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Construct Validation of the Self-Description Questionnaire II with a French Sample

Florence Guérin¹, Herbert W. Marsh², and Jean-Pierre Famose³

¹Université Paris XI, France, ²University of Western Sydney, Australia, ³Université Paris XI, France

Keywords: Adolescent self-concept, French validation, multidimensionality, hierarchy

Summary: This investigation is a French validation of the Self-Description Questionnaire (SDQ) II, an instrument derived from the Marsh and Shavelson model and designed to measure adolescent self-concept. Previous theoretical and methodological considerations in SDQ research provided guidelines for the instrument “within-construct” validity. 480 students completed the questionnaire. Reliability and confirmatory factor analyses were used to demonstrate support for the good psychometric properties, the well-defined 11 facets of the multidimensional self-concept, the two remarkably distinct higher order academic areas, and the weak hierarchical ordering. Third-order HCFAs models resulted in a hierarchical general self-concept modestly related to most nonacademic self-concepts and rather weakly to academic self-concepts. The present research strongly supports the multifaceted nature of self-concept, but cannot supply clear evidence for the usefulness of hierarchical representations of adolescent self-concept.

Self-concept research has developed considerably in recent decades. It is the objective product of W. James’s findings on self-consciousness (James, 1909), the models of intelligence proposed by British and American researchers such as Spearman, Thurstone, Guilford, or Cattell, and advances in the application of factor analysis and related statistical techniques. The enhancement of self-concept is the ultimate outcome in many disciplines such as educational, developmental, clinical, social, and sport psychology (Marsh & Hattie, 1996). Henceforth, the aim of the psychologist is to describe and explain the complex structure of the self in various environments, to predict a person’s behavior, to produce measures for intervention scores, and to relate self-concept to other constructs.

The Marsh/Shavelson Model

In the 1970s a great deal of criticism was formulated about the methodological shortcomings and the questionable quality of self-concept measurement instruments (Burns, 1979; Wells & Marwell, 1976; Wylie, 1974, 1979). Conducting their research in the education-
though they were consistent with Shavelson et al.’s assumption (1976) that self-concept was hierarchically ordered, these findings failed to demonstrate the strength of the hierarchy. While supporting most self-concept distinctive features assumed in the Shavelson et al. construct, Marsh was subsequently led to develop a different hierarchical self-concept structure. In this model the student’s “Verbal” and “Math” self-concepts were so distinct that the two constructs could not be collapsed into a single academic self-concept and had to be separated (Marsh & Shavelson, 1985). To provide a plausible explanation for that near-zero correlation, Marsh (1986) developed an internal/external (I/E) frame of reference model that proposed that students’ Math and Verbal self-concepts were formed on the basis of an external comparison (with other students) and an internal comparison (between his/her subject-specific domains). These two types of comparison could be expanded to most academic subjects (including PE or sports), and therefore illustrated the potential breadth of applicability of the I/E model (Marsh & Hattie, 1996). The SDQ self-concept research posits a General-self split into two academic self-concepts (Maths/Academic and Verbal/Academic), as well as two nonacademic self-concepts (Physical/Social) for preadolescents, and three nonacademic self-concepts (Physical, Social and Moral) for late adolescents.

To date, the hierarchy has been thoroughly tested on the SDQ I and III self-concept models but has not been explored on the SDQ II responses.

The goal of the present investigation is, first, to establish a reliable French version of the SDQ II and then to validate the construct presented in the revised model (Marsh & Shavelson, 1985), focusing exclusively on within-network studies. The internal structure of self-concept will be examined in order to provide support for its multidimensionality, to confirm the clear separation of the two higher-order academic self-concepts, and to test the hierarchical hypothesis that has previously been examined for young and late adolescents (Marsh, 1987; Marsh & Hocevar, 1985).

Methods

Sample

The sample consisted of 480 talented French students (264 males, 216 females) enrolled in grades 10 to 12; ages ranged from 15 to 17. The respondents attended a high-school specialized in sciences and tended to come from upper-middle-class families.

