 support for an English adaptation of the four-factor structure of CISS in a sample of US
20 college students and Manshadi and colleagues (2020) found support for a Persian version in a
21 sample of Iranian children with earthquake experience.

22 Although CISS has displayed good psychometric properties in a variety of different

1 populations, we need to be cautious when generalizing it to other samples (Brands et al., 2014;
2 Choi et al., 2017). For LGBs, there is no reference value on the psychometric properties and
3 factor structure of the CISS. Thus, we seek to validate the CISS to capture multiple aspects of
4 coping strategies among LGBs.

5 ***Measurement Invariance Across Sex and Sexual Identity***

6 Prior research indicated sex differences in how one copes with stress in heterosexual
7 populations. In general, compared to women, men more often try to control or deny their
8 emotions, focus on positive aspects of the situation, and use problem-focused coping
9 strategies (Matud, 2004; Rose & Rudolph, 2006). In contrast, women are more inclined than
10 men to seek social support, try to resolve a conflict with the person concerned, and openly
11 express their emotions (Byrne, 2000). Several studies found that women use EOC more
12 frequently than men, and that men adopt more TOC than women (Matud, 2004; Howerton &
13 Van Gundy, 2009; Simpson et al., 2020). However, other scholars have found mixed results.
14 For instance, Monteiro and colleagues (2014) reported that women use TOC more than men
15 and there were no significant sex differences in other coping strategies; Martin and colleagues
16 (2013) found sex differences in SOC only; Li and colleagues (2019) as well as Xiao and
17 colleagues (2018) indicated that no significant sex differences were found on any coping
18 strategies. Meanwhile, one study found that gay and bisexual men use TOC more frequently
19 and AOC as well as EOC less frequently compared with lesbian and bisexual women
20 (D'haese et al., 2016).

21 Although we cannot be certain whether these mixed findings are due to psychometric
22 differences in item responses, it is still essential to test multiple-group invariance to ensure

1 that the group differences are due to the coping strategies construct rather than to
2 measurement error (Chen, 2007; Whisman et al., 2013). To our knowledge, relatively few
3 studies have evaluated the measurement invariance of the CISS across groups. We found only
4 two studies that examined the cross-group invariance of the CISS-21 across sex (see
5 Rafnsson et al., 2006; Kakabaraei et al., 2012). To overcome this shortcoming, the present
6 study utilizes an LGBs sample, employing multi-group comparisons to test the measurement
7 invariance of the CISS-21 across sex and sexual identity.

8 In summary, in this study we investigate the psychometric properties of CISS-21 to
9 develop a more valid and reliable measure of coping strategies in a sexual minority
10 population. The aim of this study is to (a) examine the factor structure of the CISS, (b) study
11 internal consistency, (c) test the convergent and discriminant validity, and (d) examine the
12 multigroup measurement invariance of the CISS-21 across sex and sexual identity. Our
13 findings could help improve the understanding of how sexual minorities cope with minority
14 stress and may better inform prevention and intervention efforts to aid sexual minorities in
15 dealing with minority stressors in their lives.

16 **Methods**

17 *Participants*

18 This study's sample was based on a sample from a larger study on the potential impact
19 of (minority) stress on romantic relationships. Data were collected via an online survey
20 between 2017 and 2018 (see Symons et al., 2019). Participants were recruited from LGB
21 nightclubs, parties, and events, and through advertisements in the written press, and
22 LGB-specific and non-LGB-specific associations and organizations. Previous research has

1 shown that this method produces relatively large sample sizes in a limited amount of time
2 while optimizing the quality and validity of these nonrandom samples (Dewaele, 2014a,
3 2014b). All participants were recruited in Flanders (Dutch-speaking part of Belgium).

