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ABSTRACT

The aims of the present study were threefold: (1) to test for the equivalency of an hierarchical three-factor structure of the Beck Depression Inventory (BDI) across English and French versions for non-clinical adolescents; (2) given evidence of poor model fit, to validate the factorial structure of the BDI French version across three independent samples (n=336; n=435; and n=381, respectively) of French Canadian non-clinical adolescents using both exploratory and confirmatory factor analytic procedures; and (3) to compare the factorial pattern of BDI measurement and structure across English and French versions of the BDI. The data comprised BDI French responses from 1,152 French Canadian high school students (551 males and 601 females) and BDI English responses from 685 English Canadian high school students (351 males and 334 females). Although both versions of the BDI were found to be best represented by a hierarchical three-factor structure, a differential pattern of loadings was evidenced for eight of the items. Except for three items, factorial measurement and structure related to the French BDI were found to be equivalent across two independent samples. Findings carry important implications for the interpretation of scores derived from both the English and French versions of the BDI in the measurement of depression for non-clinical adolescents. Four tables and two figures present study data. A 30-item list of references is included. An appendix lists items from the BDI. (Author/SLD)

Validating the Measurement and Structure of the Beck Depression Inventory Across English and French Nonclinical Adolescents

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Abstract

The aims of the present study were threefold: (a) to test for the equivalency of an hierarchical 3-factor structure of the Beck Depression Inventory (BDI) across English and French versions for nonclinical adolescents, (b) given evidence of poor model fit, to validate the factorial structure of the BDI French version across three independent samples (n_1 =336; n_2=435; n_3=381) of French Canadian nonclinical adolescents using both exploratory and confirmatory factor analytic procedures, and (c) to compare the factorial pattern of BDI measurement and structure across English and French versions of the instrument. Although both versions of the BDI were found to be best represented by an hierarchical 3-factor structure, a differential pattern of loadings was evidenced for eight of the items. Except for three items, factorial measurement and structure related to the French BDI were found to be equivalent across two independent samples. Findings carry important implications for the interpretation of scores derived from both the English and French versions of the BDI in the measurement of depression for nonclinical adolescents.

Measuring Adolescent Depression: Tests of Equivalent Factorial Structure for English and French Versions of the Beck Depression Inventory

Based on confirmatory factor analyses (CFAs) involving three independent samples of nonclinical adolescents, Byrne and Baron (1990) concluded an hierarchical 3-factor structure of the Beck Depression Inventory (BDI; Beck, Ward, Mendelson, Mock, & Erbaugh, 1961) to best represent the data for this population. Their research, consistent with most factor analytic studies of the BDI, was conducted with English speaking samples. In 1982, however, Bourque and Beaudette (1982) developed and validated a French version of the BDI based on an exploratory factor analysis (EFA) of adult data. To date, the work of Baron and Laplante (1984) represents the only known attempt to validate the instrument with nonclinical French speaking adolescents. The purposes of the present study, in broad terms, were to test for (a) the validity of an hierarchical factorial structure of the French version of the BDI for nonclinical adolescents, and (b) the equivalency of factorial structure across English (BDI-ENG) and French (BDI-FR) versions of the instrument for this population.

Although the BDI was originally developed for use with clinical populations, a review of the literature reveals its popularity as a measuring instrument for nonclinical

populations as well. In particular, the BDI has been used almost exclusively in the assessment of depression for nonclinical adolescents. Nonetheless, only a modicum of factor analytic research has been reported on the BDI for this population. Of the studies reported, all except for the work of Byrne and Baron (1990) have used principal components analysis with varimax rotation. Findings from this research, however, have been inconsistent; 2-factor (Shek, 1990) and 4-factor (Teri, 1982) solutions have been reported for the BDI-ENG, and a 3-factor solution for the BDI-FR (Baron & LaPlante, 1984). It is highly likely that this discordance can be linked to widely known limitations associated with EFA procedures in general (e.g., Bollen 1989; Long, 1983), and principal components analysis in particular (e.g., Borgatta, Kercher, & Stull, 1986; Gorsuch, 1990; Hubbard & Allen, 1987; Snook & Gorsuch, 1989)

In light of these methodological weaknesses, then, Byrne and Baron (1990) used CFA procedures to extend the earlier work of Tanaka and Huba (1984) and test for the validity of an hierarchical underlying structure of the BDI-ENG for nonclinical English Canadian adolescents. Their cross-validated findings demonstrated strong support for a 2nd-order structure consisting of one higher-order general factor of depression, and three lower-order factors which they labelled Negative Attitudes, Performance Difficulty, and Somatic Elements. This factorial structure of the BDI-ENG is presented

schematically in Figure 1.