The SDQ II Instrument

The SDQ II (Marsh, 1990b) was developed in Australia for adolescents aged 12 to 17 years. This 102-item questionnaire yields 11 scale scores assessing seven nonacademic scales: Physical abilities (Pabl), Physical appearance (Appr), Opposite sex (Osex), Same sex (Ssex), Parents (Prnt), Honesty/Trustworthiness (Hnst), Emotional stability (Emot); three academic scales: Maths (Math), Verbal (Verb), General school (Schi); and one Global Self-Esteem scale (Estm). Its factor structure was validated in numerous prior studies on general populations (Marsh, 1990a,b; Marsh, Parada, & Ayotte, 2002; Marsh, Parker, & Barnes, 1985) as well as on gifted and talented populations (Marsh, Plucker, & Stocking, in press). The response format is based on a 6-point Likert scale. Reliability estimates for the 11 scales ranged from .83 to .91. Each a priori factor was identified through factor analysis. As to the relationships to the external criteria, the SDQ II was correlated with academic achievement indicators, age, gender, locus of control, self-attribution for success or failure, physical fitness, participation in sports, self-concept enhancement interventions and mental health. That previous research provided strong support for the construct validity of responses to the SDQ II. The instrument has already been tested in the United States (Marsh, 1994) and in Canada (Marsh et al., 2002), thus demonstrating its generalizability. Byrne (1996) introduced the SDQ II as the most validated adolescent self-concept measurement instrument with sound psychometric qualities.

Translation

The current study is the first validation of the SDQ II in France. We followed the different steps described in the translating approach for psychological tests developed by Vallerand and Halliwell (1983) and Vallières and Vallerand (1990). First, the original English anchor version was translated into French (the target language) by a first translator. This version was then backtranslated into English (the source language) by another translator. Both English versions proved globally similar from a semantic point of view, indicating a significant degree of equivalence between the anchor and the target versions. Second, the French version was evaluated by the researchers. The following steps tested the clarity of the items and minor cultural differences. Next, a committee formed by six translators and the researchers examined the French translation and developed a pilot version that was administered to 20 11th-grade students who were later interviewed individually on various aspects of the instrument. A final version was then constructed.
Statistical Analyses

The precision of a measurement includes two ordered types of analyses: the estimation of reliability and construct validity. This latter study can be broadly subdivided into internal and external validities (Cronbach & Meehl, 1955). In the course of construct validation, the researcher seeks empirical evidence in support of hypothesized relations both among facets of the same construct (within-network studies) and among different constructs or other external criteria (between-network studies). The present study focused solely on the within-construct analysis. The procedures we used were: confirmatory factor analysis (CFA), which identifies an a priori first-order factor structure; and hierarchical confirmatory factor analysis (HCFA), which tests the ability of higher-order factors to represent domain-specific self-concepts.

Estimation of Reliability

Reliability consists of estimating the internal consistency, stability, or both (Fleishman & Benson, 1987). Internal consistency was examined using the traditional coefficient α estimate of reliability.

Data Description

All questionnaires containing more than five missing responses were discarded. Missing data (0.25% of total responses) were handled by means of the SerialMean transformation method in the MVA procedure in SPSS 10.0. The SDQ II Test manual strongly advises the use of item pairs in factor analysis (Marsh, 1990b) as this increases the subjects-to-variables ratio and consequently results in more reliable variables (due to a smaller component of unique variance). In addition, factor loadings are less affected by the idiosyncracies of individual items, and this method proves most cost-efficient and time-saving.

Factor Analyses

Confirmatory Factor Analysis (CFA) and Hierarchical CFAs (HCFAs)

A detailed presentation of the conduct of the CFA and HCFAs is beyond the scope of the present investigation and is being developed elsewhere (e.g., Bollen, 1989; Jöreskog & Sörbom, 1999). Analyses were conducted with LISREL 8.30/Prelis 2 software (Jöreskog & Sörbom 2000), using the ML estimation method. LISREL provides numerous overall goodness-of-fit indices. Following Marsh, Balla, and McDonald (1988) and McDonald and Marsh (1990), the present research empha-

sized the RMSEA, TLI, and RNI to evaluate the goodness of fit. The χ² test statistics and the χ²/df ratio were also presented. The χ² statistics range between zero and infinity, with zero indicating a perfect fit and a large number indicating an important lack of fit. Moreover, it is quite sensitive to sample size and the number of variables and increases proportionally to these two elements. The TLI and RNI should vary between 0 and 1; values greater than .90 and .95 reflect an acceptable and an excellent fit, respectively. Acceptable values of the RMSEA range between .05 and .08. Browne and Cudeck (1993) suggest that a value of .05 indicates a close fit and values up to .08 represent reasonable errors of approximation in the population. It contains, as does the TLI, a penalty for lack of parsimony.