4 Participants were asked how they would label themselves in terms of their sexual
5 identity: ‘heterosexual,’ ‘more heterosexual than gay or lesbian,’ ‘bisexual,’ ‘more gay or
6 lesbian than heterosexual,’ ‘gay or lesbian,’ or ‘something else’ (Buysse et al., 2013;
7 Morrison et al., 2019). It is worth noting that participants who indicated that they identify as
8 ‘more heterosexual than gay or lesbian’ or who indicated ‘something else’ were asked
9 whether they were able to complete questions that concern LGBs. Participants who identified
10 as heterosexual were excluded, given the focus of our study. Finally, a total of 2850
11 participants were included in this study who labeled themselves in terms of their sexual
12 identity as ‘more heterosexual than gay or lesbian’ (13.4%; $n = 381$), ‘bisexual’ (15.8%; $n =$
13 450), ‘more gay or lesbian than heterosexual’ (10.4%; $n = 295$), ‘gay or lesbian’ (51.9%; $n =$
14 1478), or ‘something else’ (8.6%; $n = 246$). Participants are LGB-identified people between
15 the ages of 18 and 80 years, with a mean age of 32.46 years ($SD = 11.48$ years). We assessed
16 sex according to how a participant was registered on their birth certificate (i.e., male or
17 female). Forty-eight percent of participants were assigned as male ($n = 1367$) at birth, 52% as
18 female ($n = 1483$).

19 ***Measures***

20 *Individual Coping*

21 The Coping Inventory for Stressful Situations (CISS-21) was developed by Endler and
22 Parker (1994) to evaluate how a person generally deals with stressful or unpleasant situations

1 (e.g., “Think about how I have solved similar problems in the past” and “Blame myself for
2 reacting too emotionally to the situation”). The scale consists of 21 items and measures three
3 types of coping: TOC, AOC, and EOC. Respondents indicate their agreement using a
4 five-point scale ranging from 1 (*this does not fit me at all*) to 7 (*this completely fits me*). The
5 Cronbach’s alphas in this study were 0.86 for EOC, 0.78 for TOC, and 0.71 for AOC. The full
6 scale for successful coping had an acceptable internal Cronbach’s alpha of .76.

7 *Internalized Homonegativity*

8 The Internalized Homonegativity Inventory (Mayfield, 2001) is a scale of nine items
9 that assesses the degree to which gay individuals feel discomfort with their sexual orientation.
10 We adapted the scale to relieve its male bias by broadening the questions to refer to
11 homosexuality and bisexuality (e.g., “It bothers me when people can see that I am
12 homosexuality and bisexuality” and “When people around me talk about homosexuality and
13 bisexuality, I get nervous”). Respondents indicate their agreement on nine items using a scale
14 ranging from 1 (*completely agree*) to 5 (*completely disagree*). The scores of negatively
15 phrased items were reversed so that a higher score refers to more internalized homonegativity.
16 Then a sum score was generated for use in the analyses. The Cronbach’s alpha in the current
17 study was .75.

18 *Stigma Consciousness*

19 The Stigma Consciousness Questionnaire (Pinel, 1999) consists of ten items that assess
20 the degree to which one expects to be judged on the basis of a stereotype (i.e., “When I talk to
21 heterosexuals, I feel that they interpret all my behaviors in terms of my sexual orientation”
22 and “Most heterosexuals do not condemn LGB people on the basis of their sexual

1 preference”). Respondents indicate their agreement using a seven-point Likert-type scale
2 ranging from 1 (*completely agree*) to 7 (*completely disagree*). The score on some items was
3 reversed and a sum score for stigma consciousness was generated so that a higher score refers
4 to more stigma consciousness. In the current study, the Cronbach’s alpha was .77.

5 *Everyday Discrimination*

6 The Experiences of Everyday Discrimination Questionnaire as developed by Williams
7 and colleagues (1997) was applied. Participants indicated for eleven items how often they
8 experienced incidents such as being treated in a less friendly manner than other people or
9 being insulted. Respondents indicate their agreement using a seven-point Likert-type scale
10 ranging from 1 (*rarely*) to 7 (*daily*). The raw item scores were added up into a sum score and
11 higher scores on this scale indicate more experiences of discrimination. The Cronbach’s alpha
12 in the current study was .91.

13 *Confidant Support*

14 Confidant support was assessed with the Confidant Support Scale, which consists of 4
15 items (e.g., “Is there someone you could talk to if you were excited, worried, nervous or
16 depressed?”) (Berghe et al., 2010). Each item is rated on a five-point scale (score 1 =
17 *certainly not*, score 5 = *certainly*). All items were added up so that a higher score refers to
18 high levels of confidant support. In the current study, the Cronbach’s alpha was .95.