Insert Figure 1 about here

As noted earlier, only one study to date has sought to validate the BDI-FR (Bourque & Beaudette, 1982) for nonclinical adolescents (Baron & LaPlante, 1984). Based on a sample of 374 French Canadian high school adolescents (185 males, 189 females; 12-17 years), Baron and LaPlante, consistent with previous EFA research bearing on the BDI, used principal components procedures with varimax rotation to examine the factorial structure of the BDI-FR. They reported a 3-factor structure as optimal in explaining 35.7 % of the total variance. Specifically, Factor 1 (Mood) accounted for 22.5% of the variance and comprised Items 1, 2, 4, 9, and 15; Factor 2 (Negative Self-perception; 7.2%) was composed of Items 3, 5, 7. 8, and 14, and Factor 3 (Somatic Dimension, 6.0%) comprised Items 16, 18, and 19. Baron and LaPlante only considered factor loadings >.40 to be worthy of meaningful interpretation. As such, eight items failed to meet this criterion. Zero-rated statements for each item of the BDI are presented in the Appendix.

From this review of the literature, it is clear that further factor analytic work is needed in order to more rigorously establish the factorial structure of the BDI-FR for

use with nonclinical adolescents. Aside from the sparseness of factor analytic research in this area, previous research can be considered methodologically weak for several reasons. First, EFA procedures are limited in their ability to yield unique factorial solutions, define a testable model, assess the extent to which an hypothesized model fits the data, and adequately test for factorial invariance across groups (e.g., Bollen, 1989; Long, 1983). Second, it is now widely accepted that principal components analysis yields highly inflated factor loadings and thus, misleadingly clear factor structures (Borgatta et al., 1986; Gorsuch, 1990; Hubbard & Allen, 1987; Snook & Gorsuch, 1989). Third, the use of varimax rotation assumes the independence of multiple factors in explaining the covariation of depressive symptoms; Byrne and Baron (1990), however, found these factors to be highly correlated thereby suggesting the presence of a higher-order general factor. Confirmatory factor analytic procedures, as proposed by Joreskog (1969), can overcome these difficulties and are considered a statistically more powerful approach to factor analyses.

The present study, then, addressed these limitations and had three primary purposes: (a) to test for the equivalency of an hierarchical 3-factor structure across the BDI-ENG and the BDI-FR, (b) given evidence of poor model fit, to validate the factorial structure of the BDI-FR across three independent

samples of French Canadian nonclinical adolescents, and (c) to compare the factorial pattern of BDI measurement and structure across English and French versions of the instrument. Confirmatory factor analytic procedures were used within the framework of covariance structure modeling.

Method

Sample and Procedures

The data comprised BDI-FR responses from 1152 (551 males; 601 females) French Canadian adolescents, and BDI-ENG responses from 685 (351 males; 334 females) English Canadian adolescents. All subjects were high school students (grades 9-12) from two large urban areas in central Canada. Only questionnaires with complete data were included in the analyses.

Subjects completed the BDI, along with other assessment measures, during one regular class period; all testing materials were completed anonymously. Test instructions were paraphrased by the test administrator, and procedural questions were solicited and answered. All participation, in keeping with school and Ethics Committee policies, was voluntary and no incentives were offered.

Instrumentation

The BDI is a 21-item scale that measures symptoms related to cognitive, behavioral, affective, and somatic components of depression. Although originally designed for use by trained interviewers, it is now most typically used as a self-report

measure (Beck, Steer, & Garbin, 1988; Kearns, Cruickshaw, McGuigan, Riley, Shaw, & Snaith, 1982; Vredenburg, Krames, & Flett, 1985). For each item, respondents are presented with four statements rated from 0 to 3 in terms of intensity, and asked to select the one which most accurately describes their own feelings; higher scores represent a more severe level of reported depression. Total scores range from 0 to 63 and are used to categorize four levels of depression: none to minimal (0-9), mild to moderate (10-18), moderate to severe (19-29), and severe (30-63) (Beck et al., 1988).

Baron and LaPlante (1984) have reported an internal consistency reliability of .80, and a test-retest reliability over an 8-week period of .74 for the BDI-FR relative to nonclinical adolescents. Substantially greater psychometric data have been reported for the BDI-ENG with respect to the same population (for a review, see Byrne & Baron, 1990; Byrne et al., 1991).

Data Analyses

Data were analyzed in three major stages. First, the 3-factor 2nd-order structure proposed for the BDI-ENG by Byrne and Baron (1990) was tested for goodness-of-fit to data representing English (n=685) and French (n=1152) Canadian adolescents. Second, given findings of poor model fit to the French data, we proceeded next to validate the factorial structure of the BDI-FR across the three independent samples

comprising the data; three sets of analyses were involved: (a) an EFA of the data for Sample 1 (n=336) was conducted using maximum likelihood extraction with oblique rotation, (b) given evidence of substantially correlated factors, a 2nd-order CFA model of BDI structure was specified a priori, and its validity tested statistically on data from Sample 2 (n=435). Given findings of inadequate fit, post hoc model fitting was conducted to identify the baseline model[1] considered most appropriate, statistically and theoretically, in representing data for French nonclinical adolescents, and (c) item measurements and factorial structure related to the BDI-FR baseline model were cross-validated on data from Sample 3 (n=381). The third and final stage of analyses summarized differences in the factorial measurement and structure of the BDI for nonclinical adolescents across French and English versions of the instrument.