Whereas the SDQ II first-order model has been repeatedly replicated, its hierarchical structure has remained unexplored. That explains why our general framework for testing structural equation models was strictly confirmatory (SC) for the first-order factor structure, and somewhat in between the confirmatory and the alternative modeling (AM) approach for higher-order structure (Jöreskog & Sörbom, 1993). Model 1, a first-order model was initially posited to test the a priori structure of the 11 SDQ II factors. Examination of correlation patterns of the first-order model provided a strong basis for the development of higher-order model fitting. The rationale for fitting hierarchical models was firmly grounded in the Marsh/Shavelson model, which primarily supported the following assumptions:

1. The separation of two self-concept areas (academic and nonacademic domains as posited by Shavelson et al.),
2. The clear distinction between two uncorrelated academic factors,
3. The diversity of nonacademic higher-order factors and the complicated first-order cross-correlation pattern existing among the different nonacademic factors.

Following a parsimonious ordering, several competing hierarchical models were proposed to explain the relations among the first-order structure. First, Model 2, a single global factor structure, was posited to explain the relationships among the 11 lower-order factors. Model 3 tested the superiority of the academic and nonacademic areas hypothesis over the structure of Model 2. The next structure (Model 4) assessed, at the academic level, the superiority of the Marsh/Shavelson model (separation of two academic factors) over the Shavelson et al. model (one single academic factor). Lastly, we developed two alternative models proposing different higher-order factors the nonacademic area (Models 5 and 6) in order to test the higher-order model that would better represent the complex first-order factor covations. Complying
with the rule of parsimony, when two models exhibited an equivalent goodness-of-fit, the one requiring fewer parameters and having the larger degrees of freedom was preferred, provided it allowed a balance between statistical and substantive model fit.

Heywood Cases

An important source of concern and consternation in structural covariance modeling is the appearance of undesirable results such as negative variance estimates – Heywood cases – which necessarily yield improper solutions. These offending estimates typically mean that a model is unidentified or unstable. Several solutions have been discussed for handling Heywood cases (Bentler & Weeks, 1980; Rindskopf, 1983; Jöreskog & Sörbom, 1999; Marsh, 1987).

Explained Variance Ratio (EVR; Table 3)

An EVR is designed to provide a summary of the variance in first-order factors explained by higher-order factors. The smaller the residual variance, the better the lower-order factor is explained by a higher-order factor and conversely. The EVR is estimated as one minus the ratio of the residual variance to the factor variance; it varies between 0 and 1.0. Zero indicates that none of the variance is explained by higher-order factor, and one means that all of the variance is explained by higher-order factor (for details on EVR estimation, see Marsh 1987).

Results

Reliability

Reliability estimates for the SDQ II were good (Table 1). Internal consistency for the total self-concept score was .94. Coefficients $\alpha$ for the 11 facet scores varied from .85 for Honesty to .95 for Math (median = .91).

Factor Analyses

Confirmatory Factor Analysis (CFA)

Model 1 (Table 2) was a simple structure model in which each measured variable was assigned a non-zero loading on only the one factor it was supposed to measure. This restrictive a priori factor structure provided a good fit to the data (TLI = .925; Table 2). All factor loadings were statistically significant (from .63 to .96; Md = .83) and clearly identified the 11 components the SDQ II instrument was designed to measure. The most positive correlations involved were the following: first, the global “Esteem” factor that substantially correlated with “General school” (.58), “Appearance” (.60), “Opposite sex” (.50), “Emotion” (.47), then “General school,” which correlated with “Math” (.65) and “Verbal” (.43); and lastly, “Opposite sex” with “Appearance” (.55) and “Same sex” (.51). As predicted, the Academic “Math” and “Verbal” self-concepts were nearly uncorrelated with each other (–0.1). Correlations among the 11 factors, varying from –.08 to .65, were moderate and revealed remarkably distinct factors (Table 1). The evaluation of the parameter

