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## Examination of the Hierarchical Structure of the Brief COPE in a French Sample: Empirical and Theoretical Convergences

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# Examination of the Hierarchical Structure of the Brief COPE in a French Sample: Empirical and Theoretical Convergences

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This study aimed to determine whether the various factors of coping as measured by the Brief COPE could be integrated into a more parsimonious hierarchical structure. To identify a higher structure for the Brief COPE, several measurement models based on prior theoretical and hierarchical conceptions of coping were tested. First, confirmatory factor analysis (CFA) results revealed that the Brief COPE's 14 original factors could be represented more parsimoniously with 5 higher order dimensions: problem-solving, support-seeking, avoidance, cognitive restructuring, and distraction ( $N = 2,187$ ). Measurement invariance across gender was also shown. Second, results provided strong support for the cross-validation and the concurrent validity of the hierarchical structure of the Brief COPE ( $N = 584$ ). Results indicated statistically significant correlations between Brief COPE factors and trait anxiety and perceived stress. Limitations and theoretical and methodological implications of these results are discussed.

Coping research is fundamental to further our understanding of how stress affects people, whether negatively or positively (Skinner, Edge, Altman, & Sherwood, 2003). Coping has been defined as the behavioral and cognitive efforts of an individual to manage the internal and external demands encountered during a specific stressful situation (Lazarus & Folkman, 1984). This definition, which highlights the multidimensional nature of coping, also implies that coping strategies should be aggregated into meaningful dimensions. Several scholars have proposed a hierarchical organization of the construct in which coping actions are merged into coping strategies, which in turn are categorized into higher order dimensions of coping (e.g., Beehr & McGrath, 1996; Skinner et al., 2003). Although compelling by nature, this hierarchical measurement model of coping has received little empirical attention (Skinner et al., 2003). Hence, the goal of this two-part study was to unify empirical and theoretical perspectives by investigating the Brief COPE (Carver, 1997), an existing and widely used measure. The first part was designed to identify a higher structure for the Brief COPE, to determine if the various coping factors could be integrated into a more parsimonious hierarchical structure. The second part was designed to examine the external validity of the Brief COPE's hierarchical structure. To that end, we used the French version of the Brief COPE, in a dispositional format (Muller & Spitz, 2003). In this way, the Brief COPE assesses relatively stable dispositional coping tendencies (i.e., coping styles) that people usually use to deal with stressful situations that they encounter. As outlined by Carver, Scheier, and Weintraub (1989): "When assessing a dispositional coping style, the items are framed

in terms of what the person usually does when under stress" (p. 270).

The Brief COPE (Carver, 1997; Muller & Spitz, 2003) was derived from the Coping Orientation to Problems Experienced inventory (COPE; Carver et al., 1989). The COPE is a 60-item instrument with 4 items per scale. However, failure to complete the whole measure, observed participant frustration, and other questionnaire administration issues led to the development of a less extensive version, the Brief COPE (Carver, 1997), which is now increasingly used in research. The Brief COPE (Carver, 1997; Muller & Spitz, 2003) is a short, multidimensional inventory including 14 two-item scales that measure 14 conceptually differentiable coping reactions. These strategies, which include adaptive as well as potentially problematic responses, are acceptance, active coping, positive reframing, planning, using instrumental support, using emotional support, behavioral disengagement, self-distraction, self-blame, humor, denial, religion, venting, and substance use (Carver, 1997; Muller & Spitz, 2003; Skinner et al., 2003). As outlined by Carver (1997), "The Brief COPE thus provides researchers a way to assess potentially important coping response quickly" (p. 98). With the exception of two scales, the instrument possesses good reliability (e.g., Carver, 1997; Muller & Spitz, 2003).

The factorial structure of the Brief COPE is supposed to be oblique (i.e., its scales are intercorrelated); thus, following Skinner et al. (2003)'s recommendation, the 14 original scales could be aggregated into a few higher order dimensions explaining an important part of the variance of the lower order scales. We addressed this issue by testing several measurement models based on prior theoretical and hierarchical conceptions of coping (e.g., Duhachek & Oakley, 2007). Among the most frequently reported coping typologies in the coping literature—based each on a particular conceptualization of coping (Parker & Endler, 1992; Somerfield & McCrae, 2000; Skinner et al., 2003)—four were retained: (a) the classic problem-focused/emotion-focused typology (Lazarus & Folkman, 1984; Model 1), (b) the approach

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and avoidance coping framework (Krohne, 1993; Roth & Cohen, 1986; Model 2), (c) the three-dimension conceptual system reflecting problem, emotion, and avoidance (Carver et al., 1989; Endler & Parker, 1994; Model 3), and (d) Ayers, Sandler, West, and Roosa's (1996) alternative conceptual system including five dimensions: problem-solving, support-seeking, distraction, avoidance, and cognitive restructuring (Model 4). Although Duhachek and Oakley (2007) tested several measurement models based on theoretical and hierarchical conceptions of coping, the aforementioned theoretical models have not been empirically investigated with the Brief COPE. Therefore, the hierarchical structure and the external validity of the Brief COPE have to be examined and tested.