19 *Statistical Analysis*

20 Data analyses were performed using SPSS 23.0 (IBM, 2015) and Mplus 7.4 (Muthén &
21 Muthén, 2015). There were no missing data in the CISS-21 scales. To analyze the
22 cross-validation of factorial construct validity, the sample was randomly split into halves:

1 sample A ($n = 1425$) for exploratory factor analysis (EFA) and sample B ($n = 1425$) for
2 confirmatory factor analysis (CFA). We performed four consecutive statistical analysis steps.

3 First, before performing EFA, we evaluated the suitability of data for factor analysis
4 using the Kaiser-Meyer-Okin (KMO) measure (Kaiser, 1974) and Bartlett's test (Bartlett,
5 1954). The EFA is deemed as suitable with a KMO greater than 0.50 and significance of
6 Bartlett's test ($p < 0.05$). The Geomin oblique rotation was used to generate factor structure.
7 A visual inspection of the scree plot and the eigenvalue (> 1) were considered together to
8 decide the number of factors. The item with loading greater than 0.50 was retained (Hair et al.,
9 2014).

10 Then, for CFA, the following model fit criteria were regarded as a good fit: χ^2/df smaller
11 than 5, RMSEA and SRMR smaller than .08, and CFI and TLI greater than .90 (Marsh et al.,
12 2014). To aid model comparison, Akaike's information criterion (AIC) and Bayesian
13 information criterion (BIC) are also presented, with smaller values indicating a more
14 parsimonious model.

15 Furthermore, we examined reliability by analyzing the internal consistency (Cronbach's
16 alpha) of the adapted scale and its subscales. Also, we calculated the Pearson's correlation
17 coefficients between CISS and the confidant support scale as well as the minority-related
18 stress questionnaire to test convergent validity and discriminant validity. Support is similar in
19 nature to coping, is implicated in its development, and is relevant to coping's proposed role in
20 managing stress and symptoms of mental health problems. Coping refers to dealing with
21 stressful or unpleasant situations, while minority stress refers to different stressors (i.e.,
22 sexual orientation-related situations). Pearson's correlation between the four coping strategies

1 and confidant support will be stronger than the associations between the four coping
2 strategies and minority stressors. Both analyses were performed for the whole sample.

3 Finally, we assessed the equivalence of the CISS-21 across sex (i.e., male or female) and
4 sexual identity (i.e., 'more heterosexual than gay or lesbian', 'bisexual', 'more gay or lesbian
5 than heterosexual', 'gay or lesbian', or 'something else') by testing three models with an
6 increase in invariance stringency. The first, the configural invariance model, or baseline
7 model, allows all parameters to be freely estimated and indicates whether there is the same
8 pattern of factor loadings between groups. If the configural invariance model is not supported,
9 then the test of more restrictive models (metric and scalar models) would be aborted. The
10 metric or weak factorial model refers to the equivalence of loadings across groups. If a scale
11 fails to display metric invariance, then it is likely the scale is measuring a different construct
12 in each group. The scalar or strong invariance factorial model requires the equivalence of
13 loadings and items thresholds across groups. If the scale does not display scalar invariance,
14 then the observed scores are different across groups for identical factor scores (Chen, 2007,
15 Van de Schoot et al., 2012). According to the guidelines of Cheung and Rensvold (2002) and
16 Chen (2007), we considered measurement invariance to be indicated by $\Delta CFI < .010$,
17 $\Delta RMSEA < .015$, and $\Delta SRMR < 0.03$.