Assessment of model fit was based on multiple criteria that reflected statistical, theoretical, and practical considerations; these included (a) the X^2 likelihood ratio, (b) the Tucker-Lewis index (TLI; Tucker & Lewis, 1973), (c) the relative noncentrality index (RNI; McDonald & Marsh, 1990), (d) the adjusted goodness-of-fit index (AGFI), t-values (parameter estimates relative to their standard errors of estimate), and modification indices (MIs)[2], all provided by the LISREL VI computer program (Joreskog & Sorbom, 1985), and (e) the

substantive meaningfulness of the model (see MacCallum, 1986; Suyapa, Silvia, & MacCallum, 1988). Criteria indicative of adequate model fit were values >.90 for the TLI and RNI, and >2.00 for the t-values.

Results

Equivalency of BDI-FR and BDI-ENG factorial Structures

To test for the equivalency of factorial structures across English and French versions of the BDI, a model representing BDI-ENG structure, as presented in Figure 1, was specified and estimated separately for French and English Canadian adolescents. Although results demonstrated an exceptionally good overall fit of the hypothesized model to data representing both French ($\chi^2(187)=519.92$; AGFI=.94; TLI=.93; RNI=.93) and English ($\chi^2(187)=382.36$; AGFI=.94; TLI=.92; RNI=.93) adolescents, closer scrutiny of the MIs for the French data revealed seven severely malfitted item loadings; these MIs ranged from 10.40 to 37.27 ($\underline{M}$=19.51). In constrast, the highest MI for the English data was 7.72.

These findings indicated that while an hierarchical 3-factor model appeared optimal in representing data derived from the BDI-FR, the pattern of factor loadings, as specified for the BDI-ENG, was not appropriate for this population. Thus, we proceeded next to validate the factorial structure of the BDI-FR for nonclinical French Canadian adolescents. We turn now to the results of these analyses.

Validation of Factorial Structure for the BDI-FR

For purposes of verifying the optimality of a 3-factor structure, and in the interest of thoroughness, we decomposed our total sample into three independent groups by pairing up six sets of data. Factorial structure was determined by means of an EFA of Sample 1 data, and a CFA of Sample 2 data; CFA procedures were used in cross-validating findings across Samples 2 and 3.

Exploratory Factor Analyses: Sample 1

Common factor analyses were conducted for 2-, 3-, and 4-factor solutions using direct oblimin rotation to obtain simple structure. Consistent with Baron and LaPlante's (1984) findings, the 3-factor solution was deemed the most plausible in representing BDI-FR structure; in contrast to Baron and LaPlante, however, only 25.2 % of total variance could be explained. To maintain consonance with factorial validity findings related to the BDI-ENG, we retained the same labelling of the three factors. These results are presented in Table 1.

Insert Table 1 about here

Interestingly, of the 13 factor loadings reported by Baron and LaPlante (1984), all had the same pattern of loading in the present study. In contrast to the labels shown in Table 1, however, Baron and Laplante referred to Factor 1 as "Mood",

Factor 2 as "Negative Self-perception", and Factor 3 as "Somatic Dimension".

Also of import in this initial analysis, was the strength of relations among the BDI-FR factors. Provided with evidence of three substantially correlated factors, as indicated in Table 1, we felt justified in testing the hypothesis of a higher-order factorial structure. In sum, although the EFA findings suggested that a 3-dimensional structure underlay the BDI-FR for nonclinical French adolescents, the true test must come from a CFA approach to the data, whereby we can postulate a priori and test for the validity of a 2nd-order 3-factor structure. We turn now to these analyses.

Confirmatory Factor Analyses: Sample 2

Prior to testing the validity of a higher-order factorial structure, we first parameterized and estimated our EFA structure (Table 1) as a CFA model (Model 1). As shown in Table 2, results indicated an inadequate fit to the data; all parameters, nonetheless, were statistically significant. (Model 0 argues that each item represents a factor and provides the null model needed for computation of the TLI and RNI.)

Insert Table 2 about here

A review of the MIs revealed that model respecification could yield a significantly better fit if Item 21 (libido loss)

were free to load on the Somatic Elements factor, rather than on the Negative Attitudes factor. Since this change in loading pattern was substantively rational, Model 2 was specified to incorporate this reparameterization. As indicated in Table 2, this modified factor loading resulted in a somewhat better-fitting model. Examination of the MIs, following the estimation of Model 2, however, suggested inappropriate loadings for at least three additional items (#17, #15, #8), as well as substantial correlated errors between Items 2 and 3, Items 7 and 14, and Items 2 and 4. In order to identify the best-fitting baseline model, we continued to modify the originally hypothesized EFA model if, and only if, there was statistical and theoretical justification for doing so.

These procedures resulted in a final well-fitting model (Model 6) that incorporated a reparameterization of four factor loadings, and the specification of three item correlations. Although it might appear that the estimations of Models 5 and 6 were redundant in that no changes occurred in the AGFI, TLI and RNI values, the difference in χ^2 values was statistically significant.[3] Furthermore, given the size of the MIs related to Model 5 (MI=15.20) and Model 6 (MI=10.15), as well as the better conceptual fit of Model 6, it was considered important to incorporate these parameters into the baseline model.[4] Results for the BDI-FR baseline model are presented schematically in Figure 2.