### STUDY 1

This study aimed to examine whether the various factors of coping as measured by the Brief COPE, in a dispositional format, could be integrated into a hierarchical structure. By examining the relative fit of theoretical and hierarchical measurement models of the Brief COPE, we expected to determine which hierarchical and parsimonious structure of coping would best represent the 14 first-order components of the Brief COPE. To this end, for each of the four theoretical conceptions of coping, both first-order and higher order models were applied to Brief COPE items. To specify these models, we used the representation framework for personality constructs (i.e., Bagozzi & Edwards, 1998; Bagozzi & Heatherton, 1994; Yuan, Bentler, & Kano, 1997). This framework depicts measurement models at various levels of aggregation. In a *partial aggregation model*, we used the Brief COPE's original scales as indicators for constructs. Figure 1 depicts a first-order partial aggregation model applied to the Brief COPE scales. Each factor (e.g., problem-solving) used at least two scales as indicators, made up of the sum of its two associated items, as proposed by Carver (1997). If the partial aggregation model were not rejected, we would hypothesize that multiple indicators loading on the same factor measure a single underlying construct (Bagozzi & Heatherton, 1994). All of our partially aggregated models were first-order models. In a *total disaggregation model*, each item was used as an indicator of a factor, a facet of a factor, or as a global factor. Figure 2 shows a second-order totally disaggregated model for the Brief COPE. This model is characterized by 14 first-order factors representing the Brief COPE scales, and five higher order factors representing the theoretical dimensions of coping, hypothesized to account for the correlations among first-order factors. In this case, based on the Brief COPE (Carver, 1997; Muller & Spitz, 2003), each original item was used as an indicator of its respective coping scale in agreement with the original 14-factor measurement model. All of our totally disaggregated models were high-order models. Thus, in total, we compared eight theoretical measurement models. Each model included two versions: a first-order model with partial aggregation items (for an example, see Figure 1), and a higher order model with total disaggregation items (for an example, see Figure 2). As such, each item is selected based on the original measurement model of the Brief COPE. Each of these original items represents its respective coping scale in agreement with the original 14-factor measurement model of the Brief COPE. Each coping scale with its representative items is assigned in agreement with the higher order factors' definition of the eight theoretical

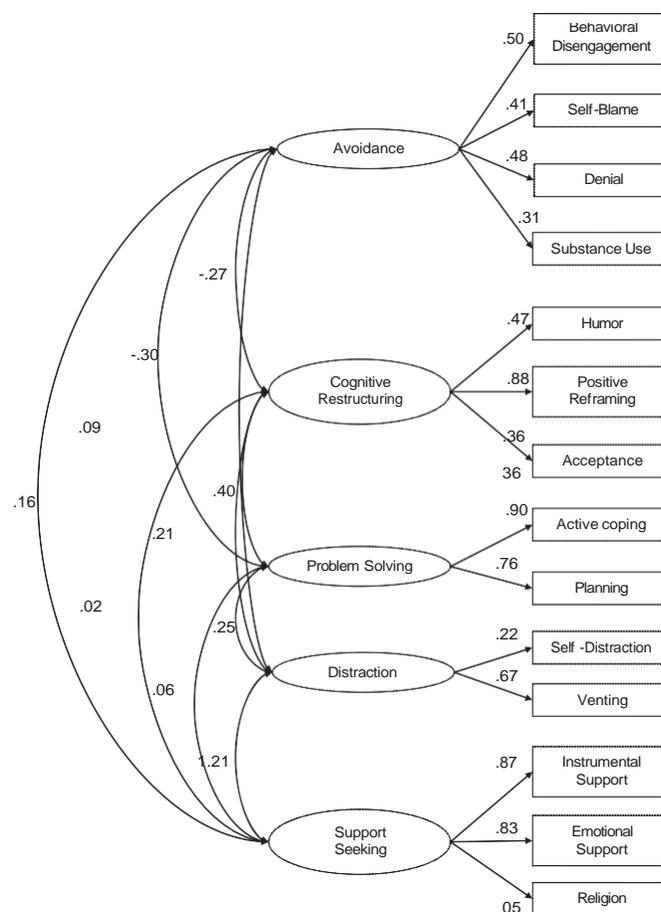


FIGURE 1.—Standardized confirmatory factor analysis solution of the partially aggregated model of the Brief COPE based on the five-dimensional model of coping (Ayers et al., 1996; Model 4). Scales are reported as squares, and dimensions as ellipses. All the factor loadings are significantly different from zero.

measurement models as mentioned earlier. The first model represents the two-dimensional model of Lazarus and Folkman (1984). The *problem-focused coping* dimension subsumes coping strategies such as planning, active coping, and instrumental support, whereas the *emotion-focused coping* dimension includes coping strategies such as acceptance, positive reframing, using emotional support, behavioral disengagement, self-distraction, self-blame, humor, denial, religion, venting, and substance use. The second model represents the two-dimensional model of Krohne (1993) and Roth and Cohen (1986). The *approach coping* dimension includes coping strategies such as acceptance, active coping, positive reframing, planning, humor, religion, using instrumental support, and using emotional support. The *avoidance coping* dimension includes coping strategies such as behavioral disengagement, self-distraction, self-blame, denial, venting, and substance use. The third model represents the three-dimensional model of Carver et al. (1989). The *problem-focused coping* dimension subsumes coping strategies such as planning, active coping, and instrumental support; the *emotion-focused coping* dimension includes coping strategies such as acceptance, positive reframing, using emotional support, self-distraction, humor, and religion; the