18 **Results**

19 *Exploratory Factor Analysis*

20 The KMO measure of sample adequacy (0.842) and Bartlett's test of Sphericity (χ^2
21 (210) = 9662.349, $p < .001$) indicated that the sample was suitable for an EFA. A four-factor
22 solution was suggested by parallel analysis and inspection of the scree plot, and these factors

1 should be retained to explain 54.277% of the total variance. Next, the factor-loading value of
 2 item 1 was found to be 0.126 (< 0.50), so we decided to exclude this item. The percentage of
 3 variance explained by the factor structure was improved by 56.886% with factor-loading
 4 values ranging from 0.587 (item 13) to 0.884 (item 18) (Table 1). Factor 1 (accounting for
 5 19.630% of the variance) comprised 7 items (3, 5, 10, 12, 14, 17, 20) and was identical to the
 6 original version. Therefore it was labeled emotion-oriented coping (EOC). Factor 2
 7 (accounting for 15.278% of the variance) comprised 7 items (2, 6, 8, 11, 13, 16, 19) and was
 8 identical to the original version. Therefore it was labeled task-oriented coping (TOC). Factor
 9 3 (accounting for 11.471% of the variance) comprised 3 items (4, 9, 18) that in the original
 10 version belonged to avoidance-oriented coping. We labeled this factor distraction-oriented
 11 coping (DOC). Factor 4 (accounting for 10.508% of the variance) comprised 3 items (7, 15,
 12 21) that in the original version also belonged to avoidance-oriented coping. We labeled this
 13 factor social diversion-oriented coping (SOC). The name and factor structure are consistent
 14 with previous studies (Pisanti et al., 2015; Van Horn & Wilpert, 2017).

15 **Table 1. Factor-loadings of the CISS based on EFA in sample A ($n = 1425$)**

CISS-21 item	EOC	TOC	DOC	SOC
3 Blame myself for the situation	.740			
5 Worry about being unable to cope	.738			
10 Blame myself for being too emotional	.731			
12 Become very upset	.723			
14 Blame myself for not knowing what to do	.791			
17 Wish I could change things	.683			
20 Focus on my general shortcomings	.709			
2 Focus on the problem		.673		
6 Consider how I have solved similar problems		.610		
8 Determine course of action		.602		
11 Work to understand the situation		.657		
13 Immediately order matters		.587		
16 Think about and learn from mistakes		.674		

19 Analyze the problem		.685		
4 Treat myself to something			.882	
9 Buy something for myself			.808	
18 Go out for a meal			.884	
7 Visit a friend				.870
15 Spend time with a special person				.684
21 Call a friend				.854
<i>M ±SD</i>	21.82±6.4	25.59±4.3	9.28±3.41	10.17±2.9
	0	0		5
eigenvalues	4.531	2.876	2.364	1.606
% explained variance	19.630%	15.278%	11.471%	10.508%

1 *Note.* CISS-21 = 21 item coping inventory for stressful situations; EOC = emotion-oriented coping; TOC =
2 task-oriented coping; DOC = distraction-oriented coping; SOC = social diversion-oriented coping.

3 ***Confirmatory Factor Analysis***

4 Table 2 illustrates the fit indices of four competing models tested with CFA in subsample
5 B. Model 1 (item 1 included) and Model 2 (item 1 excluded) both refer to the original
6 three-factor model. Model 3 (item 1 included) and Model 4 (item 1 excluded) refer to the
7 extracted four-factor model. The only model that has a good fit is Model 4, which was
8 derived from the EFA conducted in sample A. Model 4 provided an optimum fit to the data
9 compared with the other three models. For Model 3, the χ^2/df has an unacceptable model fit,
10 whereas Model 1 and Model 2 have an overall poor fit. In addition, the lower indices (AIC,
11 BIC) for Model 4 indicate that it is preferable to the other models. Model 4 was thus used for
12 correlation and measurement invariance analyses.

13 **Table 2. Comparison of goodness-of-fit indices and models in sample B (*n* = 1425)**

Model	χ^2/df	RMSEA	CFI	TLI	SRMR	AIC	BIC
Model 1	11.775	.087	.797	.770	.080	85672.096	86019.383
Model 2	12.608	.090	.802	.775	.081	81121.520	81453.022
Model 3	5.052	.053	.925	.914	.052	84412.628	84775.701
Model 4	4.719	.051	.938	.928	.049	79793.151	80145.700

14 *Note.* RMSEA=root mean square error of approximation; CFI=comparative fit index; TLI=Tucker–Lewis
15 index; SRMR = standard root-mean-square residual; AIC=Akaike’s information criterion; BIC= Bayesian
16 information criterion.