### Table 1. Self-concept factor structure.

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Maths (Math), Verbal (Verb), General school (Schl), Physical ability (Pabl), Physical appearance (Appr), Opposite sex (Osex), Same sex (Ssex), Parents (Prnt), Honesty (Hnst), Emotion (Emot), Global self-esteem (Estm)
estimates, the well-defined 11 factors, the reliability estimates, and the ability of the a priori first-order model to fit the data provided good support for the multidimensionality of adolescent self-concept, and for the frequently reported need to separate Math and Verbal self-concepts. This finding confirmed the Marsh/Shavelson fundamental hypothesis of a clear separation between the two first-order facets and provided further support for the multidimensionality of the academic self-concept.

Hierarchical Factor Analyses (HCFAs)

Heywood cases were encountered in four higher-order models (models 3, 4, 5, 6; Figure 1). Improper solutions were probably due to an insufficient number of indicators per factor. They were solved by constraining first-order loadings to equality in the academic area (see Figure 1, note b). After elimination of the offending estimates, these models yielded acceptable fit to the data.

In Model 2, a single second-order factor explained the 11 first-order factors. Most of them loaded significantly on the General factor (with the exception of the Hones- tity factor: .231). The fit was barely acceptable (TLI = .898).

Model 3 was a two second-order factor model. It had a better fit than did Model 2 (TLI = .908; Table 2). EVRs showed a much better representation of the three academic facets than in the preceding model (Table 3).

Model 4 differed from Model 3 in that its academic area was divided into two second-order factors, Math/academic and Verbal/academic, as posited by Marsh and Shavelson (1985) and Marsh (1990c). The nonacademic area remained unchanged with the exception of the Esteem factor, which loaded directly on the third-order General self-concept factor because of its superordinate status. Moreover, the three second-order factors loaded on a third-order General self-concept factor (Figure 1). This model did better than Model 3 (TLI = .911); in addition, examination of EVRs showed a better representation of first-order facets than second-order factors. And among second-order factors, Verbal/academic was more poorly represented by a General self-concept factor than Math/academic.

Model 5 proposed the same academic structure as Model 4. Except for the Esteem factor loading directly on the General self-concept, the nonacademic area was divided into three second-order factors (Physical, Social, and Moral). All five higher-order factors loaded on a General third-order factor (Figure 1). This model was able to fit the data better than Model 4 (TLI = .916). EVRs revealed that first- and second-order factors were better represented by higher-order structure than in the preceding model.

Model 6 is different from Model 5 in that the Physical and Social second-order factors were collapsed into a single facet. Comparison of these two models (Table 2) showed, for Model 6, a slightly better $\chi^2$ and better goodness-of-fit indices (TLI = .917). EVRs suggested a nearly

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Note. RNI = Relative noncentrality index, TLI = Tucker-Lewis index, RMSEA = root mean square error of approximation. N = 480.
similar explained variance for the two models. Consistent with the rule of parsimony, Model 6, having one parameter less than Model 5 (115 parameters), and one more degree of freedom ($df = 1211$), was preferable to Model 5 as the best structure to explain responses to the SDQ II.

In summary, though not the best solution, Model 4, which was designed to explain the organization of academic facets, demonstrated its superiority over more parsimonious Models 2 and 3; it also provided support for the Marsh and Shavelson model (Marsh, 1990c). Models 5 and 6, explaining the structure of the nonacademic area, provided a reasonable improvement over Model 4.

Discussion

Previous SDQ research carried out within the Marsh/Shavelson theoretical framework posited the multidimensionality of preadolescent (SDQ I; Marsh & Hocevar, 1985), adolescents (SDQ II; Marsh, Parker & Barnes, 1985), and late adolescents (SDQ III; Marsh, 1987). The findings of the present investigation, based on responses by adolescents to the French SDQ II, substantiated the multifaceted nature of self-concept.