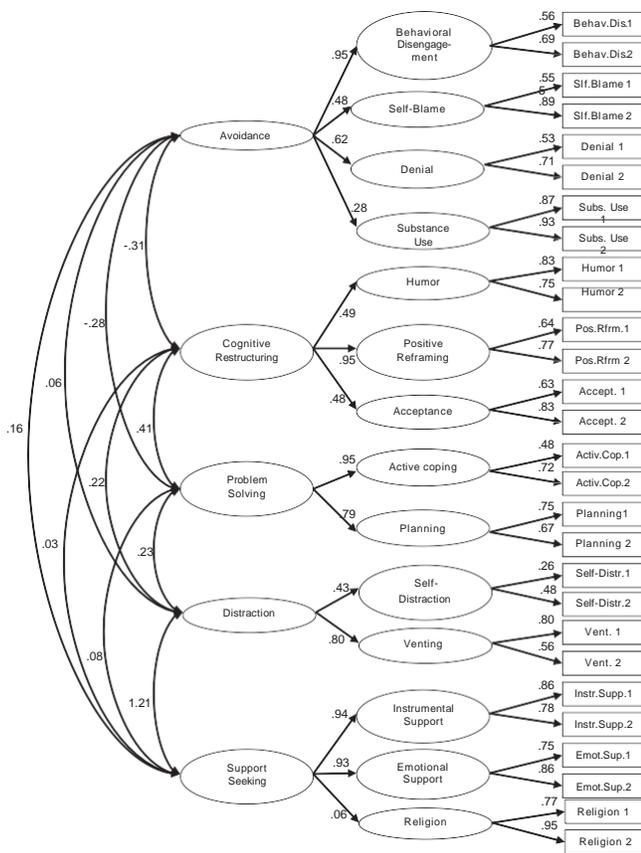


FIGURE 2.—Standardized confirmatory factor analysis solution of the totally disaggregated model of the Brief COPE based on the five-dimensional model of coping (Ayers et al., 1996; Model 4). Scales are reported as squares, and dimensions as ellipses. All the factor loadings are significantly different from zero.

avoidance coping dimension includes coping strategies such as behavioral disengagement, self-blame, denial, venting, and substance use. The fourth and final model represents the five-dimensional model of Ayers et al. (1996; see Figure 1). Furthermore, because past studies reported gender differences in the Brief COPE subscale mean scores (e.g., Kapsou, Panayiotou, Kokkinos, & Demetriou, 2010; Muller & Spitz, 2003), we tested the measurement invariance across gender of the model that best fit the data.

### Method

**Participants and procedure.** Participants were part of a larger research project on academic stress and coping. The sample included 2,187 French college students ( $M_{age} = 20.50$  years,  $SD_{age} = 3.50$ ), of whom 1,258 were women ( $M_{age} = 20.60$  years,  $SD_{age} = 3.96$ ) and 928 were men ( $M_{age} = 20.38$  years,  $SD_{age} = 2.72$ ). One student did not specify gender. Participants completed the Brief COPE during classes. To prevent missing data, the researcher checked for missing data when students returned the questionnaire and before they left the class. Therefore, no missing data were reported. All students agreed to participate in the research and signed the consent form prior to joining the study. The protocol was also approved by an ethical committee, the Comité de Protection des Personnes SUD Méditerranée IV.

**Measures.** Coping was assessed using the French version (Muller & Spitz, 2003) of the Brief COPE (Carver, 1997), which contains 14 two-item subscales. Participants were asked to rate the extent to which they typically use each of the strategies described to manage stressful situations encountered during the previous 2 months (i.e., dispositional coping styles) on a four-point Likert scale ranging from 1 (*not at all*) to 4 (*usually*). The French version was obtained via back-translation (Muller & Spitz, 2003). The validation study showed that the 14-factor solution displayed adequate structural validity,  $\chi^2 = 606$ ,  $p < .05$ , root mean squared error of approximation (RMSEA) = .04, Goodness-of-Fit Index (GFI) > .95, adjusted Goodness-of-Fit Index (AGFI) > 0.92, (RMR) < .03 (Muller & Spitz, 2003). These results are congruent with those obtained by Carver (1997), who reported a 14-factor solution for the original English version using exploratory factor analysis. However, neither the Cronbach's alpha reliability nor the test-retest reliability was estimated in Muller and Spitz (2003)'s study. Nevertheless, in Carver's (1997) study, only Cronbach's alpha of internal consistency was estimated and ranged from .50 to .90.

**Statistical analyses.** Lisrel 8.8 software (Jöreskog & Sörbom, 2007) was used to fit all models to the sample covariance matrices using maximum likelihood estimation. The statistics used to evaluate model fit were the chi-square test, the comparative fit index (CFI), the Tucker-Lewis Index (TLI, or the nonnormed fit index), the RMSEA and its 90% confidence interval (90% CI). The CFI and TLI are both comparative fit indexes (also called incremental fit indexes) as they indicate the relative improvement of the target model compared with the null model (i.e., all the observed variables are uncorrelated; Hu & Bentler, 1998), but the TLI and RMSEA contain penalties for the lack of parsimony (Marsh, Scalas, & Nagengast, 2010). Because the various measurement models we tested exhibited various degrees of complexity, we included two indexes to compensate for its effect. A description of these model-fit indexes can be obtained from Hu and Bentler (1999), and Marsh, Hau, and Wen (2004). Hu and Bentler (1999) suggested that, to minimize Type I and Type II errors under various conditions, an RMSEA value below .06, and CFI and TLI values of .95 or more together indicate acceptable model fit. Moreover, as advocated by Chen, Curran, Bollen, Kirby, and Paxton (2008), the lower and upper bounds of the RMSEA's 90% CI should be lower than .05 and .1, respectively. Factor loadings equal to .30 or .40 were interpreted as meaningfully related to the factor (Brown, 2006).