1 **Reliability and Validity Analysis**

2 The internal consistency coefficients of the CISS and its four subscales were .790 (total
 3 scale), .864 (EOC subscale), .803 (TOC subscale), .833 (DOC subscale), and .783 (SCO
 4 subscale). To evaluate the convergent and discriminant validity of the CISS, we computed
 5 Pearson’s correlation between CISS and minority stress as well as confidant support scores.
 6 There were significant correlations between the overall scale of CISS and its four subscales
 7 (all $p < .01$). Besides the DOC subscale and stigma consciousness, as well as the DOC
 8 subscale and everyday discrimination, the overall scale of CISS and its four subscales were
 9 significantly correlated with the three types of minority-specific stress and confidant support
 10 (all $p < .01$). In general, the correlations are stronger for coping and confidant support than
 11 for coping and minority stress.

12 **Table 3. Descriptive statistics and Pearson’s correlation among study variables ($n = 2850$)**

Model	1	2	3	4	5	6	7	8	9
1 CISS	1								
2 EOC	.604**	1							
3 TOC	.397**	-.244**	1						
4 DOC	.540**	.078**	.037*	1					
5 SOC	.479**	-.072**	.185**	.254**	1				
6 Internalized Homonegativity	-.020	.177**	-.112**	-.090**	-.168**	1			
7 Stigma Consciousness	-.046*	.175**	-.068**	-.006	-.128**	.253**	1		
8 Everyday Discrimination	-.030	.118**	-.066**	-.001	-.064**	.077**	.381**	1	
9 Confidant Support	.142**	-.124**	.146**	.075**	.380**	-.225**	-.156**	-.203**	1
<i>M</i>	67.37	22.54	25.21	9.50	10.13	19.04	33.52	14.29	18.06
<i>SD</i>	8.97	6.45	4.44	3.40	3.08	5.31	9.12	5.84	3.26

13 *Note.* *M* = mean. *SD* = standard deviations. CISS = coping inventory for stressful situations; EOC =
 14 emotion-oriented coping; TOC = task-oriented coping; DOC = distraction-oriented coping; SOC = doical
 15 diversion-oriented coping. * $p < 0.05$, ** $p < 0.01$.

16 **Measurement Invariance across Sex and Sexual Identity**

17 After identifying the best fitting CISS model, we conducted a measurement invariance
 18 analysis to determine whether the CISS was best described by a four-factor structure across

1 sex and sexual identity. With regard to the gender groups, the results (see Table 4) revealed
 2 that three models of invariance testing resulted in significant χ^2 ($p < .01$), acceptable (MSEAs
 3 $< .08$, CFIs $> .90$, SRMRs $< .08$), and equivalent fit indices (Δ CFIs $< .01$, Δ RMSEAs $< .01$
 4 and Δ SRMR $< .03$). All results indicated that the CISS-21 assesses coping strategies
 5 equivalently across sex.

6 Concerning the sexual identity groups, the results (see Table 4) showed that three
 7 models of invariance testing resulted in significant χ^2 ($p < .01$), acceptable (RMSEAs $< .08$,
 8 CFIs $> .90$, SRMRs $< .08$), and equivalent fit indices (Δ CFIs $< .01$, Δ RMSEAs $< .01$ and
 9 Δ SRMR $< .03$). All results indicated that the CISS-21 assesses coping strategies equivalently
 10 across sexual identity.

11 **Table 4. Fit indices and model comparisons for tested models**

Model	χ^2/df	RMSEA	CFI	SRMR	Δ RMSEA	Δ CFI	Δ SRMR
Sex invariance							
M1	1423.247**(328)	.048	.934	.049	—	—	—
M2	1359.443**(342)	.046	.939	.051	.002	.005	.002
M3	1589.000**(358)	.053	.926	.053	.005	.008	.002
Sexual identity invariance							
M1	1990.446**(820)	.050	.932	.055	—	—	—
M2	2068.242**(884)	.048	.931	.057	.002	.001	.002
M3	2222.444**(948)	.049	.926	.058	.001	.006	.003

12 *Note.* M1 = configural invariance model or baseline model, M2 = metric or weak factorial model, M3 =
 13 scalar or strong invariance factorial model. RMSEA = root mean square error of approximation; CFI =
 14 comparative fit index; TLI = Tucker–Lewis index; SRMR = standard root-mean-square residual. * $p < .05$,
 15 ** $p < .01$.