Prior SDQ research, based on responses by preadolescents and late adolescents, also posited a complicated...
and relatively weak hierarchical ordering. Our study confirmed this result and expanded this finding to adolescents as a new area of self-concept. It also provided a strong test of the generality of SDQ II results to a French population.

In the academic area, we supported the clear distinction between the two second-order academic facets proposed in the Marsh and Shavelson revision (Marsh, 1990c). In addition, in the present study, these two facets were not equally represented. General self-concept was better defined by Math/academic than by Verb/academic (Table 3). This could be explained as a typical educational setting effect (importance of Math in French high schools) reinforced by an even greater predominance of Math in this science-oriented high school. However, further research would be needed on this aspect.

In the nonacademic domain, the reason for favoring Model 6 over Model 5 stemmed from the study of their Physical and Social facets. In Model 5, Physical (Physical appearance, Physical ability) and Social (Same sex, Opposite sex) factors were distinct. Yet, correlations between Physical appearance and Opposite sex were higher than correlations among the Physical and among the Social facets. A similar feature had been found in SDQ I (Marsh, 1988), SDQ II (Marsh, Parker, & Barnes, 1985), and SDQ III (Marsh, 1987) research. Moreover, the correlation between Physical and Social factors (.477) was the highest among the second-order facets. All these reasons argued in favor of the single-Physical/Social factor that was tested in Model 6. It revealed a slightly better fit than Model 5. It also corresponded to the best fitting model proposed by Marsh and Hocevar in 1985 for preadolescents and was quite similar to the author’s second-best solution for late adolescents (Marsh, 1987). This choice of a single factor seemed intuitively consistent with an adolescent population.

The last second-order factor, Moral, in the nonacademic area was composed of first-order Parents, Honesty, and Emotion self-concepts (Table 2). The very poor correlation between Emotion and Honesty (.05; Table 1) was a definite weakness in this higher-order factor and contributed to the weakness of the hierarchical representation.

In Models 4 to 6, the first-order factor Esteem loaded on the General self-concept (the Esteem self-concept is an adaptation of the Rosenberg Self-Esteem Scale (1979) incorporated in all three SDQ instruments). It was hypothesized that Esteem, as a superordinate factor, would contribute directly to the hierarchical General self-concept. For that reason, overall correlations of Esteem self-concept among first-order factors, as well as with the General self-concept, were found to be the highest.

In summary, the present investigation demonstrates the existence of a clearly defined multidimensional structure of self-concept, which is the essential and recurrent finding in SDQ research. However, the negative evidence because much of the variance in many lower-order factors was not explained by higher-order factors, the generalized improper solutions found in Models 3, 4, 5, 6 – and hence, the need for so much constraining (especially in the academic facet) for solving the offending issue – did not argue in favor of a strong hierarchy. It seemed very clear that the best-fitting model was by far the CFA first-order model. Each of the HCFA models did significantly poorer than the first-order model that was the basis of comparison for each HCFA model, which argues against an overemphasis on the HCFA structure. In previous studies, similar results on the hierarchy of general self-concept led Marsh and colleagues to the conclusion that General self-concept was not a particularly useful construct (Marsh, Byrne, & Shavelson, 1992). In fact, it could not adequately reflect the diversity of specific self-facets. In a different age range, recent self-concept research on preschool children (SDQP) brought further support in favor of the first-order model (Marsh, Craven, & Debus, 1991, 1998; Marsh, Ellis, & Craven, 2002). Their results showed that self-concept hierarchy was so weak that it would have been useless to use a higher-order representation instead of a first-order structure. Moreover, in the SDQ academic area, it had been found that each self-concept domain was more highly correlated with external criteria relevant to its corresponding facet rather than with other self-concept domains (Marsh, 1993). These considerations strongly support the particular relevance of specific self-concept research in various areas: Academic (Marsh, 1990c; 1992; 1993), Physical (Marsh, Hey, Johnson, & Perry, 1997; Marsh, Richards, Johnson, Roche, & Tremayne, 1994), Social (Byrne, 1996) or, performing Arts (Vispoel, 1995), especially if researchers wish to understand, explain and predict the person’s specific behavior in order to help implement appropriate interventions.

References


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