### Results

**Test of the original Brief COPE model.** The CFA of the Brief COPE (Carver, 1997; Muller & Spitz, 2003) supported the 14-factor structure. Table 1 shows the correlations among the 14 factors of the Brief COPE. Parameter estimates revealed that all factor loadings were > .40, except for the Self-Distract scale first item ( $\beta = .16$ ,  $p = .001$ ). However, we retained this item to avoid using a single-item factor. The Cronbach's alpha reliability coefficients indicated that most of the scales demonstrated acceptable internal consistency, except for four scales (Self-Distract, Active Coping, Denial, and Behavioral Disengagement), which demonstrated less desirable internal consistency. Similar results were obtained when Cronbach's alpha coefficients were calculated on scores for males and females. The same four scales demonstrated less desirable internal

TABLE 1.—Correlations among the 14 factors included in the factorial structure of the Brief COPE.

|                              | 1      | 2       | 3      | 4       | 5       | 6       | 7       | 8       | 9      | 10     | 11     | 12     | 13     | 14 |
|------------------------------|--------|---------|--------|---------|---------|---------|---------|---------|--------|--------|--------|--------|--------|----|
| 1. Religion                  | —      |         |        |         |         |         |         |         |        |        |        |        |        |    |
| 2. Self-distraction          | -.04   | —       |        |         |         |         |         |         |        |        |        |        |        |    |
| 3. Venting                   | .11*** | .20***  | —      |         |         |         |         |         |        |        |        |        |        |    |
| 4. Active coping             | .15*** | -.18*** | .22*** | —       |         |         |         |         |        |        |        |        |        |    |
| 5. Planning                  | .15*** | -.11*** | .17*** | .90***  | —       |         |         |         |        |        |        |        |        |    |
| 6. Acceptance                | .04    | .04     | .10*** | .36***  | .31***  | —       |         |         |        |        |        |        |        |    |
| 7. Humor                     | .001   | .18***  | -.07*  | -.01    | -.05    | .23***  | —       |         |        |        |        |        |        |    |
| 8. Positive reframing        | .13*** | .13***  | .23*** | .47***  | .29***  | .46***  | .54***  | —       |        |        |        |        |        |    |
| 9. Self-blame                | .04    | .20***  | .22*** | .04     | .13***  | .04     | -.12*** | -.01    | —      |        |        |        |        |    |
| 10. Substance use            | .04    | .16***  | .01    | -.15*** | -.08*** | -.02    | .16***  | .02     | .13*** | —      |        |        |        |    |
| 11. Behavioral disengagement | .03    | .22***  | .04    | -.50*** | -.24*** | -.13*** | -.07*   | -.24*** | .44*** | .27*** | —      |        |        |    |
| 12. Denial                   | .14*** | .18***  | .10**  | -.06    | -.04    | -.18*** | -.08**  | -.06    | .36*** | .23*** | .62*** | —      |        |    |
| 13. Instrumental support     | .03    | .21***  | .85*** | .20***  | .16***  | -.02    | -.11*** | .16***  | .23*** | .02    | .11*** | .12*** | —      |    |
| 14. Emotional support        | .05*   | .29***  | .81*** | .15***  | .12***  | -.02    | -.17*** | .08**   | .31*** | .05    | .20*** | .18*** | .88*** | —  |

Note.  $N = 2,187$ .  
\* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

consistency reliability: Self-Distraction ( $\alpha_{\text{male}} = .20$ ,  $\alpha_{\text{female}} = .26$ ), Active Coping ( $\alpha_{\text{male}} = .50$ ,  $\alpha_{\text{female}} = .54$ ), Denial ( $\alpha_{\text{male}} = .50$ ,  $\alpha_{\text{female}} = .58$ ), and Behavioral Disengagement ( $\alpha_{\text{male}} = .56$ ,  $\alpha_{\text{female}} = .55$ ).

*Partial aggregation models.* All four of the first-order, partially aggregated models included a single indicator (i.e., sum

of the two items) for each of the 14 original scales of the Brief COPE. According to the GFI values (see Table 2), Models 1, 2 and 3, showed poor data fit, whereas Model 4 provided a better one (see Figure 1). All freely estimated parameters in this model were statistically significant ( $p < .05$ ). Factor loading estimates were  $> .40$ , except for Religion ( $\beta = .07$ ), Self-Distraction ( $\beta = .19$ ), and Substance Use ( $\beta = .27$ ). Moreover, we reported the

TABLE 2.—Goodness-of-fit indexes and values of factor loadings of model testing the 14-factor structure of the Brief COPE and of the measurement models.

| Models   | $\chi^2$              | $df$ | CFI | TLI | RMSEA | 90% CI of RMSEA | Factor Loading Range   | No. of Loadings $\geq .40$ |
|--|-----------------------|------|-----|-----|-------|-----------------|------------------------|----------------------------|
| 14-factor structure of the Brief COPE                                      | 932.28 <sup>VI</sup>  | 259  | .97 | .96 | .036  | [.032, .039]    | .16–.93                | 27/28                      |
| Model 1:<br>Two-dimensional model of Lazarus & Folkman (1984)              |                       |      |     |     |       |                 |                        |                            |
| Partial aggregation  | 2345.01 <sup>VI</sup> | 76   | .37 | .25 | .706  | [.160, .170]    | .01–.85                | 6/14                       |
| Total disaggregation   | 2274.04 <sup>VI</sup> | 335  | .82 | .80 | .074  | [.071, .060]    | (6 negative variances) |                            |
| Model 2:<br>Two-dimensional model of Krohne (1993) and Roth & Cohen (1986) |                       |      |     |     |       |                 |                        |                            |
| Partial aggregation  | 3963.19 <sup>VI</sup> | 76   | .33 | .19 | .153  | [.149, .157]    | .02–.81                | 5/14                       |
| Total disaggregation   | 2971.99 <sup>VI</sup> | 335  | .75 | .72 | .086  | [.083, .089]    | (4 negative variances) |                            |
| Model 3:<br>Three-dimensional model of Carver et al. (1989)                |                       |      |     |     |       |                 |                        |                            |
| Partial aggregation  | 3667.44 <sup>VI</sup> | 74   | .38 | .23 | .149  | [.145, .153]    | .05–.95                | 5/14                       |
| Total disaggregation   | 4744.82 <sup>VI</sup> | 333  | .77 | .73 | .078  | [.076, .080]    | (5 negative variances) |                            |
| Model 4:<br>Five-dimensional model of Ayers et al. (1996)                  |                       |      |     |     |       |                 |                        |                            |
| Partial aggregation  | 715.79 <sup>VI</sup>  | 64   | .89 | .84 | .068  | [.064, .073]    | .05–.90                | 10/14                      |
| Total disaggregation   | 1505.24 <sup>VI</sup> | 325  | .94 | .93 | .041  | [.039, .043]    | .26–.95                | 27/28                      |