16 **Discussion**

17 The primary purpose of this study was to test the factor structure of the CISS using EFA
 18 and CFA in a Flemish convenience sample targeted at LGBs. The results from EFA and CFA
 19 supported a structure consisting of 20 items falling into four components, which is different
 20 from the structure of the original version of the measure but still in line with previous results

1 from an Italian study with a sample of hospital-based nurses (Pisanti et al., 2015). The
2 wording of item 1 (Taking a break for a while to distance yourself from the situation) in our
3 results is more abstract than that of most other CISS items. In addition, it has a relatively low
4 factor loading; therefore, removing this item improved the fit indices. A factor model that
5 subdivides AOC into DOC and SOC subscales was also reported in a study on US college
6 students and Dutch patients with acquired brain injury. (Han et al., 2009; Brands et al., 2014).
7 These results suggest that CISS-21 may be applied in different regions or countries as well as
8 in samples.

9 Furthermore, we tested the convergent validity and discriminant validity. Generally, the
10 results showed that the correlation coefficients for the overall scale and its four subscales and
11 confidant support were significantly higher than the overall scale and its four subscales and
12 minority stressors. These results follow the expected convergent-discriminant validity pattern.
13 One limitation of the present findings, however, is that the power of these associations is
14 small. This may be because CISS is a tool typically used to evaluate strategies for confronting
15 stressful or unpleasant situations rather than for coping specifically sexual minority stressors,
16 and on the CISS, these strategies have a high correlation with mental health outcomes (i.e.,
17 depression and anxiety, see Brands et al., 2014; Choi et al., 2017). We need additional studies
18 that include mental health measures to help us understand the validity of CISS. Future studies
19 should also seek to examine the role of variables that could buffer the effect of minority stress
20 on mental health outcomes, as this may contribute to improving intervention methods.

21 The current study also examined measurement invariance across sex and sexual identity.
22 The multiple CFA results showed that the configural equivalence, weak equivalence, and

1 strong equivalence of CISS were supported. That is, for group comparisons by sex and sexual
2 identity, the same construct of coping strategies appears to be measured and in the same
3 metric, which is consistent with prior research about the measurement invariance of CISS on
4 sex (Kakabaraei et al., 2012; Rafnsson et al., 2006). Hence, if any sex and sexual identity
5 difference in the factor score is found, it is likely to reflect possible sex and sexual identity
6 differences in the amount of coping strategies rather than item bias or measurement artifact.

7 Some limitations of the current study should be noted. First, the scale's predictive
8 validity could not be confirmed because of the cross-sectional nature of this study. Second,
9 our study used multiple channels (such as bars, clubs, etc.) to recruit participants, potentially
10 leading to response bias. Third, the scale used in the present study relied primarily on
11 self-reported measures. Additional future research should include additional measures, such
12 as interviews and physiological indicators, to provide support for the construct validity of the
13 CISS-21. Finally, this study examined sex differences between only male and female groups
14 on coping strategies and did not consider other gender identities (e.g., transgender,
15 non-binary). Future studies should examine whether there are coping differences according to
16 sexual orientation as well as gender identity.

17 Despite these limitations, CISS appears to be a useful instrument for assessing emotion
18 regulation strategies for LGBs. Our findings increase our knowledge of the psychometric
19 properties of CISS, which may encourage others to continue the empirical investigation of the
20 role of coping strategies in explaining mental health outcomes in LGBs. Future researchers
21 and clinicians should also continue to examine the multidimensional nature of the CISS for
22 LGBs in addition to seeking effective coping strategies that could help decrease the adverse

1 effects of minority stress, such as the risks of developing depressive moods, on LGBs.

2 **Disclosure Statement**

3 No potential conflict of interest was reported by the authors.

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