Insert Figure 2 about here

Cross-validation of Baseline Model: Sample 3

The cross-validation of Model 6 involved testing for the invariance of both the item measurements and the factorial structure of the BDI-FR, as depicted in Figure 2, in a simultaneous analysis of data across Samples 2 and 3. Due to space limitations, a detailed description of these procedures will not be presented here; readers are referred, instead, to Byrne (1989) and Marsh and Hocevar (1985) for a more extensive discussion with concomitant exemplification. Findings from the cross-validation analyses are presented in Table 3.

Insert Table 3 about here

Tests for invariance involved first specifying a model in which all 1st-order factor loadings were constrained equal across samples, and then comparing that model with a less restrictive one in which these parameters were free to take on any value. As noted earlier, the difference in fit between the two nested models provides a basis for determining the tenability of the hypothesized equality constraints; a significant $\Delta\chi^2$ indicates noninvariance, and thus rejection of the hypothesis. Turning to Table 3, we see that the comparison

of Model 2 (in which these parameters were constrained equal) with Model 1 (in which they were free to vary), yielded a $\Delta\chi^2$ (18)=38.90 ($p<.01$) thereby indicating the inequality of some item measurements across Samples 2 and 3. Given these findings, our next task was to identify which items were noninvariant across the two samples. As such, subsequent analyses involved first testing for the equality of clustered item measurements by factor, and then, testing for the equality of individual items. As summarized in Table 3, these analyses detected three items (#12, #18, #21) that were operating differentially across the two samples of French Canadian adolescents.

In testing next for the invariance of factorial structure, we were careful to take into account the partial measurement invariance of the items noted in Table 3 (see Byrne, Shavelson, & Muthén, 1989). Accordingly, we specified a model (Model 4) in which all 1st-order loadings (except those representing Items 12, 18, and 21) and 2nd-order loadings were constrained equal. This model, then, was compared with Model 3 in which the 2nd-order loadings were unconstrained. This comparison yielded findings that were not significant ($\Delta\chi^2(3)=6.04$, thereby indicating the equivalency of factorial structure across Samples 2 and 3. Despite the noninvariance of three items, these results nonetheless provide strong support for the validity of the BDI-FR structure as illustrated in Figure 2, in terms of its use with nonclinical French Canadian adolescents.

Comparison of Factorial Structures: BDI-FR vs BDI-ENG

Analyses, thus far, have demonstrated that although the factorial structure of both the French and English versions of the BDI is most plausibly described by an hierarchical ordering that comprises one higher-order factor representing general depression, and three lower-order factors representing negative attitudes, performance difficulty, and somatic elements, there is some discrepancy between the two with respect to the pattern of factor loadings; these differential loadings involve Items 3, 4, 5, 7, 12, 14, 17, and 20. A summary of these differences is presented in Table 4.

Insert Table 4 about here

Discussion

Of substantial importance in the present study was the finding that for both the BDI-FR and BDI-ENG, a 2nd-order 3-factor structure best represented the data for nonclinical French and English Canadian adolescents, respectively. This being so, it is of particular interest to determine (a) why eight of the items should exhibit a differential factor loading pattern across the two instruments, and (b) why three atypically large correlated errors involving five items should be present for data based on the BDI-FR, and not on the BDI-ENG. We turn now to a discussion of these findings.

Differential Pattern of Factor Loadings

One interesting difference in loading pattern between the two instruments involved Items 3 (failure), 5 (guilt), 7 (self-dislike), and 14 (self-image). Whereas these items loaded on the Negative Attitude factor for English adolescents, they loaded on the Performance Difficulty factor for French adolescents. A second differential loading pattern involved Items 4 (dissatisfaction) and 12 (withdrawal). For the BDI-ENG data, these items loaded on the Performance Difficulty factor; for the BDI-FR data, they loaded on the Negative Attitudes factor. Finally, whereas Items 17 (fatigue) and 20 (hypochondria) loaded on the Performance Difficulty factor for English adolescents, they loaded on the Somatic Elements factor for French adolescents.

Given the paucity of research conducted to date on depression for nonclinical Canadian adolescents, it is difficult to provide definite and specific explanations bearing on the various differential factor loading patterns; two recent exceptions, however, are the studies of Marcotte and Baron (1990), and Pharand (1990). Of the two, the latter is of particular interest relative to our present work. Accordingly, Pharand examined stress and adaptive resources as predictors of depression in high school adolescents whose ages ranged from 14 to 18 years. The study focused on a cross-cultural comparison of two samples of English Canadians, and two samples of French

Canadian adolescents, each drawn from typically small urban centers in Central East Canada --- Kingston, Halifax (Ontario), and Sherbrooke (Quebec).

Although major findings for the English adolescent samples replicated across the French adolescents, strong differences emerged between the two cultural groups. Specifically, two demographic variables (gender, church attendance) were found to correlate with depression for French adolescents only. On the other hand, two cognitive resources (positive recall, attributional style) failed to correlate with depression for French adolescents. Finally, for the French samples, depression correlated significantly with school achievement, but not with school absenteeism.