Note.  $N = 2,187$ . CFI = Comparative Fit Index; TLI = Tucker–Lewis Index (or non-normed fit index); RMSEA = root mean squared error of approximation; CI = confidence interval.  
<sup>VI</sup> $p < .0001$ .

TABLE 3.—Descriptive statistics and internal consistency reliability of the 14 first-order factors and the five higher-order factors of the totally disaggregated Model 4 of the Brief COPE.

|                          | <i>M</i> | <i>SD</i> | <i>α</i> |
|--------------------------|----------|-----------|----------|
| First-order factors      |          |           |          |
| Substance use            | 3.08     | 1.56      | .89      |
| Emotional support        | 4.65     | 1.62      | .79      |
| Religion                 | 2.70     | 1.45      | .87      |
| Acceptance               | 5.54     | 1.54      | .70      |
| Venting                  | 4.61     | 1.51      | .70      |
| Instrumental support     | 4.73     | 1.58      | .81      |
| Positive reframing       | 5.37     | 1.46      | .70      |
| Self-blame               | 4.46     | 1.55      | .66      |
| Planning                 | 4.94     | 1.55      | .70      |
| Humor                    | 4.31     | 1.69      | .76      |
| Self-distraction         | 5.21     | 1.24      | .24      |
| Active coping            | 4.80     | 1.35      | .53      |
| Denial                   | 2.70     | 1.10      | .55      |
| Behavioral disengagement | 2.50     | 1.18      | .56      |
| Higher order factors     |          |           |          |
| Support seeking          | 3.70     | 1.11      | .74      |
| Problem solving          | 4.63     | 1.32      | .75      |
| Cognitive restructuring  | 4.73     | 1.16      | .71      |
| Avoidance                | 2.82     | 0.96      | .70      |
| Distraction              | 4.66     | 1.05      | .42      |

Note. *N* = 2,187.

following internal consistency reliability coefficients of the five dimensions of coping: distraction ( $\alpha = .22$ ), support seeking ( $\alpha = .52$ ), problem solving ( $\alpha = .74$ ), cognitive restructuring ( $\alpha = .54$ ), and avoidance ( $\alpha = .44$ ).

*Total disaggregation models.* The four higher order totally disaggregated models included all the Brief COPE items as indicators (i.e., 2 items on 14 scales each). According to the GFI values (see Table 2), Model 4 fit the data well, whereas Models 1, 2, and 3 showed poorer fit indexes. In this model, only one factor loading was  $< .40$ , but statistically significant (i.e., self-distraction–self-distraction Item 1:  $\beta = .26, p = .001$ ). This item is not a good indicator of the related factor; however, we retained it to avoid using a single-item factor. All the path values in the structural model (e.g., paths from second-order factors to first-order factors) were positive and statistically significant. Table 3 shows descriptive statistics and Cronbach's alpha reliability coefficients for both the first- and second-order factors of the Brief COPE.

*Tests of measurement invariance across gender.* To test whether the hierarchical structure of the Brief COPE (with totally disaggregated data, see Model 4, Figure 2) was statistically equivalent across gender, we followed the procedure suggested by Byrne and Stewart (2006). First, we tested the model's adjustment to the data for men and women separately. Second, we tested the less restrictive configural model. In this model, the number of parameters and factors are forced to be equal across groups, but the values of parameters are freely estimated. This model serves as a baseline against which all subsequent models are compared. Third, we tested the metric invariance by constraining the first-order and second-order factor loading to be equal across groups. We based all our subsequent analyses on the covariance structures (COVS) because parameters representing regression coefficients, variances, and covariances

were of interest. This is categorized as weak invariance, because we did not base our analyses on the mean and covariance structure (MACS). However, using weak invariance is a relevant strategy when researchers are more interested in the construct validity than in testing for latent mean differences. Our research focused on the construct validity of the Brief COPE; we did not need to base our analyses on the MACS, nor did we continue from invariance testing to strong invariance testing (for a more comprehensive discussion, see Byrne, 2010). As recommended by Cheung and Rensvold (2002), the RMSEA ( $\leq .05$ ), which is not affected by model complexity and is not sensitive to sample size, was used to indicate the configural model fit. Researchers also recalled that, like the  $\chi^2$  statistic, the  $\diamond\chi^2$  test is sensitive to sample size and model complexity. Accordingly, Cheung and Rensvold (2002) and Byrne (2010) suggested that  $\diamond\text{CFI} (\leq .90)$  is a good indication of support for measurement invariance.