In an attempt to explain these cross-cultural disrepancies, Pharand (1990) linked them to differences in the socialization patterns of the two Canadian cultural groups. She suggested that the French culture possibly fostered stronger traditional family roles, values, and expectations, than the English culture. Additionally, she alluded to potential cultural differences in relations between the affective, cognitive, and somatic functioning of adolescents. Indeed, such tentative explanations may well apply to the differential loading patterns observed in the present study. Nonetheless, precision of the interplay between cultural influences and expression of depression needs to be more clearly delineated before any

generalization to these adolescent populations can be made.

Presence of Correlated Errors

Error correlations between pairs of items are usually an indication of perceived redundancy in item content. Three substantially correlated errors were evidenced with respect to the BDI-FR only; these involved Items 2 (pessimism) and 3 (failure), Items 7 (self-dislike) and 14 (self-image), and Items 2 (pessimism) and 4 (dissatisfaction). Again, such discrepancies may well find their explanation in the differential attitude of Francophone adolescents towards themselves and the future as they perceive it. For years, the environment of French Canada (i.e., Quebec) has been a fertile ground for instability and anxiety; still today, the status of this environment remains characterized by political, environmental, and cultural uncertainty. Within this context, it is not surprising that French Canadian youth hold a pessimistic view of their future, and that this outlook becomes equated with a personal sense of dissatisfaction and failure which ultimately translates itself into a self-image characterized by self-dislike. As noted earlier, more research is needed to further understand the influence of cultural experience on the depressive experiences of French adolescents. Ideally, within the Canadian context, future validity research bearing on the BDI-FR should involve French adolescent samples representing the western, central, and eastern regions of the

country; from a broader perspective, it is of substantial interest to determine if factor analytic findings replicate across other European French-speaking nonclinical adolescents.

Finally, the finding that three items failed to demonstrate equivalent measurement across calibration and validation samples should not be interpreted as cause for concern. Rather, the fact that 18 item measurements, as well as the theoretical structure of the BDI-FR were found to be invariant across independent samples is truly quite remarkable! Indeed, it speaks well for use of the BDI-FR with nonclinical French Canadian adolescents. We consider the finding of three noninvariant items to be a function of sampling variability and expect that, upon replication, such inequality will not hold.

One limitation of the study was the use of ML estimation procedures, in light of some nonnormality in the data. As such, it is possible that the t-values were inflated as a consequence of downwardly biased standard errors (Muthén & Kaplan, 1985; Sharma, Durvasula, & Dillon, 1989). However, given our interest in comparing the factorial structure of the BDI across English and French Canadian adolescents, we considered it important to maintain consistency with previous CFA study of the BDI-ENG (Byrne & Baron, 1990). Nonetheless, future work in this area should consider basing the analyses on asymptotic, rather than on normal distributional properties.

Given increasing interest in the incidence of depression

among normal adolescents, and increasing use of the BDI as the instrument of measurement, it is imperative that score interpretations be based on the factorial structure appropriate to the group under study. Although it now seems evident that an hierarchical 3-factor structure underlies the BDI for clinical and nonclinical populations, the pattern by which individual items load on these factors can differ across groups (see e.g., Byrne & Baron, 1990; Byrne, Campbell, & Baron, 1991). That our cross-validated results demonstrated such differentiation across samples of English and French Canadian adolescents further underscores this claim. We expect these findings to be of substantial interest both to practitioners and researchers whose concerns focus on the well-being of normal adolescents.

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Appendix

Items Comprising the Beck Depression Inventory[a]

	English		French
1.	I do not feel sad.	1.	Je ne me sens pas triste.
2.	I am not particularly discouraged about the future.	2.	Je ne suis pas particulièrement découragé(e) par l'avenir.
3.	I do not feel like a failure.	3.	Je ne me considère pas comme un(e) raté(e).
4.	I get as much satisfaction out of the things as I used to.	4.	Je retire autant de satisfaction de la vie qu'auparavant.
5.	I don't feel particularly guilty.	5.	Je ne me sens pas particulièrement coupable.
6.	I don't feel I am being punished.	6.	Je n'ai pas l'impression d'être puni(e).
7.	I don't feel disappointed in myself.	7.	Je n'ai pas l'impression d'être déçu(e) de moi.
8.	I don't feel I am any worse than anybody else.	8.	Je n'ai pas l'impression d'être pire que quiconque.
9.	I don't have any thoughts of killing myself.	9.	Je ne pense aucunement à me suicider.
10.	I don't cry any more than usual.	10.	Je ne pleure pas plus qu'à l'ordinaire.
11.	I am no more irritated now than I ever am.	11.	Je ne suis pas plus irrité(e) maintenant qu'auparavant.
12.	I have not lost interest in other people.	12.	Je n'ai pas perdu mon intérêt pour les gens.

13.	I make decisions about as well as I ever could.	13. Je prends des décisions aussi facilement qu'avant.
14.	I don't feel I look any worse than I used to.	14. Je n'ai pas l'impression que mon apparence soit pire qu'auparavant.
15.	I can work about as well as before.	15. Je peux travailler aussi bien qu'avant.
16.	I can sleep as well as usual.	16. Je dors aussi bien que d'habitude.
17.	I don't get more tired than usual.	17. Je ne me sens pas plus fatigué(e) qu'à l'accoutumé.
18.	My appetite is no worse than usual.	18. Mon appétit n'est pas pire que d'habitude.
19.	I haven't lost much weight, if any lately.	19. Je n'ai pas perdu de poids dernièrement.
20.	I am no more worried about my health than usual.	20. Ma santé ne me préoccupe pas plus que d'habitude.
21.	I have not noticed any recent change in my interest in sex.	21. Je n'ai remarqué récemment aucun changement dans mon intérêt pour le sexe.

---

[a] Only the first of four statements for each item is presented here.

[a] Seulement le premier énoncé de quatre pour chaque groupe est présenté ici.

Footnotes

1. A baseline model is the most parsimonious, albeit best-fitting and most substantively meaningful model to represent the observed data.
2. An MI can be computed for each constrained parameter and indicates the expected decrease in χ^2 if the parameter were to be relaxed; the decrease, however, may actually be higher. Only MI values > 5.00 were considered since smaller values indicate little appreciable improvement in model fit (see Joreskog & Sorbom, 1985).
3. Nested models can be compared with one another by computing the difference in their χ^2 values ($\Delta\chi^2$) and degrees of freedom; this χ^2 difference is itself χ^2- distributed with degrees of freedom equal to the difference in degrees of freedom.
4. A more detailed summary of these results is available from the first author.

Table 1

Exploratory Factor Analytic Results for 3-Factor Structure (Sample)

Items	Factor 1	Factor 2	Factor 3
Factors			
1 Negative Attitudes			
4 Dissatisfaction		.59	
9 Suicidal Ideation		.55	
15 Work Inhibition		.52	
2 Pessimism		.49	
1 Sadness		.46	
10 Crying		.36	
12 Withdrawal		.34	
6 Punishment		.28	
17 Fatigue		.25	(.22)
21 Libido Loss		.15	
2 Performance Difficulty			
8 Self-accusation		.69	
3 Failure	(.23)	.57	
5 Guilt		.44	
7 Self-dislike	(.29)	.41	
14 Self-image		.38	
13 Indecisiveness		.25	
11 Irritability		.14	
3 Somatic Elements			
18 Appetite Loss			.46
19 Weight Loss			.42
16 Insomnia	(.25)		.40
20 Hypochondria			.36
Factor Correlations			
1	1.00		
2	.27	1.00	
3	.31	.57	

[a] Cross-loadings ≤ .20 are deleted for sake of clarity; those > .20 are parenthesized.

Table 2

Confirmatory Factor Analytic Results for 3-Factor Structure (Sample 2)

	Competing Model	χ^2	df	AGFI	TLI	RNI
0	Null Model	2374.23	210	---	---	---
1	EFA specification	436.53	187	.89	.87	.88
2	Model 1 with Item 21 loaded on F_3	413.96	187	.89	.88	.90
3	Model 2 with correlated errors between: Items 2 & 3 Items 7 & 14[a]	361.75	185	.91	.91	.92
4	Model 3 with: Item 17 loaded on F_3 Item 15 loaded on F_2[b]	343.64	185	.91	.92	.93
5	Model 4 with correlated error between Items 2 & 4	328.63	184	.91	.92	.93
6	Model 5 with Item 8 loaded on F_1	330.64	184	.91	.92	.93

[a] Correlated error parameters were each estimated in separately specified models.

[b] Modified factor loadings were each estimated in separately specified models.

Table 3

Results of Tests for Invariant Factorial Structure Across Samples 2 and 3

	Competing Model	χ^2	df	Model Comparison	$\Delta\chi^{2a}$	Δdf^a	p
1	Multigroup 3-factor model (no equality constraints)	690.97	368	---	---	---	---
2	All 1st-order factor loadings constrained equal	729.87	386	2 vs 1	38.90	18	<.01
3	All 1st-order factor loadings constrained equal except Items 12, 18, 21[b]	701.52	383	3 vs 1	10.55	15	NS
4	Model 3 with all 2nd-order factor loadings constrained equal	707.56	386	4 vs 3	6.04	3	NS

[a] $\Delta\chi^2$ represents the difference in χ^2 values, and Δdf, the difference in degrees of freedom.

Table 4

Comparative Summary of BDI Item-Factor Associations for English and French Adolescent Data

		Associated Factor	
	Item	English	French
1	Sadness	F1	F1
2	Pessimism	F1	F1
3	Failure	F1	F2
4	Dissatisfaction	F2	F1
5	Guilt	F1	F2
6	Punishment	F1	F1
7	Self-dislike	F1	F2
8	Self-accusation	F1	F1
9	Suicidal ideation	F1	F1
10	Crying	F1	F1
11	Irritability	F2	F2
12	Withdrawal	F2	F1
13	Indecisiveness	F2	F2
14	Self-image	F1	F2
15	Work Inhibition	F2	F2
16	Insomnia	F3	F3
17	Fatigue	F2	F3
18	Appetite Loss	F3	F3
19	Weight Loss	F3	F3
20	Hypochondria	F2	F3
21	Libido Loss	F3	F3