Prior to testing for measurement invariance, we estimated this model for women ( $n = 1,258$ ) and men ( $n = 928$ ) separately. The results revealed a good model fit for both women and men, with relatively equal model fit statistics: Men,  $\text{CFI} = .93$ ,  $\text{RMSEA} = .041$ ,  $90\% \text{ CI} = [.038, .044]$ ; women,  $\text{CFI} = .94$ ,  $\text{RMSEA} = .042$ ,  $90\% \text{ CI} = [.039, .046]$ . All factor loadings were statistically significant ( $p \leq .01$ ) and most of them remained  $> .40$  for both women and men. Then, simultaneous analysis of measurement invariance was performed (see Table 4). The configural invariance model showed good data fit,  $\chi^2(650) = 1912.19, p = .000$ ,  $\text{CFI} = .93$ ,  $\text{RMSEA} = .03$ ,  $90\% \text{ CI} = [.028, .031]$ . The first-order factor loadings invariance model displayed an overall good data fit,  $\chi^2(664) = 1930, p = .000$ ,  $\text{CFI} = .93$  ( $\diamond\text{CFI} = 0$ ),  $\text{RMSEA} = .030$ ,  $90\% \text{ CI} = [.028, .031]$ , with results equal to those obtained in the configural model. These results indicated that first-order factor loadings were equivalent across gender. First- and second-order factor loading invariance was then tested and again our results showed a good adjustment of the model to the data,  $\chi^2(673) = 1952.14, p = .000$ ,  $\text{CFI} = .93$ ,  $\text{RMSEA} = .030$ ,  $90\% \text{ CI} = [.028, .031]$ , indicating that the second-order factor loadings were invariant across gender.

## Discussion

This first study's main contribution was to identify a hierarchical structure for the Brief COPE, in a dispositional format. The results could be interpreted along the lines of the five-factor model of coping, which is considered more consensual than the alternative models. In addition, this study provides valuable information regarding the gender-invariance of the Brief COPE's hierarchical structure.

We reported that the hierarchical measurement models based on the theoretical and empirical works of Ayers et al. (1996; Model 4) showed the best data fit, with all standardized factor loading values being acceptable. We showed that all 14 original first-order coping dimensions loaded significantly onto specific second-order coping dimensions (i.e., problem-solving, support-seeking, cognitive restructuring, distraction, and avoidance). However, the hierarchical measurement models based on the theoretical and empirical works of Lazarus and Folkman (1984; Model 1), Krohne (1993) and Roth and Cohen (1986; Model 2), and Carver et al. (1989; Model 3) did not demonstrate good data fit.

TABLE 4.—Tests for invariance of the structure of the Brief COPE: Goodness-of-Fit indexes.

| Models  | $\chi^2$             | <i>df</i> | CFI  | TLI  | RMSEA | 90% CI of RMSEA | Model Comparison | $\chi^2(df)$ | <i>p</i> Value | CFI  |
|---|----------------------|-----------|------|------|-------|-----------------|------------------|--------------|----------------|------|
| Model 1:<br>Configural invariance   | 1354.78 <sup>W</sup> | 654       | .940 | .940 | .045  | [.041, .048]    | —                | —            | —              | —    |
| Model 2:<br>First-order factor loadings invariant                                     | 1381.78 <sup>W</sup> | 668       | .940 | .940 | .045  | [.041, .048]    | 2 vs.1           | 27(14)       | .02            | .000 |
| Model 3:<br>First- and second-order factor loadings invariant                         | 1389.35 <sup>W</sup> | 677       | .950 | .940 | .044  | [.041, .048]    | 3 vs.2           | 7.6(9)       | >.50           | .010 |
| Model 4:<br>First- and second-order factor loadings; first-order intercepts invariant | 1408.58 <sup>W</sup> | 691       | .950 | .950 | .044  | [.041, .047]    | 4 vs.3           | 19.2(14)     | >.10           | .000 |

Note. *N* = 2,187. In each model, the disturbance variance of the first-order active coping factor was constrained to be > 00. CFI = Comparative Fit Index; TLI = Tucker–Lewis Index (or non-normed fit index); RMSEA = root mean squared error of approximation; CI = confidence interval.  
<sup>W</sup>*p* < .0001.

In addition, our results raised some issues regarding the psychometric properties of the Brief COPE. Specifically, the Self-Distraction scale of the French version appeared to be poorly representative of this dimension and demonstrated low internal consistency. The reliability value of this scale was also problematic in other language versions of the Brief COPE: Spanish ( $\alpha = .50$ ; Perczek, Carver, Price, & Pozo-Kaderman, 2000), Portuguese ( $\alpha = .48$ ; Dias, Cruz, & Fonseca, 2009), and Greek ( $\alpha = .50$ ; Kapsou et al., 2010). This scale might differ from others inasmuch as it works as a multiple-action criterion (Carver, 1997; Muller & Spitz, 2003). In addition, limitations affecting the internal consistency of several scales of the Brief COPE have been listed in many investigations (e.g., Carver 1997; Doron, Stephan, Boiché, & Le Scanff, 2009; Kristiansen, Roberts, & Abrahamsen, 2008). We should note that alpha is strongly affected by the scale's length (Cortina, 1993; Streiner, 2003). Thus, specific efforts to improve the assessment of self-distraction strategy should be made.

## STUDY 2

Our second study aimed to cross-validate and examine the criterion-related validity of the Brief COPE's hierarchical measurement model comprising 14 first-order factors and 5 second-order factors, in a dispositional format. The criterion-related validity was provided through correlations with constructs known to be associated with coping styles such as trait anxiety (Carver et al., 1989) and perceived stress (Cohen, Kamarck, & Mermelstein, 1983; Muller & Spitz, 2003). Based on Carver et al. (1989)'s work, coping strategies such as active coping and positive reframing are expected to be negatively associated with trait anxiety, whereas coping strategies such as denial, behavioral disengagement, and venting are expected to be positively associated with trait anxiety. Based on Muller and Spitz's (2003) work, coping strategies such as active coping, planning, acceptance, positive reframing, and humor are expected to be negatively correlated with perceived stress, whereas coping strategies such as seeking instrumental support, denial, behavioral disengagement, seeking emotional support, self-blame, religion, and

substance use are expected to be positively correlated to perceived stress.