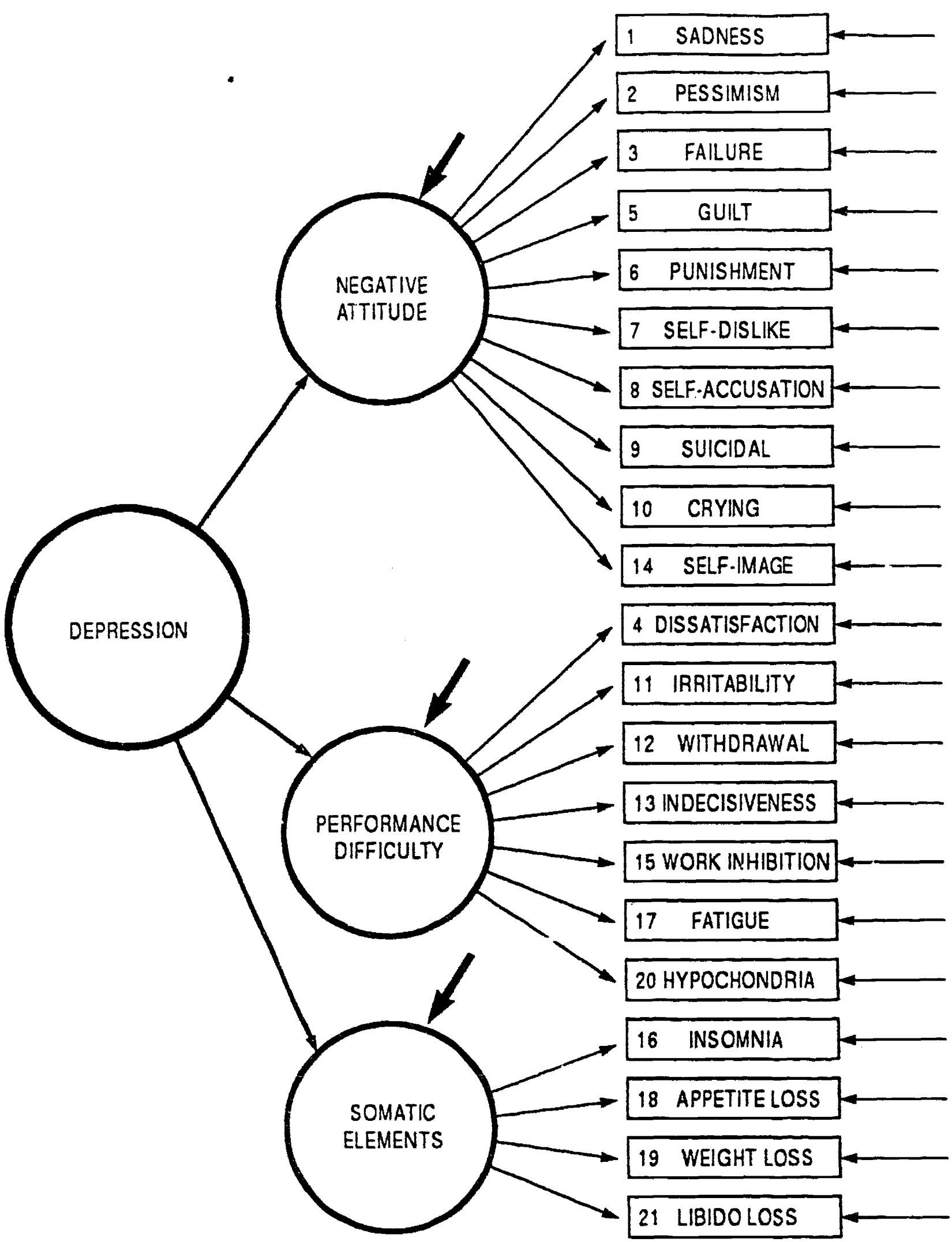
F1 = Negative Attitudes
F2 = Performance Difficulty
F3 = Somatic Elements

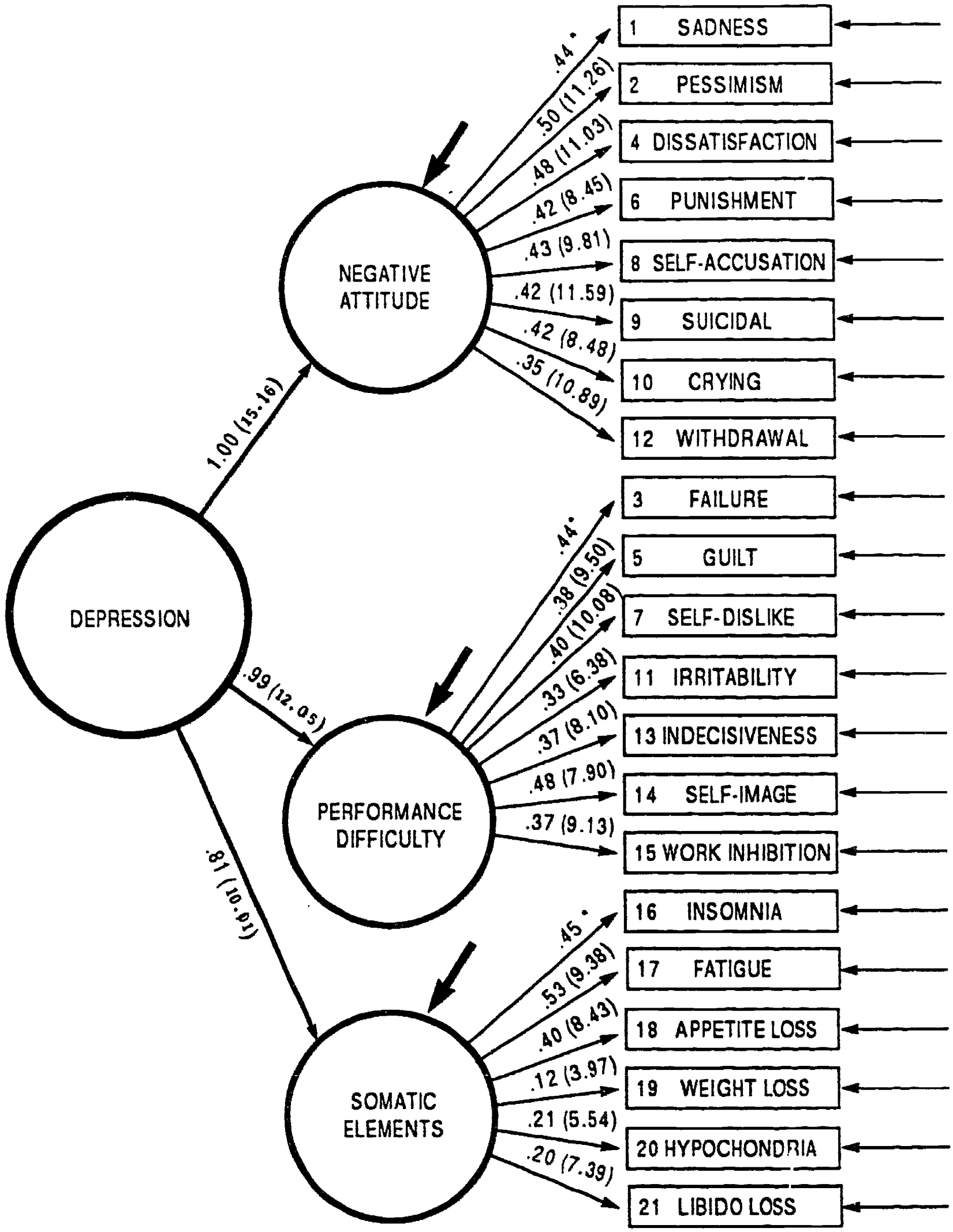
Figure Captions

Figure 1. Hypothesized 2nd-order Factorial Structure of the Beck Depression Inventory (English Version) for Nonclinical Adolescents (Byrne & Baron, 1990).

Figure 2. Standardized Estimates for 2nd-order Factorial Structure of the Beck Depression Inventory (French Version) for Nonclinical Adolescents. Parenthesized values represent critical ratios of estimates; values > 1.96 indicate statistical significance ($p < .05$). Values in boxes represent item numbers.

* denotes parameter fixed to 1.0 in the original solution for purposes of statistical identification.


DEPRESSION
NEGATIVE ATTITUDE
PERFORMANCE DIFFICULTY
SOMATIC ELEMENTS
1 SADNESS
2 PESSIMISM
3 FAILURE
5 GUILT
6 PUNISHMENT
7 SELF-DISLIKE
8 SELF-ACCUSATION
9 SUICIDAL
10 CRYING
14 SELF-IMAGE
4 DISSATISFACTION
11 IRRITABILITY
12 WITHDRAWAL
13 INDECISIVENESS
15 WORK INHIBITION
17 FATIGUE
20 HYPOCHONDRIA
16 INSOMNIA
18 APPETITE LOSS
19 WEIGHT LOSS
21 LIBIDO LOSS


DEPRESSION
1.00 (15.16)
NEGATIVE ATTITUDE
.99 (12.05)
PERFORMANCE DIFFICULTY
.81 (10.91)
SOMATIC ELEMENTS
.44*
.50 (11.26)
.48 (11.03)
.42 (8.45)
.43 (9.81)
.42 (11.59)
.42 (8.48)
.35 (10.89)
1 SADNESS
2 PESSIMISM
4 DISSATISFACTION
6 PUNISHMENT
8 SELF-ACCUSATION
9 SUICIDAL
10 CRYING
12 WITHDRAWAL
.44*
.38 (9.50)
.40 (10.08)
.33 (6.38)
.37 (8.10)
.48 (7.90)
.37 (9.13)
3 FAILURE
5 GUILT
7 SELF-DISLIKE
11 IRRITABILITY
13 INDECISIVENESS
14 SELF-IMAGE
15 WORK INHIBITION
.45*
.53 (9.38)
.40 (8.43)
.12 (3.97)
.21 (5.54)
.20 (7.39)
16 INSOMNIA
17 FATIGUE
18 APPETITE LOSS
19 WEIGHT LOSS
20 HYPOCHONDRIA
21 LIBIDO LOSS