## Method

**Participants and procedure.** This sample included 584 French third-year college students (345 women, 233 men; 6 students did not specify gender;  $M_{\text{age}} = 21.78$  years,  $SD_{\text{age}} = 2.21$ ). The same procedure as in Study 1 was followed.

**Measures.** Coping was assessed using the French version (Muller & Spitz, 2003) of the Brief COPE (Carver, 1997), which contains 14 two-item subscales. Participants were asked to rate the extent to which they typically use each of the strategies described to manage stressful situations encountered during the previous 2 months (i.e., dispositional coping styles) on a 4-point Likert scale ranging from 1 (*not at all*) to 4 (*usually*). Coping strategy scores (14 factors) were obtained by summing up two items for each coping strategy (see Figure 2). Coping dimension scores (5 factors) were calculated by averaging the coping strategy scores referring to the coping dimensions (see Figure 2). Table 5 shows Cronbach's alpha values of internal consistency for the 14 first-order and the 5 second-order factors.

Trait anxiety was assessed using the French version (Gauthier & Bouchard, 1993) of the State–Trait Anxiety Inventory (STAI; Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983). The scale consists of 20 items that are rated on a 4-point Likert scale ranging from 1 (*almost never*) to 4 (*almost always*). The trait anxiety score is calculated by summing all 20 items. Scores range from 20 to 80, with higher scores correlating with greater anxiety. The estimate of internal consistency for the Trait anxiety scale as reported by Gauthier and Bouchard (1993) was high (i.e.,  $\alpha = .90$ ). Table 5 shows Cronbach's alpha values as obtained in our study.

Perceived stress was measured using the French version (Bruchon-Schweitzer, 2002; Koleck, Quintard, & Tastet, 2002) of the Perceived Stress Scale (PSS–14; Cohen et al., 1983). The measure assesses the degree to which situations in one's life are judged to be stressful. Participants reported how often they felt or thought in the way described during the previous 2 months on

TABLE 5.—Descriptive statistics, internal consistency reliability, and Pearson's correlations of the 14-factor structure and the five-factor structure of the Brief COPE with trait-anxiety and perceived stress.

|                          | <i>M</i> | <i>SD</i> | <i>α</i> | Trait-Anxiety | Perceived Stress |
|--------------------------|----------|-----------|----------|---------------|------------------|
| Trait-anxiety            | 45.40    | 8.40      | .88      |               |                  |
| Perceived stress         | 42.31    | 3.65      | .99      |               |                  |
| Active coping            | 4.85     | 1.35      | .55      | -.17**        | .02              |
| Planning                 | 5.03     | 1.56      | .71      | -.04          | .08*             |
| Acceptance               | 5.25     | 1.54      | .74      | -.24**        | -.03             |
| Positive reframing       | 5.17     | 1.47      | .70      | -.25**        | -.13**           |
| Humor                    | 3.83     | 1.62      | .82      | -.30**        | -.15**           |
| Instrumental support     | 4.93     | 1.71      | .87      | .18**         | .14**            |
| Emotional support        | 4.94     | 1.63      | .80      | .25**         | .19**            |
| Substance use            | 3.07     | 1.54      | .91      | .12**         | .14**            |
| Self-blame               | 4.73     | 1.48      | .67      | .45**         | .27**            |
| Behavioral disengagement | 2.75     | 1.04      | .59      | .36**         | .18**            |
| Denial                   | 2.59     | 1.06      | .67      | .22**         | .18**            |
| Religion                 | 2.67     | 1.43      | .89      | .11**         | .12**            |
| Self-distraction         | 5.11     | 1.25      | .20      | .09*          | .10*             |
| Venting                  | 4.77     | 1.65      | .75      | .19**         | .05              |
| Problem solving          | 4.71     | 1.33      | .76      | -.12**        | .04              |
| Distraction              | 4.68     | 1.12      | .50      | .14**         | .09*             |
| Support seeking          | 3.85     | 1.20      | .60      | .24**         | .19**            |
| Avoidance                | 2.92     | 0.85      | .50      | .43**         | .27**            |
| Cognitive restructuring  | 4.42     | 1.16      | .60      | -.35**        | -.13**           |

Note. *N* = 584 for all analyses.

\**p* < .05. \*\**p* < .01.

a 5-point Likert scale ranging from 1 (*never*) to 5 (*very often*). The internal consistency as reported by Koleck et al. (2002) was high (Cronbach's  $\alpha = .89$ ). The perceived stress score was calculated by summing all 14 items. A higher score indicated a higher level of perceived stress. Table 5 shows Cronbach's alpha values of internal consistency.

*Statistical analyses.* First, the same statistical tests as those run in Study 1 were used to examine the qualities of the measurement model based on Ayers et al. (1996)'s five-dimensional model. Second, concurrent validity was examined by calculating Pearson correlation coefficients for both the 14-factor structure and the 5-factor structure of the Brief COPE, as well as the criterion variables (i.e., perceived stress and trait anxiety).

### Results

Table 5 shows the means, standard deviations, and Cronbach's alpha reliability coefficients for the Trait anxiety scale, the PSS, the 14-factor structure, and the five-factor structure of the Brief COPE.

*Cross-validation of the hierarchical measurement model of the Brief COPE.* The results confirmed the good data fit of the measurement model based on Ayers et al.'s (1996) five-dimensional model,  $\chi^2(325) = 652.213, p < .001; \chi^2/df = 2.01, CFI = .95, RMSEA = .04 (.04-.05)$ . In addition, all factor loadings were statistically significant ( $p \leq .01$ ) and most of them remained  $> .40$ . Only one factor loading was  $< .40$ , but it remained statistically significant (i.e., Self-distraction-Distraction:  $\beta = .21, p = .04$ ).

*Criterion validity.* We tested the criterion-related validity of the hierarchical model of the Brief COPE by examining the correlations between the 14-factor structure and the 5-factor structure of the Brief COPE and the criterion variables. Results indicated statistically significant correlations between trait

anxiety and coping strategies and dimensions, as well as between perceived stress and coping strategies and dimensions (see Table 5).

### Discussion

The results of Study 2 provided support for the external validity of the Brief COPE's hierarchical measurement model, in a dispositional format. First, we cross-validated measurement Model 4 proposed in Study 1. Thus, the Brief COPE hierarchical measurement model based on Ayers et al.'s (1996) five-dimensional model remained valid with different samples in a dispositional format. Second, we assessed the relationship of the Brief COPE's first- and second-order factors with trait anxiety and perceived stress. Results indicated statistically significant associations in the small-to-medium range between Brief COPE factors and the criterion variables. Similarly weak but significant correlations between Brief COPE factors and criterion variables were found in previous studies conducted with comparable samples (Carver et al. 1989; Muller & Spitz, 2003).

As expected (Carver et al., 1989), our results showed similar patterns of associations between trait anxiety and coping, except for a positive correlation with seeking instrumental support. However, this result could be due to the characteristics of the student population. Stober (2004) showed that overall test anxiety was associated with increased social support-seeking, which could explain, in part, the positive association between trait anxiety and seeking instrumental support. Overall, the convergence of association patterns suggests that the coping strategies postulated to be functional are in fact linked to personality dimensions that are widely regarded as beneficial. Similarly, coping tendencies hypothesized to be less functional were inversely associated with desirable personality dimensions (Carver et al., 1989). Trait anxiety should be associated with a tendency to become preoccupied with distress emotions when under stress and

with unwillingness to engage in active coping and a tendency to disengage from goals (Carver et al., 1989). In addition, our results displayed similar patterns of associations between perceived stress and coping, except for an absence of correlation with planning and acceptance (Cohen et al., 1983; Muller & Spitz, 2003).

#### GENERAL DISCUSSION

This study aimed to unify empirical and theoretical perspectives by determining whether the various factors of coping as measured by the Brief COPE, in a dispositional format could be integrated into a more parsimonious hierarchical structure. To identify a higher structure for the Brief COPE, we were interested in examining some competing hierarchical models.

The results of Study 1 indicated that, across a large sample ( $N = 2,187$ ), the Brief COPE's 14 first-order components can be best represented through a hierarchical structure containing five second-order dimensions. This five-factor solution is in line with the assumption that the two- and three-dimensional models of coping might be too simplistic (Ayers et al., 1996; Connor-Smith, Compas, Wadsworth, Thomsen, & Saltzman, 2000; Skinner et al., 2003). Our results show that the Brief COPE can be used to measure coping styles in agreement with the meta-analytic study recommendations and assumption that these "five categories of coping are clearly core: Problem-solving, support-seeking, avoidance, distraction, and positive cognitive restructuring" (Skinner et al., 2003, p. 239). In addition, our results showed that the hierarchical structure of the Brief COPE is a gender-invariant measure: The scale has the same meaning and structure for both men and women. The consistent support for the five-second-order-dimension model across gender provides evidence that this hierarchical measurement model could afford a reasonable conceptualization of the latent structure of coping. Furthermore, the results of Study 2 gave additional evidence of the external validity of the Brief COPE's hierarchical structure.

Although this study makes a number of strong arguments, it has some limitations. First, even if our results significantly supported the hierarchical structure of the Brief COPE, some issues related to the 14-factor structure remain (e.g., the Self-Distraction scale). Future research should address this by reformulating Brief COPE items in agreement with the current conception of coping construct (Skinner et al., 2003). Furthermore, our results were obtained with the French version of the Brief COPE: Caution should be exercised when discussing them. Second, this study was also limited by its retrospective design and dispositional measure of coping. Third, the results obtained in our study are specific to a sample of French students and might not prove generalizable to populations with different characteristics. Finally, participants filled in the coping questionnaire prior to responding to the stress-related measures. However, their participation in a larger research project might have influenced or sensitized them when they completed the coping questionnaire. This could further impair the generalization of our results.

In spite of these limitations, this study provided several insights into the hierarchical structure of the Brief COPE and extended the existent coping literature both methodologically and theoretically. Its results strongly support a robust, theoretically parsimonious, five-dimensional model in a dispositional format (Skinner et al., 2003), which *allows a relative balance*

*between scale brevity and score reliability.* It offers microscopic (i.e., 14 coping strategies) and macroscopic (i.e., five coping dimensions) assessments of coping, as well as additional perspectives to researchers. Indeed, the total disaggregation model of the Brief COPE allowed both the amount of information and the complexity of the construct to be reduced. Although this brief measure of coping styles includes only 28 items, its latent structure, which is made up of 14 scales, is relatively complex. This complexity could prove problematic for researchers who plan to test path or structural models including coping styles. In this situation, an aggregate measure represented by the higher order factors could be an appropriate alternative. Future research should use multiple-group CFA to examine the potential measurement invariance of the Brief COPE so as to determine the generalizability of its hierarchical structure to populations with different characteristics.

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